

# **FINAL COUNTRY REPORT: ST. LUCIA**



**October 2009**

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*By*

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# St. Lucia

## Country Profile

Geographic coordinates	13° 53' N, 60° 58' W
Total area	616 sq km
Land area	606 sq km
Water area	10 sq km
Length of Coastline	166 km
Shelf Area	271 sq km
Territorial Sea	3,716 sq km
Claimed EEZ	11,483 sq km
Highest point (m)	950 m
Climate	tropical, moderated by northeast trade winds; dry season January to April, rainy season May to August
Natural hazards	hurricanes; volcanic activity
Population	160,267 (July 2009 est.)
Annual Population Growth Rate	0.416% (2009 est.)
Life Expectancy at birth	total population: 76.45 years
Languages	English (official), French patois
Ethnic Mix	black 82.5%, mixed 11.9%, East Indian 2.4%, other or unspecified 3.1% (2001 census)
Work force	79,700 (2007)
Unemployment	20% (2003 est.)
GDP (PPP)	\$1.774 billion (2008 est.)
GDP Growth rate	0.7% (2008 est.)
GDP per Capita (PPP)	\$11,100 (2008 est.)
Currency Unit	Eastern Caribbean dollar (XCD) US\$1 = 2.707
Area of Mangrove Forests	1 sq km
Percent of Mangrove Forests Protected	7%
Per Capita Food Supply from Fish/Fishery Products (2000)	37 kg/person
Exports	\$288 million (2006); bananas 41%, clothing, cocoa, vegetables, fruits, coconut oil

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

## 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
DOF	Department of Fisheries
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
GOSL	Government of St. Lucia
IHHN	Hypodermal Hematopoietic Necrosis
JICA	Japan International Co-operation Agency
MALFF	Ministry of Agriculture, Lands, Forestry and Fisheries,
MPA	Marine Protected Area
mt	Metric Ton
NAFCOOP	National Association of Fishermen's Co-operatives
OECS	Organisation of Eastern Caribbean States
SLFMC	St. Lucia Fish Market Corporation
TIP	Trip Interview Program
TSV	Taura Syndrome Virus
UNDP	United Nations Development Program

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# CHAPTER 1: INTRODUCTION



**Saint Lucia** is an island nation in the Windward Islands on the boundary between the Atlantic Ocean and the Caribbean Sea. Part of the Lesser Antilles, it is located north-northeast of Saint Vincent and the Grenadines, northwest of Barbados and south of Martinique. A chain of wooded mountains runs from north to south, and from them flow many streams into fertile valleys. It is a member of the Caribbean Community (CARICOM), the Organisation of Eastern Caribbean States (OECS), and the British Commonwealth of Nations.

## ***Description of Fisheries***

The fisheries of Saint Lucia are still considered artisanal in nature, with most of the catch being landed by fiberglass pirogues and wooden canoes (5-9 m) powered by outboard motors (40-115hp). The number of fiberglass pirogues is now on the increase and exceeds the number of wooden canoes. A small number of locally owned larger long-liners now operate in the industry. The Department of Fisheries (DOF) is encouraging improved fishing gear and methods, especially for the pelagic fishery.

Due to the very limited island shelf, catches are predominantly made up of migratory pelagics (dolphinfish, wahoo, tuna species and flyingfish), which comprise over 70% of total annual landings. Gears used mainly include manually operated trolling gear and longlines

The coastal pelagic fishery is particularly important to communities along the west coast of the island, where large schools of coastal pelagic species (including “jacks<sup>1</sup>”, ballyhoo and sardines)

<sup>1</sup> This grouping includes mainly small coastal pelagic of the genera *Selar* and *Decapterus*

tend to congregate at certain times of the year. These fish are captured using encircling nets (beach seine and gillnets) operated out of one or more canoes near to shore.

The nearshore fishery targets a variety of reef species; the catch can comprise some 40-60 finfish species, in addition to lobsters and octopuses. It mainly uses fish traps (wire mesh or bamboo hexagonal mesh Z-traps, locally known as "fish pots") that are raised by hand. This fishery occurs in reef and shelf areas, usually in depths of less than 50 m. Alternatively, bottom-set gillnets are becoming more common, and spear guns and handlines are also used. The vessels utilized include those used for pelagic fisheries, in addition to a number of smaller wooden vessels powered by smaller capacity engines. Most pot fishing occurs during the off-season for coastal pelagics (i.e. June to December yearly), although some landing sites, such as Gros Islet, Bannanes Bay, Anse la Raye, Canaries, Soufriere and Savannes Bay, tend to focus on this fishery throughout the year. The lobster fishery is a high-value fishery primarily targeted at an expanding tourism sector.

Other fisheries include a small fishery for queen conch and sea urchins, as well as a currently moderately developed deep slope and bank fishery that targets snapper and grouper species. A moratorium is in force for the turtle fishery, but this is currently under review.

Fish landings occur at seventeen (17) coastal communities, with the largest proportion of the catch being landed at the town of Vieux

Fort, the village of Dennery and the town of Gros Islet, with the first two sites receiving some 44% of the total annual landings. Table 1 below indicates the relative importance of landing sites in terms of their contribution to total catch<sup>2</sup>, and categorizes them as primary (1), secondary (2) or tertiary (3). Castries, as capital, is considered primary notwithstanding the relatively low level of landings when compared to the "top" three.

Recently the industry has undergone increased commercialization, although most of the technologies used can still be considered artisanal in nature (hand hauled gear; more than 95% of the fleet are open vessels less than 11 m long, powered by outboard engines). The trend has been towards larger, more stable open craft (i.e. fiberglass pirogues) and to a lesser extent, small longliners (11+ m) with inboard engines and using mechanized gear. In 2007 the number of registered fishing vessels was 721 and 2,232 fishers were registered as operating in the fisheries. 142 additional registrants are not active fishermen.



<sup>2</sup> Estimates of fish landing in 2009 were 1856.9 tons, valued in excess of EC\$ 24 million

Another recent change is that more fishers are investing in their own vessels rather than working as crew. This transition has largely been facilitated by a soft loan facility offered through the Saint Lucia Development Bank which has granted over EC\$3.5 million (US\$1.4 million) in small loans to the fishing sector.

The Government of Saint Lucia, with financial and technical assistance from the Governments of Canada and Japan, has invested substantially in fisheries infrastructure throughout the island.

Landing Sites	Relative Importance	Annual Landings	
		Tonnes	% of Total
Banannes	3	14.51	1.0
Castries	1	46.15	3.2
Dennery	1	306.98	21.3
Gros Islet	1	109.52	7.6
Micoud	2	83.3	5.8
Choiseul	2	65.27	4.5
Laborie	2	76.9	5.3
Soufriere	2	99.48	6.9
Vieux Fort	1	366.42	25.4
Others (Anse la Raye, Canaries, River Doree, Savannes Bay, Marisule, Monchy, Praslin, Roseau)	3	271.41	18.8
<b>TOTAL</b>		<b>1,440.03</b>	<b>99.8</b>

Source:DOF: 2006

The largest marketing facilities are operated by the Saint Lucia Fish Marketing Corporation, a statutory body set up to promote proper processing, cold storage and marketing of fish and fish products. Increased cold storage capacity now allows for local fish to remain available to the local population and rapidly expanding tourism market throughout the year. A major fisheries facility opened in 2000 at the main fish landing base of Vieux Fort and provides cold storage and processing facilities, a fish market, fishermen's facilities (lockers, a gear mending shed, fueling point and cooperative building) and a protected harbor for the area's expanding fleet. Fisheries complex facilities were also opened in Soufriere and Choiseul in 2003. In addition, another facility was built in Anse la Raye.

Table 2 indicates a discernable increase in the number of registered fishers in St. Lucia between 1997 and 2007. The landing sites with the most registered fishers were Vieux Fort, Castries and Dennery. Although the St. Lucia 1994 Fisheries regulations provide for the keeping of a register of fishermen [24(1)] it does not stipulate that all fishers must obtain a license in order to fish. Since registration began only after 1994, the increase in registered fishers could just reflect more fishers choosing to become registered, not an absolute increase in the number of fishers.

A similar trend was observed with the number of vessels (Table 3). The landing sites with the most registered vessels were Vieux Fort, Castries and Soufriere.



Table 2 Numbers of registered fishers by site 1997-2007

SITE	Year										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
ANSE LA RAYE	95	96	98	98	102	102	103	106	118	119	119
ANSE GER								2	2	2	2
BANANNES	63	68	68	76	79	83	85	86	92	96	99
CANARIES	83	83	84	84	89	90	90	92	91	94	97
CASTRIES	212	221	228	240	246	254	254	256	265	267	276
CHOISEUL	123	126	132	139	140	140	145	147	148	149	152
CUL DE SAC	1	1	1	1	1	1	1	1	1	1	1
DENNERY	209	216	225	235	243	248	253	257	277	280	290
GROS-ISLET	152	161	167	175	184	192	201	202	206	210	213
LABORIE	105	110	116	123	125	127	121	124	134	136	140
MARISULE	11	13	17	20	21	21	22	22	20	19	19
MICOUUD	161	179	188	199	205	210	213	205	206	214	219
MONCHY	14	14	14	14	14	14	14	14	14	14	14
PRASLIN	29	35	42	51	51	51	51	52	53	54	55
RIVER DOREE	24	24	25	25	26	26	26	26	26	26	26
ROSEAU	2	2	2	2	2	2	2	2	2	2	2
SAVANNES BAY	29	30	32	40	41	42	44	43	44	45	47
SOUFRIERE	146	149	151	154	155	156	158	159	164	165	168
VIEUX-FORT	246	271	287	329	369	378	380	385	404	418	435
<b>TOTAL</b>	<b>1705</b>	<b>1799</b>	<b>1877</b>	<b>2005</b>	<b>2093</b>	<b>2137</b>	<b>2163</b>	<b>2181</b>	<b>2267</b>	<b>2311</b>	<b>2374</b>

Table 3 Numbers of vessels registered by site 1997-2007

SITE	Year										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Anse La Raye	33	36	36	46	47	51	25	31	25	24	28
Banannes	37	39	41	46	53	59	36	35	37	39	39
Canaries	33	34	34	36	37	40	30	30	30	30	32
Castries	85	90	102	117	127	133	56	59	58	60	60
Cas-En-Bas	1	2	2	2	3	3					
Choiseul	50	52	56	67	69	72	45	45	49	51	53
Cul De Sac	3	3	3	3	3	3					
Dennery	43	49	60	69	83	88	59	63	68	67	72
Gros-Islet	59	63	68	74	84	93	48	49	51	52	51
Laborie	47	50	55	60	67	70	31	39	36	34	35
Marigot	6	8	10	10	10	11	8	11	11	10	10
Marisule	14	14	17	18	19	21	14	14	14	14	14
Micoud	25	27	30	35	37	40	23	26	25	27	28
Monchy	11	11	11	11	11	11					
Praslin	11	13	16	20	21	21	13	14	13	11	13
River Doree	16	18	18	19	19	20	7	7	7	5	5
Roseau	10	10	10	10	10	10	2	2	2	2	2
Savannes Bay	11	12	16	18	19	20	15	16	17	15	18
Soufriere	105	108	111	122	131	135	107	111	117	116	119
Vieux-Fort	104	114	131	143	158	177	150	117	120	133	142
Total	704	753	827	926	1008	1078	669	669	680	690	721

There are eight (8) fishermen's co-operatives in St. Lucia: seven (7) on the west coast and one (1) on the east. They are:

- Gros Islet Fishermen's Co-operative (78)\*
- Castries Fishermen's Co-operative (167)\*
- Dennery Fishermen's Co-operative (113: East Coast)\*
- Goodwill Fishermen's Co-operative (215: Vieux Fort)
- Laborie Fishers and Consumers Co-operative (30)
- Soufriere Fishermen's Co-operative (95)\*
- Choiseul Fishermen's Co-operative (91)\*
- Anse-la-Raye/Canaries Fishermen's Co-operative (93)\*

Numbers of registered members are parenthesized in the list above, with the majority being boat-owners<sup>3</sup>. Attempts are being made at present to revive the recently defunct Micoud fishermen's cooperatives. There are no fishers' organizations in St. Lucia that are not-co-operatives. One can see from tables 2 and 3 that the co-operatives are located in communities where there are relatively large numbers of registered fishers and boats.

Fishers' cooperatives in St. Lucia were developed for the administration of duty free refunds on fuel and other concessions given to fishers by the Government. As a result only boat owners were attracted to forming such organizations since there was no incentive for other fishers, such as non-boat owners, to get involved. Murray and d'Auvergne (1994) noted that the relationship between boat ownership and whether or not a fisherman is a member of a co-operative was based on the fact that, up to that time, the major benefit provided to members of fishermen's co-operatives was the duty refund on fuel used for fishing. Since the boat owner is responsible for the purchase of fuel, he is entitled to the full refund. Other incentives to the industry such as rebates on the import duty on fishing gear, given to co-operative members, also accrue to the boat owner. The average, non-boat-owning fisherman, therefore, does not see the co-operative as being able to provide him with any real benefits. Both Gardner (1975 cited by Murray and d'Auvergne, 1994) and Mc.Goodwin (1984 cited by Murray and d'Auvergne, 1994) noted that the reasons for non-involvement in co-operatives include a misapprehension that co-operatives are solely for boat owners. They had also both suggested (*ibid.*) that participation by non-boat-owning fishermen would continue to be minimal until the relevant co-operatives are more effectively run. Little has changed in these regards in the last decade and a half; even at this time, the fishermen's co-operative movement still needs to be developed to enhance the well-being of all fishermen whether or not they are boat owners.

All the fishermen's co-operatives sell fishing gear, which is a million dollar business; and all (except Anse-la-Raye) operate gas stations. Only a small minority of fishermen join the co-operatives; they have been considered to become something of an "old boys' network". The Co-operative department of the St. Lucia government focuses on credit unions, leaving fishing co-operatives more-or-less unsupervised, except to the extent that DOF monitors them.

In 1978 all the fishing co-operatives got together and formed the National Association of Fishing Co-operatives (NAFCOOP), with a board comprised of representatives of each of the parent bodies. NAFCOOP was expected to represent the interests of the co-operatives to the government, and the government runs subsidies to the fisheries sector through them. The co-operatives receive 100% duty exemption on imports of fishing gear, while private individuals only get 60% exemption. Problems arose when persons other than fishers who also used wire seemed to be benefiting from the scheme, and operations were not closely monitored. NAFCOOP became defunct, and has recently been revived with assistance from a CRFM/CTA

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<sup>3</sup> source: Wayne Barthelmy, Department of Cooperatives, pers. comm. to PAM, September 2010  
Final Country Report for St. Lucia – Formulation of a Master Plan on Sustainable Use of Fisheries Resources for Coastal Community Development

project geared to develop the institutional capacities of fisher folk organizations at the regional, national and community levels. The co-operatives used to order in bulk and distribute, but now each orders on its own. Cooperatives marked in the list above with an asterisk (\*) are part of the recently formed Saint Lucia Fisher Folk Cooperative Society, which has replaced what was previously NAFCOOP.

### ***The Contribution of Fisheries to the St. Lucian Economy***

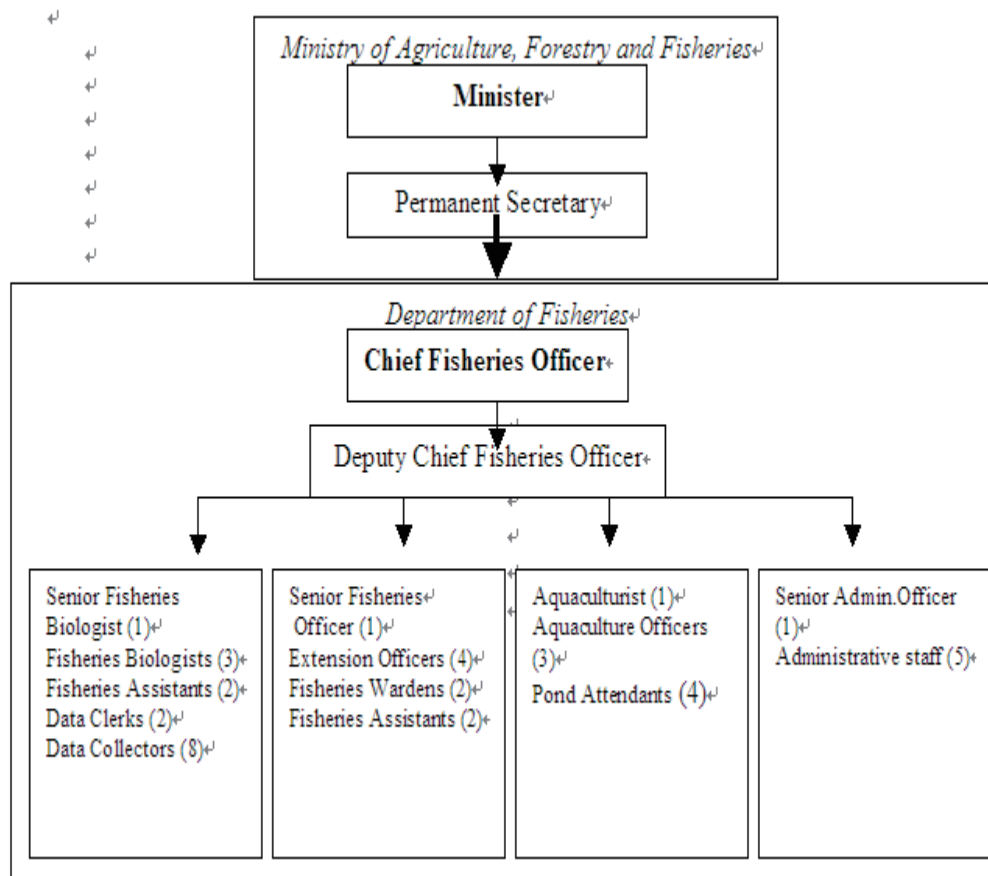
The Fisheries sector is a relatively small contributor to the economy of St. Lucia. In 2009, the gross value of fisheries output (i.e. ex-vessel value) was estimated to be EC\$12.4 million, or approximately 0.9% of the total 2009 GDP (EC\$1373 million) of the country (Source ECCB National Accounts Statistics 2009). However, such estimations underestimate overall contributions to the economy which result from value-added processing and ancillary services. Therefore, the overall contribution to the economy is likely far greater (George, 2004).

A 1993 study (George, 1994, cited in Murray 1994) indicated that 73% of St. Lucian fishermen were full-time, DOF data suggests that on average 57.2% of fishermen registered between 2005 and 2009 were full time fishermen. It had been suggested (Murray, *et al.*, 1992) that most of the part-time fishermen, when not employed in the fishing industry, were involved in the banana industry. Tabor (1990) suggested that, in fact, 100% of part-time fishermen have farming as their employment alternative. Vaughn Charles (pers. comm., 1990) had noted that at the two major commercial ports of Castries and Vieux Fort, part-time fishermen also take employment as stevedores. Most of this alternate employment takes place, for most part-time fishermen, during the "low" or "snapper" fishing season, at which time the frequency of fishing excursions decreases. Thus the fisheries sector provides employment for a significant number of persons, and also has linkages with other economic sectors.

The lack of occupational mobility observed in 1984 (Mc. Goodwin, 1984 cited in Murray and d'Auvergne, 1994), 1989 (Murray and d'Auvergne, 1994), and 1993 (George, 1994 cited in Murray and d'Auvergne, 1994) can be viewed in light of the suggestion by Panayotou (1982) that fishermen will stay in a fishery as long as they earn an income at least as high as the opportunity cost of their labour or capital. The fact that by 1989 the average fishermen had been in this occupation for 22 years ((Murray and d'Auvergne, 1994), could be the result of long isolation, low formal education, advanced age, preference for the life-style, cultural mores, frozen assets, indebtedness, or simply the lack of knowledge and opportunities (*ibid.*). The lack of mobility of the modal age group for fishermen between 2005 and 2007, begs the question whether this trend has not changed significantly. It was suggested over fifteen years ago ((Murray and d'Auvergne, 1994) that the consequence of this immobility is that fishermen may be remaining in the occupation even though they are earning less than their opportunity costs, i.e. the opportunity cost of fishing may, effectively, be considered to be zero. This appears (at least on the surface) not to have changed, hence, reiterating the importance of the role played by the fisheries as a provider of employment, notwithstanding the apparently low level of contribution to national GDP.

### **THE ADMINISTRATION OF FISHERIES IN ST. LUCIA**

The St. Lucia DOF, a unit of the Ministry of Agriculture, Lands, Forestry and Fisheries (MALFF), oversees the fishing sector. DOF was originally established as a Fisheries Division within MALFF some (45) years ago and at that time consisted of only one (1) male staff member. Sixteen (16) years later, the Division developed into the Fisheries Management Unit and by the mid 1980's, it was transformed into DOF. An organogram of DOF is shown below.



The primary mission of DOF is to develop the fishing industry and ensure its sustainability by promoting increased production of marine and aquaculture products for self-sufficiency.

DOF, at present, consists of four units:

- The Resource Management Unit, which focuses on
  - implementation of management actions for selected resources and fisheries as outlined in the Fisheries Management Plan
  - administering a variety of licenses and permits legally required under the fisheries legislation
  - data collection on fish landings, maintenance of accurate databases and distribution of related information to the public
- The Extension Unit focuses on
  - dissemination of information to the fishing and coastal communities on various aspects of fisheries management, fisheries polices and procedures
  - improvement of fishing technology and methods
  - assisting with the resolution of conflict among coastal users, especially where this affects fishers
- The Aquaculture Unit works towards the promotion of marine and freshwater aquaculture as an alternative source of fish protein for the domestic market.

- The Administrative Unit is essential to the proper functioning of the Department by providing an array of services including the issuance of letters of recommendation for registration of fishers, the processing of import licenses, fuel duty refunds from fishermen's co-operatives and other concessions to the fishing communities.

Currently the laws that give DOF its mandate (directive) are the Fisheries Act No. 10 of 1984 and the Fisheries Regulations No. 9 of 1994. In addition, the work program of the Department is guided by a Fisheries Management Plan (FMP), which, among other things, seeks to facilitate preservation of fragile ecosystems and habitats, sustainable use of fishery resources, and restoration of depleted resources.

From the historical standpoint, the first official fisheries legislation in Saint Lucia was the Turtle and Fish Protection Ordinance Cap. 45 of 1911, which was replaced by the Turtle, Lobster and Fish Protection Act No. 13 of 1971. The latter was in turn replaced by the *Fisheries Act No. 10 of 1984*. The Fisheries (Turtle, Lobster and Fish Protection) Regulations No. 67 of 1987 were then established, which were replaced by the *Fisheries Regulations No. 9 of 1994*. The *Fisheries Act (No. 10 of 1984) and Regulations (No. 9 of 1994)*, which are based on the OECS harmonized legislation, cover the establishment of a fisheries advisory committee, fisheries access agreements, local and foreign fishing licensing, fish processing establishments, fisheries research, fisheries enforcement and the registration of fishing vessels. This Act also specifies conservation measures such as prohibiting the use of any explosive, poison or other noxious substance for the purpose of killing, stunning, disabling, or catching fish; close seasons, gear restrictions and creation of marine reserves. It gives the Minister responsible for fisheries the authority to create new regulations for the management of fisheries as and when necessary.

In 2001, technical assistance was provided by the United Nations Food and Agricultural Organisation to review the existing legislation to take into account more recent international fisheries agreements and the national requirements for fisheries management and development. A number of consultations were held with stakeholders and a proposed new Fisheries Act and Fisheries Regulations were developed. The draft Act and Regulations are with the Attorney General in their final stages.

Some of the management measures currently supported by fisheries legislation to ensure sustainability of the island's fishery resources include:

- License and permit systems (which regulate access to fishery resources)
- Marine reserves (no 'extractive' activities permitted in these areas)
- Fishing priority areas (fishers have priority over all other users in these areas)
- Closed seasons for many fisheries, such as lobster and sea urchins (which protect species during vulnerable times such as breeding seasons)
- Size limits (these ensure the protection of juvenile/young species)
- Protection of breeding species (which ensures continued input of new individuals into the fishery)
- Gear restrictions such as regulation of mesh sizes (which allows juveniles to escape)

### **Enforcement of Regulations**

### ***Agencies responsible for the Enforcement of Fisheries Regulations***

- DOF: 2 fisheries wardens are employed to enforce regulations on land and at sea;
- The Marine Police Unit of the “Royal St. Lucia Police Force.”

### ***Level of enforcement***

- Fair and inadequate in general.
- *Problems:*
  - Financial resource limitations: high cost of fuel is one of the most important constraints;
  - Human resource limitations;
  - Regulating fisheries is not a high level priority for the Police force: more time and resources devoted toward enforcing drug laws;
  - High turnover rate within the police force: new officers are coming into the enforcement system, but without adequate training.
  - Collaboration between countries in term of regulating fishing activities are project-oriented; there is urgent need for developing long term and more sustainable collaboration.

### ***Level of compliance***

- There is no information available on the level of compliance;
- Illegal fishing by foreign vessels in St. Lucia waters is highly problematic: in general there is little knowledge on the level of “Illegal Unreported and Unregulated Fishing” (i.e. IUUF) within the St. Lucia EEZ.

### ***Needs in training and funding***

- Funds to improve collaboration between countries for enforcing fishing regulations and reducing illegal fishing;
- Funds to improve knowledge on the level of illegal fishing in St. Lucian waters (i.e. IUUF).
- Funds to train new police officers who are coming into the enforcement system.

Against the backdrop of the administrative structures outlined above, a number of challenges that face the fisheries sector:

- The extent of the Exclusive Economic Zone of Saint Lucia is limited by the close proximity of Saint Vincent to the south, Martinique to the north, Barbados to the east and the Venezuelan territory to the west. This, in turn, is considered as limiting the resources available to national users. At the same time, Saint Lucia lacks the resources to ensure continued surveillance of the island’s fishing zone, facilitating some illegal, un-regulated and unreported foreign, as well as local, fishing activities.
- The continued threat of land based sources of pollution, such as sedimentation and untreated liquid waste, especially after heavy rainfall, is negatively impacting much of Saint Lucia’s coastal fisheries, destroying habitats such as coral reefs and sea grass beds. This is one of the island’s biggest challenges, as it relates to maintenance of near shore resources, and ensuring continued benefits from these resources. To overcome these challenges, it will take a concerted effort at integrated coastal zone management, giving special consideration to the fact that Saint Lucia is a small island and much of what is done inland impacts on near shore resources in a relatively short space of time.

- The insufficiency and inadequacy of resources, whether human or financial, hampers the Department's ability to conduct appropriate research and to collect data on a regular basis. Currently, notwithstanding the work done during the annual CRFM Scientific meetings, there is insufficient information on the condition of many fisheries resources, the impacts of pressures acting on them, and their response to management interventions, to effectively guide management authorities and decision makers.

Ultimately, effective management of fisheries resources entails achieving satisfactory benefits (e.g. food security, biodiversity conservation, and economic and social benefits) for both present and future generations - a goal that Saint Lucia, along with the rest of the world, is trying desperately to achieve.



## CHAPTER 2: COMMUNITY-BASED FISHERIES MANAGEMENT COMPONENT

### 2.1 Coastal Community Characteristics

Most of the population of the island State of St. Lucia live on or near the coast. The major coastal settlements with their populations as measured by the 2001 Population Census are:

**TABLE 4:  
POPULATIONS OF THE MAIN COASTAL SETTLEMENTS,  
ST. LUCIA, 2001**

SETTLEMENT	QUARTER	MALE	FEMALE	TOTAL
Banannes	Castries	9	4	13
Castries	Castries	29,405	31,237	60,642
Dennerly	Dennerly	6,277	6,490	12,767
Gros Islet	Gros Islet	8,402	9,239	17,641
Micoud	Micoud	8,314	8,481	16,795
Choiseul	Choiseul	3,082	3,171	6,253
Laborie	Laborie	3,952	4,032	7,984
Soufriere	Soufriere	3,676	3,652	7,328
Vieux Fort	Vieux Fort	8,118	8,215	16,333
Anse la Raye	Anse la Raye	3,295	3,200	6,495
Canaries	Canaries	963	942	1,906
River Doree	Choiseul	56	63	119
Savannes Bay <sup>4</sup>	Micoud	28	26	54
Marisule	Gros Islet	759	826	1,585
Monchy <sup>5</sup>	Gros Islet	269	319	588
Praslin	Micoud	150	158	308
Roseau	Castries	225	256	481

*Source: St. Lucia 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<sup>6</sup>, the importance of fishing to the local economy becomes apparent.

### 2.2 Policy, Legislation, and Supporting Institutional Arrangements POLICY

In September 2006 the draft **Plan for Managing the Marine Fisheries of St. Lucia** received its latest revision; and serves the same function. Two years later in August 2008, a draft **Strategic Plan 2008-2013** was prepared under the heading “*Sustainability of our Fisheries Sector*”.

<sup>4</sup> The 2001 census cites Savannes Bay as being in Micoud district

<sup>5</sup> Only figures presumed to relate to Monchy “proper” have been included here; the 2001 census refers to 17 communities within Monchy

<sup>6</sup> Each boat may have as many as four or five crew members, and each boat may supply three or more fish vendors; and each player in the industry may support two or three other family members.

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The seven (7) **Goals of Fisheries Management** outlined in the 2006 **Plan for Managing the Marine Fisheries of St. Lucia** are:

## Goals of Fisheries Management

The Goals for fisheries management are:

To contribute to the attainment of self-sufficiency and food security.

To sustainably optimise the net incomes of the fishers and the communities involved in fisheries, and related economic activities.

To sustainably optimise employment opportunities for those dependent on fisheries and aquaculture for their livelihoods.

To maintain or restore populations of marine and freshwater species at levels that can produce optimum sustainable yields.

To preserve rare or fragile ecosystems, as well as habitats and other ecologically sensitive areas, especially mangrove forests, seagrass beds, reefs and other spawning and nursery areas.

To sustainably optimise the amount of fish protein available for domestic consumption.

To improve on fisheries infrastructure and promote the use of appropriate fishing technologies with a view to sustainably optimise catch.

*Source: 2006 Plan for Managing the Marine Fisheries of St. Lucia*

The third goal of fisheries management is to optimize employment in the sector, while the second is to optimize their incomes; these two goals may be mutually exclusive, for economic efficiency will usually require “right-sizing” in the sector, which may require a reduction in the number of fishers. The sixth goal is to optimize the catch, which means to optimize the fishing effort, also requiring a reduction in the number of fishers. Some of these goals of fisheries management are conflicting but, while the document does not specifically speak to this, it is recognized that the management process would have to include determining the extent of trade-off between these goals and the resolution of and adherent conflicts. It is to be noted that participation in fisheries management is not a stated goal.

The 2006 FMP outlines the following principles which will guide the attainment of the goals:

## Guiding Principles

In pursuance of the policy and goals, it has been determined that fisheries managers and resource users will be guided by the following principles:

### ***Management and Conservation***

Ensuring effective conservation and management of the living aquatic resources.

Ensuring the conservation of target species, but also of species belonging to the same ecosystem or associated with or dependent upon the target species.

Ensuring that fishing effort is commensurate with the productive capacity of the fishery resources and their sustainable utilization.

Encouraging bilateral and multilateral cooperation in research, as appropriate, in recognition of the transboundary nature of many aquatic ecosystems.

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.

Cooperating at subregional, 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.

### ***Decision-making***

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.

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.

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.

Ensuring that decision making processes are transparent and achieve timely solutions to urgent matters.

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.

### ***Technology***

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.

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.

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.

### ***Other Related Principles***

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.

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.

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.

Promoting the awareness of responsible fisheries through education and training.

protecting the rights of fishers and fish workers, 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.

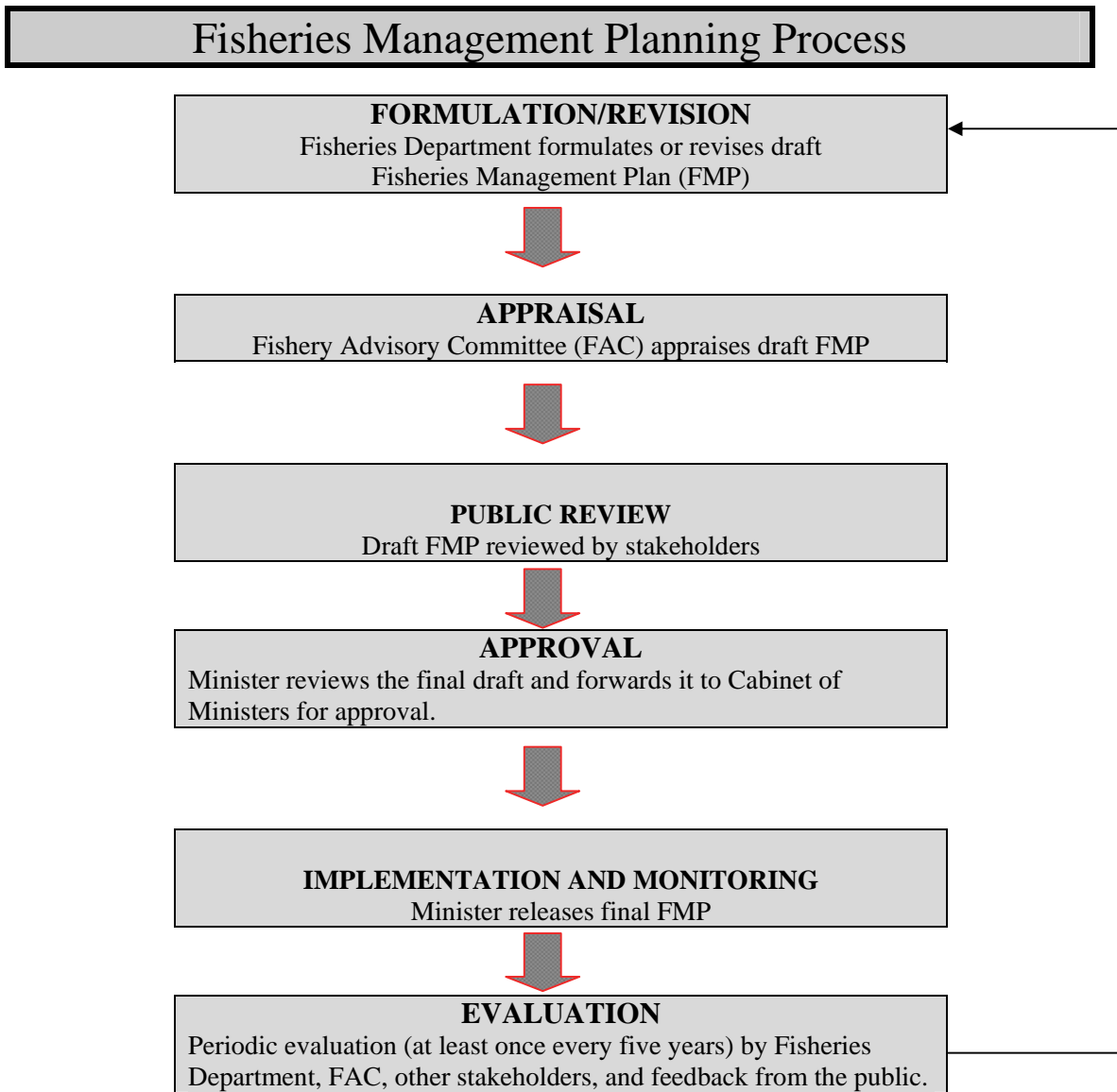
Considering aquaculture, including culture-based fisheries, as a means to promote diversification of income and diet.

***Source: 2006 Plan for Managing the Marine Fisheries of St. Lucia***

Absent is any stated principle of participation or collaboration or co-management of the fisheries resources. The only specific reference to resource-users is in the section headed "*Other Related Principles*" where they are to receive education and training, and where their rights to access to traditional fishing grounds are to be protected. However it is considered by some to be implicit in

the first principle under decision making which refers to “taking into account traditional knowledge of the resources”.

The 2006 FMP describes the process of fisheries management planning with the diagram below, which includes stakeholder consultation in several places. It is suggested that the exposition of goals and principles inadvertently omitted references to participation because they were taken for granted, especially given the stated composition of the Fisheries Advisory Committee.



*Source: 2006 Plan for Managing the Marine Fisheries of St. Lucia*

The planning process diagram above indicates that there will be an opportunity for “stakeholders” to review the draft FMP at the same time as other members of the public before it goes to the Minister for approval. These stakeholders will have the same opportunity during the process of evaluation. The fishers may justifiably feel that because of their special position and involvement they should have their own opportunity to give their comments.

The stakeholders are always responding to drafts prepared by DOF. Even the FAC on which delegates from fishers’ organizations sit, responds to drafts prepared by DOF. Notwithstanding Final Country Report for St. Lucia – Formulation of a Master Plan on Sustainable Use of Fisheries Resources for Coastal Community Development

that DOF can be seen as carrying out the legal mandate to prepare the Draft FMP and then undertaking a process of consultations to review and obtain stakeholder input into the draft document prior to approval, an improvement over the current approach would be to involve the stakeholders in the drafting process itself. This would provide more opportunities for stakeholder involvement and input.

The **2006 draft FMP** contains detailed fishery-specific management plans. Using the “Shallow Shelf and Reef Fishery” management plan as an example, one management strategy proposed is “*Identify the stakeholders in the Fishery and promote participatory management*”. The role for the stakeholders mentioned here is “*capability of the fishers’ organizations to sustain their economic activities*” and “*advocacy*” (i.e. to “*represent their members at various fora in the area of fisheries management and development*”), not to actually do fisheries management itself. This approach is replicated in other fishery-specific management plans. In the section on the “Large Pelagic Fishery” the proposed management strategy is to “*Collaborate with fishers at all levels (local and regional) to manage these shared resources*”. Here, empowerment of fishers is associated with their “*awareness of issues regarding the fishery*”. It is true that, in a sense, “*knowledge is power*”, but a much more meaningful empowerment of fishers and fishers’ associations comes when they meaningfully participate in the management of the fisheries resources upon which their livelihoods depend.

In summary, the 2006 draft FMP does not pay sufficient attention to the involvement of fishers, fisher organizations, fishing communities and other stakeholders in fisheries management planning, or implementation or enforcement. Hopefully the activities of this JICA-CRFM project will see advances in this area.

The draft **Strategic Plan 2008-2013** for DOF in St. Lucia prepared more recently than the 2006 FMP contains much more participatory language. In the introduction the document states that sustainability of the sector provides a framework for “close collaboration with all key private and public sector stakeholder groups” The planning process is said to have included “a series of consultations ... with various individuals and groups from the public, private and community organizations that have an interest in DOF and the wider fisheries sector ... (as well as) ... face to face interviews and discussions ... with a sample of all key stakeholders considered to have some level of influence in the implementation of the Strategic Plan”

The values and guiding principles expressed in the **2008-2013 Strategic Plan** includes a commitment to “working closely with all stakeholders in a fair and respectable manner for the sustainable use of the fishery resources and the advancement of the fisheries sector” and goes on to note that “during the strategic planning process, the staff of DOF, in collaboration with key stakeholder groups, identified a number of strategic issues confronting the Department”. The objectives under the Programme Goal referred to here are:

- PG 3.1 To design and implement an appropriate public education and awareness programme;
- PG 3.2 To provide an effective means of communicating relevant information to the clientele.

## **LEGISLATION**

With respect to community involvement in fisheries management the **1984 Fisheries Act** calls for the Chief Fisheries Officer to (1) prepare and keep under review a Fisheries Management and Development Plan and (2) consult with the local fishermen, local authorities, other persons affected by the fishery plan and with any Fishery Advisory Committee appointed by the Minister

to advise on the management and development of fisheries. Stakeholder participation in management can also be realised if the Minister designates an area as a local fisheries management area and consequently designates a “local authority, fishermen’s co-operative or fishermen’s association or appropriate body representing fishermen in the area as the Local Management Authority for that area“ Under this scenario the Local Management Authority is required to “make by-laws regulating the conduct of fishing operations in the designated area” for subsequent approval of the Minister. These provisions give local fishers’ organizations real power, not just the right to be consulted. These provisions are not being acted upon, except indirectly within The Soufriere Marine Management Area (SMMA).

The **St. Lucia Fisheries Regulations 1994** explain the procedure for appointment of a Fisheries Advisory Committee (FAC), and its composition. The 1987 regulations go on to describe the functions of the FAC. At present there is no FAC in St. Lucia, and there is little or no consultation with fishers on matters such as fees. There is no mechanism for such consultation, and none is contemplated; none is mentioned either in the **2006 draft FMP** or the **2008-2013 Strategic Plan**.

The new St. Lucia Fisheries Regulations, which are in draft, propose additional members on the FAC; the number of artisanal fisher representatives remains the same although one now comes from their umbrella association. The fish marketing sector is now represented, as well as sports fishermen and water-based tourism interests. Section 24 of the **St. Lucia Fisheries Regulations 1994** provides that the names of fishermen who “*request in writing or in person that his name be registered as a local fisherman*” be entered in a register, but it does not make it a requirement. The new draft St. Lucia Fisheries Regulations propose to make registration compulsory for fishers (now called “commercial fishermen. In addition a new category of commercial fisherman has been created, called a “trainee commercial fisherman” who has to undergo training before he can become a “commercial fisherman”. This will raise the competence level of fishers, and make it harder for someone to become registered and enter the fishery.

The Tenth Schedule in the **St. Lucia Fisheries Regulations 1994** lists the designated fish landing areas in St. Lucia without further qualification. The regulations state (reg. 23) that “no person shall haul up or berth any fishing vessel in any area except in a designated landing area...” The new St. Lucia Fisheries Regulations, which are in draft, similarly proposes to limit the places where fishing vessels may berth

#### **Other fisheries-related legislation:**

- *Forest, Soil and Water Conservation Ordinance* (1945): controls use of mangroves.
- *Crown Lands Ordinance* (1946): established the Crown Land Committee to review and make recommendations on the allocations/use of crown lands.
- *The Minerals Vesting Act* (1966): deals with the exploitation of minerals.
- *Land Development (Interim) Control Act* (1971): established a Development Control Authority to review and determine development plans.
- *Fishing Industry (Assistance) Act No. 33 of 1972 and Fishing Industry (Assistance) Regulations No. 25 of 1973*: provides for the granting of assistance to the fishing industry.
- *Pesticides Control Act* (1975): controls use of pesticides.
- *Public Health Act* (1975) *and Regulations*: provides regulatory oversight for sewage, industrial and solid waste disposal.
- *Saint Lucia National Trust Act of 1975*: deals with the preservation of areas of natural beauty/ historic interest, including submarine areas.
- *Wildlife Conservation Act* (1980) : deals with the control of protected species.
- *Tourism Industry Development Act* (1981): promotes tourism development.
- *Water and Sewage Authority Act* (1984): regulates sewage treatment and disposal.

- *The Maritimes Areas Act No. 6 of 1984*: addresses some aspects of marine pollution.
- *Solid Waste Management Authority Act (1996)*: makes provision for a Solid Waste Management Authority and details their function.
- *National Conservation Act (1999)*: controls, maintains and develops beaches and protected areas.
- *Oil in Navigable Water Act (cap 91)*: covers some aspects of oil pollution within the marine environment.
- *Fisheries (Snorkelling Licence) Regulations No. 223 of 2000*: regulates commercialised snorkelling activities.

## **SUPPORTING INSTITUTIONAL ARRANGEMENTS**

The Extension Unit comprises four Extension Officers and two Wardens who provide extension services to fishers. These services include, but are not limited to the following:

- Providing relevant training to fishermen and members of the fishing community, including training in safety at sea, navigation and seamanship;
- Assisting in the supervision and monitoring of statistics collectors;
- Serves as the main liaison between the fishermen and the Department;
- Liaising with and assists relevant enforcement officers with regard to compliance with the fisheries laws and regulations;
- Liaising with Fishermen's Co-operatives;
- Assisting fishermen and fishing communities in disaster preparedness;
- Undertaking/assisting with public education activities with fishers, fishing communities, schools, resource users and other community groups;
- Assisting in the maintenance of the Department's vessels and fishing equipment.

While the concept of participation has been embraced by the **1984 St. Lucia Fisheries Act** and **St. Lucia Fisheries Regulations 1994**, its implementation lags far behind. Neither the **2006 draft FMP** or the **2008-2013 Strategic Plan** reflects the approach of the legislation. The vast majority of Saint Lucian fishers are not members of an association, and there is no mechanism for them to participate in fisheries management. Although the Minister may appoint a National Fisheries Advisory Committee, this has not been done in recent times. 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, except for the Soufriere Marine Management Area (SMMA) this has not been done. In fact the SMMA is not managed by a fishermen's association, but by a multi-sectoral, multi-stakeholder association with representation from a broad swath of user groups.

In practice the FD has supported fishermen's groups that are functional, providing assistance so that they do not become defunct; while the cooperative department has primarily functioned as a financial oversight/advisory/audit entity. 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.

## **FISHERIES INFRASTRUCTURE**

The Government of Saint Lucia, with the technical and financial assistance of Japan, continues to upgrade the standard of fish landing facilities around the island. Castries, Gros Islet, Dennery, Vieux-Fort and, more recently, Soufriere and Choiseul, have benefited from this development initiative. In all cases, community-based management committees have been set up to oversee the use and maintenance of the fish landing facilities. These committees usually involve the local town/village councils, the Saint Lucia Fish Marketing Corporation (Castries Fisheries Complex), the local fishermen's cooperative, fishermen and public representatives and DOF. Notably, fees

generated from the various users of the fish landing facilities are put back into day-to-day management and maintenance.

These fisheries facilities allow for:

- Safer storage of fishing vessels and gear
- Better gear maintenance facilities
- Higher sanitary standards for fish handling and marketing
- Decentralized operations of the main fish purchasing, cold storage and marketing institution i.e., the Saint Lucia Fish Marketing Corporation.
- More centralised supply of fish to the local consumer
- Decentralization of fisheries administration services

## **PLI OVERVIEW**

Good governance is considered to have positive attributes such as participation, transparency, representation, deliberation, accountability, empowerment and social justice<sup>7</sup>. It is worth differentiating between governance and management. The former is said to be “the fundamental goals and the institutional processes and structures that are the basics for planning and decision making”<sup>8</sup>, while the latter is the “process by which humans and material resources are harnessed to achieve a known goal within a known institutional structure”<sup>9</sup>. It may be argued that the mechanisms currently in place and described above, may contribute to “good management”, but not necessarily to “good governance”. Stakeholder participation should contribute to a governance approach that is people-centered; responsive; conducted in partnership; dynamic; and, holistic, there is now possibly an opportunity for the JICA-CRFM project to make advances in this area.

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

The **1984 St. Lucia Fisheries Act** and **St. Lucia Fisheries Regulations 1994** specify that a Fisheries Advisory Committee (FAC) **shall** 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.

In 1978 the fishing co-ops in St. Lucia came together and formed the **NAFCOOP** which regularly provided advice to the Chief Fisheries Officer and the Minister responsible for fisheries.

Communications with the fishing industry are now channelled through the individual cooperatives to the Chief Fisheries Officer, extension officers and the Minister. 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 Saint Lucia are members of these organizations.

There do 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

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<sup>7</sup> CERMES, 2007

<sup>8</sup> Olsen *et al.*, 2006 cited in CERMES, 2007

<sup>9</sup> *ibid.*

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fishery resources such as community enforcement and participatory monitoring. In many respects, fisheries management in St. Lucia is still “top-down”.

The National Consultation to Launch a National Fisherfolk Organization in St. Lucia was held at the conference room of DOF in Castries on the 23<sup>rd</sup> July 2007. The result was a revival of NAFCOOP.

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

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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 SMMA (which has also been given the responsibility of managing the Canaries/Anse la Raye Marine Management Area – CAMMA) could probably serve as an example of how this type of initiative could be operationalized at the community level. It is questionable whether SMMA/CAMMA arrangement has been effective in truly representing the concerns of fishermen.

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

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

Anecdotal knowledge suggests that fishers are not averse to playing a more active role in fisheries management provided that it does not impact negatively on their active fishing time. That being the case, there would be need for some compensation for loss of earnings. Having said this, non-seagoing fishers are likely to be more willing to play such a role, but this would beg the question as to whether management decisions would lean away from the preferences of seagoing fishers.

Mc.Goodwin (1984 cited in Murray and d’Auvergne, 1994) notes that fishermen accorded high priority to the provision of accident, medical, life insurance and retirement plans. If such schemes were to be organized in some form through the co-operatives, this might encourage more fishermen to become members of co-operatives whether or not they are boat owners. Conceivably this would mean that they might also be more willing to play a fisheries management role.

Fisheries-related livelihoods are considered sustainable if they allow for maintenance or improvement of the standard of living related to well-being and income as well as other human development goals (Allison and Horemans, 2006 cited in Murray, in prep) while not being dependent on external support (Campbell, 1999 cited in Murray, in prep). Sustainable livelihoods also reduce vulnerability of external shocks and trends (Allison and Horemans, 2006 cited in Murray, in prep), ensure that activities being carried out are compatible with maintaining the fisheries resource base (Campbell; Allison and Horemans, *ibid.*) and do not undermine their livelihoods of, or compromise the livelihood options open to, others (Campbell, 1999 cited in Murray, in prep). An on-going study (Murray, in prep) suggests that the seemingly high cash-

flow often noticeable in the fisheries sector reflects the rapid turnover of a very perishable product rather than profitability (Farrington, 2002 cited in Murray, in prep). Thus, the poverty in fishing communities can also be masked by the diversity of stakeholders (*ibid.*). Changes in fish availability on domestic markets threaten food security for many people; at the same time, their livelihoods are being displaced by unsustainable, often land-based, practices that contribute to hastening resource over-exploitation (*ibid.*).

# CHAPTER 3: PELAGIC FISH RESOURCE MANAGEMENT AND DEVELOPMENT COMPONENT

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

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There is no **National Fisheries Policy** for St. Lucia. There is the **2006 draft FMP** and the **2008-2013 Strategic Plan**, which perform a similar function and states that DOF will focus on a strategic approach which will ensure integrated management of the fisheries sector.

### ***Fishery Management Plan (FMP)***

As indicated earlier, the Fisheries Act requires the preparation and implementation of a FMP for St Lucia. The FMP was first implemented in 1997/98, to be reviewed and updated at least every 5 years. The last updated FMP was published 2003. Since 2006 a new draft FMP has been in review. This FMP has many goals, but in respect to pelagic fisheries we can distinguish three main ones:

- (1) To contribute to the attainment of self-sufficiency and food security, by sustainably optimizing the amount of fish protein available for domestic consumption;
- (2) To sustainably optimize the net incomes of the fishers and the communities involved in fisheries, and related economic activities;
- (3) To improve on fisheries infrastructure and promote the use of fishing technologies with a view to sustainability, to optimize the catch.

The FMP notes that target species of the large (“offshore”) pelagic fishery are tunas (*Scombridae*); dolphinfish (*Coryphaena hippurus*); king mackerel (*Scomermoras cavalla*); wahoo (*Acanthocybium solandri*); sharks (*Elasmobranchii*); billfishes (*Istophioridae*) and swordfish (*Xiphius gladius*). The Eastern Caribbean is considered to be the minimum management unit for the region’s large pelagics (Source: FAO Fish. Tech. Page 313). For most ocean species, ICCAT proposes the Western Atlantic or even the entire Atlantic Ocean as the management unit, thus the target pelagic species are regulated consistent with the ICCAT regime, Specific regulations are in place for pelagic species caught by sports fishers. While it has been said that the status of most species is unknown, the Potential Yields for important large pelagic species within the marine area of Saint Lucia have been estimated at: yellowfin tuna - 74 MT; albacore - 11 MT; bluefin tuna - 2 MT; skipjack tuna - 21 MT; bigeye tuna - 17 MT (Source: Singh-Renton, S. and J. Neilson, 1993).

Within this context, Saint Lucia is stated as subscribing to a management strategy geared to:

- Effectively manage the exploitation of the large pelagic resources by continuing to introduce the most appropriate equipment/technology in the artisanal fishery in order to optimize on the economic returns to the fishers and other operators.
- Continue the development ‘catch and release’ tournaments in the sports fishery within the Tourism Sector.
- Collaborate with fishers at all levels (local and regional) to manage these shared resources.
- Collaborate with regional agencies/organizations to manage these shared resources.

According to the FMP, the flyingfish fishery targets:

- Four-winged flyingfish (*Hirundichthys affinis*) comprises over 95% of the catch.
- A large species, the guinea man (*Cypselurus cyanopterus*) occurs occasionally.
- Other species are too rare or small to be commercially important.

Evidence from tagging studies suggests a single stock within the southeastern Caribbean area (Dominica to Trinidad and Tobago). The exact status of this resource is unknown; however, high inter-annual variability is probably linked to a combination of factors (e.g., abundance of spawners, environmental factors or predation mortality). Current regulations are limited to mesh size restrictions on nets. The management strategy proposed for flyingfish in the fisheries management plan includes

- Enforce existing regulations.
- Conduct research in collaboration with range States.
- Based on research, revise regulations, if necessary.
- Improve on the fishing technology for flying fish.

The FMP also notes that small coastal pelagic are targeted, these include:

- “Jacks” (*Carangidae* and *Selar* spp.)
- Herrings (*Clupeidae*)
- Ballyhoo (*Hemiramphus* spp.),
- Robins or scads (*Decapterus* spp.)
- Small tuna species and the young of large tuna such as yellowfin, may also be caught.

The management unit for these species is seen as the island shelf for juveniles and adults and the whole Eastern Caribbean for planktonic larvae. Between 1995- 2001, a steady decline in landings was observed for four years with a sharp increase in landings for the latter two years of the period of review. The decline in 1998 and 1999 can probably be attributed to the removal of several fillet nets from the fishery during the establishment of the SMMA (CRFM, 2003). The majority of landings comprised of the families Carangidae and Hemiramphidae. Current regulations include:

- Mesh size of seines, fillet and cast nets.
- Trammel nets are prohibited.
- Soak time of nets restricted.

In the case of these species the proposed management strategy is to:

- Enforce existing regulations.
- Establish target and limit reference points for the Fishery.
- Based on research, revise regulations if appropriate to use such management tools as minimum size, mesh size regulations, close seasons, and close areas to protect the fish stocks.
- Promote participatory management and TURFs where appropriate.
- Promote maintenance of beach access for traditional fishing activities

A management plan exists for freshwater fish (*Cichlidae*: , namely *Oreochromis mossambica* and *Oreochromis niloticus*). No regulations are currently in place for freshwater fish; neither are catch data collected for this fishery. However, in terms of aquaculture, during the fiscal year 2004/5 35,000 fingerlings were produced for distribution to farmers. Management measures identified are:

- Conduct research to determine status of stocks in the wild.
- Develop and implement data capture system for the fishery.

- Based on research, revise management plans as necessary.
- Continue to promote culturing of freshwater fish.

The FMP also speaks to freshwater shrimp (*Palaemonidae* and *Atyidae*) with the management unit under consideration being the inland and coastal/riverine waters of Saint Lucia. Observed reductions in population numbers in rivers island-wide are believed to be primarily due to the indiscriminate use of non-selective illegal fishing methods and degradation of rivers (habitat) due to poor land management practices. Currently there is an indefinite closed season for these species and the proposed management strategy is to conduct research to determine status of stocks and based on research develop plans to rebuild stocks. The current moratorium is to continue until stocks reach exploitable levels that are sustainable.

### ***2008 – 2013 Department of Fisheries Strategic Plan***

The strategic plan states the mission of DOF as being to provide effective and efficient services in promoting sustainable development of St Lucia's fisheries sector through participatory management and sustainable utilization of the fishery resources. The strategic program goals are to:

- Enhance the management of marine and aquaculture related resources to ensure sustainable development of the fisheries sector, with objectives to:
  - To restore and/or maintain populations of marine and freshwater species at levels that can produce optimum sustainable yields;
  - To preserve rare or fragile ecosystems, as well as habitats and other ecologically sensitive areas.
  
- Promote the use of appropriate methods and technologies within the fisheries sector, with objectives to:
  - To enhance the skills of local fishers in the use of more appropriate methods and technologies with a view to sustainably optimizing catch;
  - To promote the use of more advanced and safer fishing vessels;
  - To encourage navigation safety of domestic fishing vessels;
  - To promote the improvement of fisheries-related processes and infra-structure within the sector.
  
- Increase stakeholder participation by promoting a collaborative approach to fisheries resource management and development with objectives to:
  - To design and implement an appropriate public education and awareness programme;
  - To provide an effective means of communicating relevant information to the clientele.

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

The general effectiveness of FMP implementation in St Lucia is considered moderate by DOF staff. The realization of stated policy goals and management objectives has been primarily

limited by lack of financial support from the GOSL; this is implicit in the stated weaknesses noted in relation to a number of the program goals in the strategic plan. Indeed, the budget of DOF is usually not sufficient to allow the employment of enough permanent staff to fully implement management strategies. For example, DOF used to have five fisheries biologists, but presently only two are employed. Also, limited financial resources have prevented adequate in-house training of the staff. St Lucia does not have an undergraduate training institution, and it is too costly to send staff abroad for basic training in fisheries biology and stock assessment. This lack of formation has considerably impaired the capability of DOF to conduct fisheries research to support its management strategies to achieve its policy goals (see strategic plan of action ). Further, as enforcement of management regulations is not a priority for the GOSL, DOF does not have the means to effectively protect fisheries resources against both local and foreign illegal fishing. Consequently, the country is far from achieving its objective of self sufficiency and food security by increasing fish production by managing sustainably fisheries resources. Note that in 2005, fish production ex-vessel value was US\$7.4 million while importation of fish products was estimated to be US\$6 million (FAO 2007), indicating that local fish consumption is largely dependent of foreign fish production.

Despite these financial constraints the attainment of development objectives is generally considered to be very good by the DOF staff. Indeed, compared to other CARICOM countries St Lucia has a better and more effective extension/outreach program. St Lucia is one of the rare countries in the Caribbean where fishermen's cooperatives are now investing in purchasing FADs without government or other institutional help. As St Lucia seeks to develop its fisheries in order to reduce dependency on food supply from other countries, such initiatives by fishermen's cooperatives could play an important role in achieving current management and development objectives (*i.e.*, as defined in the Strategic Plan 2008-2013).

### **3.3 Fishery and Market Characteristics**

#### **FISHERIES CHARACTERISTICS**

##### **Exploited Species**

Table 5 summarizes the exploitation and the management status of the coastal pelagic fisheries in St Lucia. The exploitation of fisheries resources in St Lucia is mostly done by artisanal fishermen. However, there is a growing recreational fishery (sport fishing) in St. Lucia that primarily targets species such as wahoo and dolphinfish.

The impact of Saint Lucia's artisanal fishing on pelagic species is considered largely sustainable (see below). This is a qualitative assessment given the artisanal characteristic of the fishery. Hence, more data are needed to be collected regionally to have a quantitative understanding of the level of fishing pressure on each exploited fish population.

Lobsters and conch are minor fisheries in St. Lucia, compared to the pelagic species. However, there are considerable concerns about illegal fishing of lobster within St. Lucian waters. There are ongoing efforts to collect better information on the status of this species, but funds are not sufficient to allow a systematic assessment of the level of illegal fishing.

Diamond back squid is not currently exploited in St. Lucia. However, there is interest in developing this fishery. In the past, several trials had been conducted to assess the possibility of exploiting this species, but with mixed results. Better pilot experiments are needed in the future.

##### **Stock Status**

The catches of large pelagic species in the Atlantic are commonly monitored by the International Commission for the Conservation of Atlantic Tunas (ICCAT 2008). The estimates of potential yield for pelagic species, mentioned in section 3.1 above, should be seen against the back-drop of ICCAT's assessments and management recommendations, which are that for: yellowfin tuna – effective fishing effort not to exceed 1992 level; skipjack tuna - catches should not exceed MSY, season/area closure; albacore (north Atlantic) – limit number of vessels to 1993-1995 average, Total Allowable Catch (TAC) of 30,200t for 2008 and 2009; and, small tunas – regional and national regulations remain in place. Specifically in the case of wahoo, in 2004 the CRFM conducted an evaluation stocks in the eastern Caribbean, which suggested that wahoo catches in the region were sustainable (CRFM, 2004).

With the suggestion in section 3.2 above as to the reason for the decline in coastal pelagic fishery landings, the overall status of these stocks is uncertain, mostly because of the regional dynamic of most species. However, it is generally assumed that local exploitation of most stocks is sustainable, but more formal studies need to be conducted to better understand the dynamics of these populations and to assess their level of abundance.

**Table 5:  
Status of Pelagic Fisheries in St. Lucia**

Species	Stock Status		Fishery Status			
	Type of exploitation	Over-exploited	Developed	Sustainable	Monitored	Managed
Wahoo ( <i>Acanthocybium solandri</i> )	Artisanal/Recreational	No		Yes		To be
Dolphin fish ( <i>Coryphaena hippurus</i> )	Artisanal/Recreational	No		Yes		To be
Black fin tuna ( <i>Thunnus atlanticus</i> )	Artisanal	No		Yes		To be
King mackerel ( <i>Scomberomus cavalla</i> )	Artisanal	No		Yes		To be
Jack Mackerel ( <i>Trachurus spp.</i> )	Artisanal	No		Yes		To be
Flying fish ( <i>Hirundichthys spp.</i> )	Artisanal	No		Yes		To be
Sardines ( <i>Sardinella aurita</i> )	N	?				
Scaled Herring ( <i>Harengula jaguana</i> )	N	?				
Atlantic thread herring ( <i>Opisthonema oglinum</i> )	N	?				
Jack ( <i>Selar spp.</i> )	Artisanal	?			Yes	
Robin ( <i>Decapterus spp.</i> )	Artisanal	?				
Diamond back squid ( <i>Thysanoteuthis rhombus</i> )*	N	?	To be			
Conch ( <i>Eustrombus gigas</i> )*	Artisanal	Near	Fully	Endangered		Yes
Caribbean spiny lobster ( <i>Panulirus argus</i> )*	Artisanal	Near	Fully	Uncertain		Yes
Spotted spiny lobster ( <i>Panulirus guttatus</i> )*	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

**MARKET CHARACTERISTICS**

**Market Profile**

The production of the fishing industry in St. Lucia is highly seasonal. There is a high supply of fish from November-June, and a low availability during the low fishing season (July-October). Regardless of seasons, dolphinfish is the species of choice in the market of St Lucia. This species has the highest price and in most years yields the most revenue (Table 6 and Table 7) to St. Lucia, compared to other pelagic fish. Wahoo is the second most prized species in St Lucia (Table 6). From 2000 to 2008, dolphinfish and wahoo approximately made up 30% to 49 % of the total value of landings in St. Lucia (Table 7).

With the establishment and expansion of existing cold storage facilities, there is now the ability to bulk purchase and store large quantities of fish during the first half of the year, thus local fish now remains available to the tourism and local market for most of the year.

The bulk of the fish production is processed *via* the St. Lucia Fish Market Cooperative (SLFMC). The SLMC is a statutory body of the “National Development Corporation”. It is managed by a Board of Directors that comprises a representative from DOF and from the fishermen’s cooperatives.

**Table 6:  
Fish Prices at the St Lucia Fish Market Corporation, 1997, 1999.\***

Fish type	Price (EC \$/Lbs)			
	1997		1999	
	Purchase	Sale	Purchase	Sale
Dolphin	5.00	6.50	5.50	7.50
Wahoo	4.00	5.75	4.50	6.00
Tuna	4.00	6.00	4.00	6.50
Lobster	15.00	19.00	15.00	21.50
Conch	6.00	12.50		12.50

*Notes: \*Sale price referred to fish that has been cleaned, scaled, gutted and packaged (George 1999).*

The SLMC is based in Castries, where it owns a fish complex that has 250 tons of cold storage capacity, and 3-5 tons of ice making capability. This cooperative also owns facilities where it purchases fish in Anse La Raye, Dennery, Laborie, and Vieux Fort. Actually, there is also a storage facility in Vieux Fort that was built with financial support from JICA. The Vieux Fort complex has a cold storage capacity of 250 tons and an 8-ton ice-making facility.

George (1999) reports that the SLMC redistributes its sales as follows:

- 50% to large and medium hotels;
- 20% to small hotels;
- 20% to restaurants;
- 10% to retail outlets and supermarkets;

However, the overall structure of the market for fish in St Lucia is more complex than that, and may be summarized as follows:

- Direct sale by fishermen to the consumer;
- Direct sale by fishers to larger purchasers, i.e. hotels, restaurant, supermarkets;
- Purchase and resale by fish vendors;
- Purchase and resale by SLFMC, both to individual consumers and to large-scale purchasers such as hotels, restaurant, and supermarkets;
- Export by the SLFMC;
- Export by fishers (in special cases, e.g. conch).



**Table 7:  
Total Ex-Vessel Value of Fish Landings, St. Lucia, 2000-2008**

Year	Ex-vessel value (in EC \$)							Year
	Wahoo	Dolphinfish	Tuna	Flyingfish	Other Pelagic	Lobster	Conch	
2000	2,673,597	7,327,821	5,207,601	433,450	4,257,072	931,227	620,991	21,451,759
2001	1,882,900	6,106,000	4,448,000	1,422,500	4,783,800	1,469,500	773,700	20,886,400
2002	2,275,499	4,722,391	3,621,501	689,785	2,518,802	337,709	1,323,505	15,489,193
2003	1,645,279	3,439,488	4,859,894	301,653	2,731,230	827,556	1,043,389	14,848,489
2004	2,293,374	4,568,803	4,456,210	60,668	2,821,206	416,533	1,087,667	15,704,461
2005	2,795,548	1,927,192	5,375,779	257,051	3,347,301	593,301	1,013,155	15,309,329
2006	2,329,609	5,655,996	5,097,237	155,765	3,102,882	381,696	854,909	17,578,093
2007	2,451,812	6,696,701	4,266,969	260,735	3,409,779	497,728	1,071,677	18,655,400
2008	2,348,080	5,472,959	7,424,351	1,486,703	1,486,703	491,049	1,167,913	19,877,758

Estimates of the value of landings in 2009 are: wahoo – EC\$2,488,587, dolphinfish – EC\$ 6,748,470, tunas – EC\$6,398,459, other offshore pelagics – EC\$ 1,303,764, snapper – EC\$ 1,266,190, lobster – EC\$ 389,094, conch – EC\$ 1,044,156, other species – EC\$ 4,423,561, making up a total value of EC\$ 24,062,281

It often appears as if there is a tacit policy to restrict imported fish products, so that local products can be consumed first. The Chief Fisheries Officer, who determines the level of imports of fish products and this may at times be based on consideration being given to the seasonal availability of local fish. This approach appears to be applied mostly in the case of pelagic fish products.

### **Products and Processing**

Fish processing remains in its infancy. The SLFMC provides its consumers with whole, steak and fillet fish. There were plans to undertake the filleting of flying fish on a large scale to replace sizable imports of this product from Trinidad and Tobago. It was anticipated that, with the establishment of new processing facilities and product development technology as part of the Japanese funded Vieux Fort Fisheries Complex, local capabilities in fish processing and product development will be substantially expanded. It was planned that the SLFMC, the Goodwill Fisherman's Cooperative Society, and the Vieux Fort Town Council would manage the Vieux Fort facility, with technical support provided by DOF. The extent to which this has become the case is not clear. DOF has basic expertise in fish handling and fish processing, but presently lacks a technical officer specialized in this field.

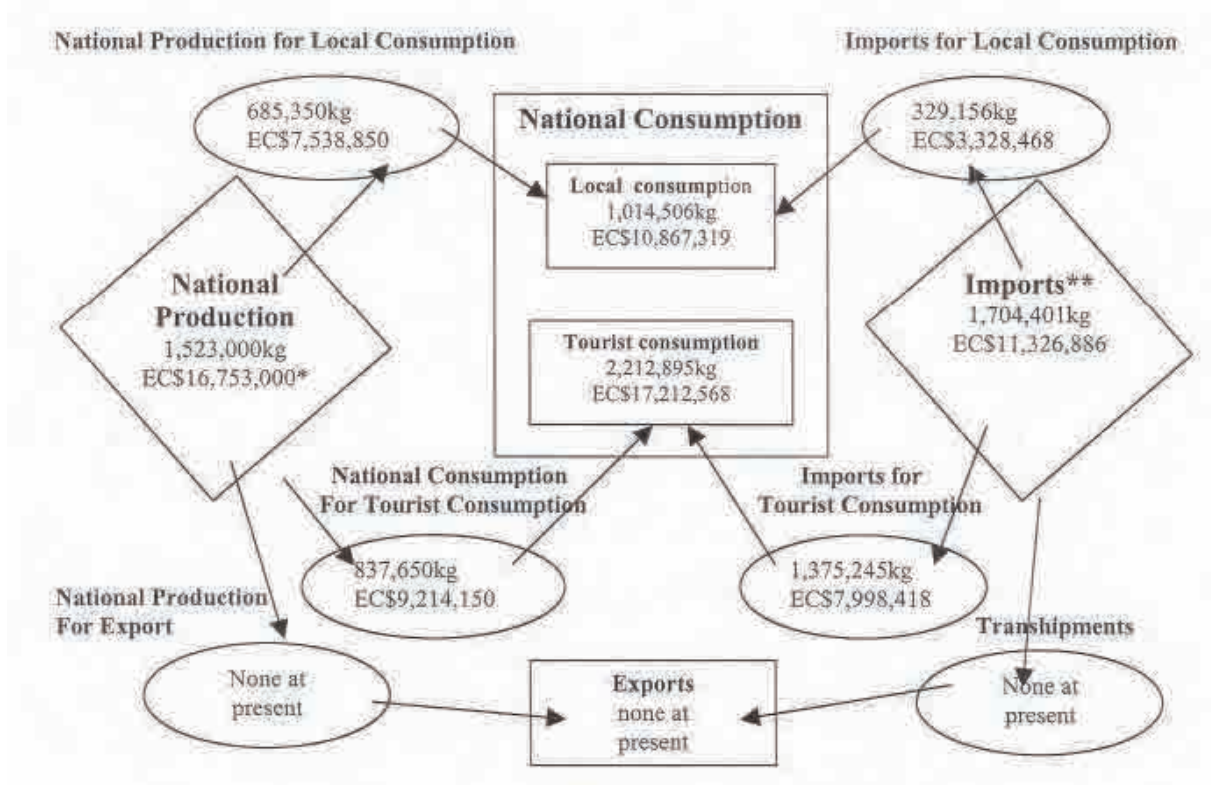
### **Promotion and Market Development**

The SLFMC undertakes promotion of new products, for example, by offering price specials to promote sales and awareness of selected products. The retail section allows for the use of display freezers. Generally, improvements have been achieved in the area of product packaging (boxing, labeling and bagging), and certain products are vacuum-packed to maintain freshness and enhance the aesthetics of the product. Regular discounts are offered for selected products. Advertising is conducted through the local media (newspapers and the radio).

The tourism sector provides a growing market for local and imported fish products. The challenge is now to maximize the capacity to meet demands with local supplies, and this will necessitate improved fish handling and quality control practices, as well as increased initiatives in product development.

### Annual Production and Consumption

The figure below shows the estimated annual production and consumption of fish and fishery products in 1999<sup>10</sup>. National production was estimated with an average price of XCD11/kg and Imports include canned fish.



### 3.4 Catch and Effort

Pelagic catches are landed at thirteen (13) sites in St. Lucia, but 36-57% of the annual catches are usually landed in two sites: Dennery and Vieux Fort. Table 8 shows the geographic location of these sites; along with the number of fishermen that land their catches on these sites in 1997.

#### Effort Data

Table 8 shows that artisanal fishing vessels such as wooden boats and fiberglass pirogues are predominant in the fishing industry of St. Lucia. Thus, the fishery remains largely artisanal, although some St. Lucian commercial fishers have been operating vessels including longliners and whalers. Further, approximately 60% of St. Lucian fishers fish as a part-time activity (Table 2, George 1999), which is a good indicator of the artisanal nature of this economic activity.

<sup>10</sup> From George, 1999.

**Table 8**  
**Total Number of Registered Vessels by type 2005-2009**

Year	CANOE	PIROGUE	TRANSOM	SHALOOP	WHALER	LLINER	OTHER	TOTAL
2005	134	456	43	30	9	5	3	680
2006	131	466	48	29	9	4	3	690
2007	129	496	51	30	8	5	2	721
2008	83	429	31	17	3	7	4	574
2009	87	445	37	15	3	8	4	600

The number of fishing trips has remained very stable over the years (Table 9). However, these data are aggregated, and as such were computed for all type of vessels and species. Hence, it is difficult to infer the effective trends in fishing effort, particularly on the pelagic species.

Nevertheless, the artisanal fishery may account for most of these trips, and in term of fishing activity and intensity a typical “Pelagic Fishing Unit” in St Lucia may be described as follows:

- Vessel: Fiberglass pirogue fitted with a 105 hp outboard engine;
- Gear: Trolling lines, artificial baits and hooks;
- Number of Crew: 3;
- Fishing activity: 8 month/year;
- Number of trips: 5 per week, November-June (High season);  
3 per week, July-October (Low season);
- Catch: 50-900 lbs per week, depending on season;

**Table 9:**  
**Total Number of Fishing Trips, St. Lucia, 2001-2008**

Year	2001	2002	2003	2004	2005	2006	2007	2008
<b>Number of Fishing Trips</b>	35,017	34,229	34,013	32,041	33,941	33,677	33,830	35,224

Fishing trips in 2009 appeared to show a 2.58% decrease over the previous year, to 34,314

***Catch Data***

Table 10 shows that over the last decade wahoo, dolphinfish, and flyingfish were the three most important pelagic species in the landings. Flyingfish landings in St. Lucia were highly variable, decreasing from 303 mt in 2001 to 10 mt in 2004, before increasing again to 328 mt in 2007. This level of variability is in the range of expectation for such small pelagic fishes, assuming that the level of effort did not change substantially (table 9). In contrast, catches of wahoo, dolphinfish and tunas have remained fairly stable during the same period of time (c.f. table 10).

**Table 10:  
Annual Landings by Species, St. Lucia, 1999-2008**

Year	Total Landing (mt)						
	Wahoo	Dolphinfish	Tuna	Flyingfish	Other Pelagic	Lobster	Conch
1999	309.9	587.77	324	66.79	375.6		
2000	243.1	555.1	473.4	98.5	351.8	24.9	40.3
2001	214	427	404.4	323.3	434.9	36.1	41.4
2002	242.92	402.17	319.91	193.01	323.90	9.52	60.44
2003	169.30	286.62	456.17	75.47	325.46	23.37	47.51
2004	238.0	375.6	418.7	10.7	361.6	10.6	45.6
2005	168.85	198.33	465.71	71.48	379.95	15.34	41.96
2006	187.10	382.03	409.97	29.57	343.98	9.36	34.71
2007	210.64	511.99	328.11	328.11	302.29	41.01	12.66
2008	182.02	360.51	560.13	251.25	340.57	12.64	37.72

Landings for 2009 have been estimated (mt) as: wahoo - 195.12, dolphinfish - 464.61, tunas - 485.76, other offshore pelagics – 228.47, snapper – 64.09, lobster – 9.63, conch – 34.39, other species – 374.74 to a total of total 1,856.90 tonnes.

### **Technology Improvement & Extension Programs**

A major goal of the St. Lucia FMP is to “*improve on fisheries infrastructure and promote the use of fishing technologies with a view to sustainability optimize catch.*” Accordingly the St. Lucia DOF has planned several programs regarding technology development and improvement:

(1) *The European Union FAD program:*

- This project started in May 2009 and is funded by the European Union.
- Main objective: to increase landings of dolphin, tuna & coastal pelagic fish in St. Lucia.
- Number of FADs: 10 moored within the EEZ of St. Lucia.

(2) *The St. Lucia Chamber of Commerce FAD Project:*

- This project started in 2009, and is funded by the St. Lucia Chamber of Commerce/Industry and Agriculture Business Development Unit;
- The main objective is to increase fish landings via Fishermen Cooperatives in St. Lucia;
- Participating cooperative : Soufriere;
- Budget: \$ 30,000 (EC).

(3) *The Young Fishers Training Program:*

- This project will be funded from taxed-payer money, and it is being supported by the government of St. Lucia.
- The main goal of this project is to get more “scientifically minded individuals” involved in the fishing and fishing related activities.”
- *Rationale:* the majority of St. Lucian fishers have a primary school education, and thus cannot be trained in using new technology such as GPS systems. So, the project aims to target youngsters that have dropped out of secondary school and remain without a job, with the primary objective of getting them interested and involved in the fishing industry.

(4) *Program for the Development of FADs in shallow waters*

- Funds are needed to develop these projects;
- The main goal of this project is to reduce the cost of fishing operations when using FADs, by developing these devices in shallower waters and closer to shores.

- Rational
    - FADs implanted by the EU program are moored off shores, within distance ranging from 4.5-15 miles;
    - Fishing around these FADs requires long distance trips by fishermen;
    - These long distance trips are usually too costly because of the price of fuel (\$10.9/gal.);
    - Hence, shallow water FADs may reduce operating costs by facilitating shorter trips
    - Adding light to the FADS should also increase productivity and may encourage fishing to invest more time fishing at night.
- As part of this development program, Saint Lucia might also wish to consider formalizing a regulatory system for the use of FADs

*(5) Food Sovereignty program:*

- Funds are needed to develop this program;
- The main objective of this initiative is to reduce the dependency of St Lucia on food supply from other countries, by developing means to increase the production of fishing products in St Lucia.
- Rationale:
  - The EEZ of St. Lucia is about five times the total land area of the countries, but little of this EEZ is currently exploited.
  - The consumption of imported fish product in St. Lucia is still high, so there is need to reduce it by enhancing local production.

The extension officer of the fisheries department of St Lucia is also responsible for developments in technology and in education. Hence, the overall strategy is to have an extension component to all technology development programs.

***Needs in training and funding***

The last study of market characteristics in St Lucia was done in the 1990s. Since then, market conditions have changed a lot, and there are growing concerns on the overall quality of fish products. In general funds are needed to:

- conduct studies to better understand present market characteristics;
- afford consultancy on fish market development and improvement in Ste Lucia;
- Develop quality standards and to retrofit existing vessels for better storage/preservation of the catches.
- Train staff in fish market promotion, *i.e.* in developing socio-economic activities that can add values to fish products.

**Technical Assistances and Funding**

***Needs in technology development:***

- Training in fishing vessels, particularly in retrofitting existing vessels;
- Expanding the FAD program. The FADs will particularly help in expanding the period of the high fishing season. Note that there is excess of storage capacity in the Vieux Fort Complex. So, any increase in production will allow supplying more local fish products on the market during the low fishing season.
- Developing technology to recycle local fishing materials;

***Needs in institutional assistance toward:***

- Consultancy in developing St Lucia fishing fleets. For example, The OES “New Development Bank” would like to finance the purchase of new and larger fishing vessels,

but there is need for guidance to understand the economic and the environmental impacts of using larger boats.

- Reinforcing the capabilities of the fisheries department by training its staff in:
  - Conflict resolution;
  - Inter-personal relations;
  - Mediation/ negotiation ;
  - Project planning, management, and evaluation;
- Training of members of fish cooperatives in business management.
- Mapping the traditional fishing grounds in St. Lucia. As many fishermen are ageing, there is high risk to lose the knowledge on the location of the most productive fishing grounds in St Lucia waters.
- Establishing a Fishery Advisory Committee
  - Rationale: stakeholder inputs are valuable for developing successful management plans and policies.

### **Technical and Research Capabilities**

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

- *The department has* a laboratory but the facility is not utilized because of lack of funding.
- The department used to have five fisheries biologists, but only two are currently on staff. Hence, human resource limitation is a major constraint.
- St. Lucia doesn't have a university, so it is difficult to get the department staff the level of training needed in both biological and fishery data collection, in data analysis and stock assessment in general. The CRFRAM project was useful, but since this project ended there are problems to evaluate St Lucia fish stocks, because of limiting resources to collect biological information.

#### *Needs in funding*

- More sustainable financing is required; in particular the department needs financial supports that are less project-oriented and that can support long term programs;
- Funds to develop stock assessment research: a combination of population-based and ecosystem-based assessment is warranted;
- Funds for improving data collection and analysis ;
- Establish scholarship funds to support undergraduate training of the staff;
- Funds to conduct a study on cost of fishing production;
- Funds to conduct socio –economic surveys.

# CHAPTER 4: AQUACULTURE DEVELOPMENT COMPONENT

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## 4.1 Policy, Supporting Legislation, Development Plans

### SEA MOSS

The cultivation of seamoss started in St. Lucia in 1981. Initially, various species of the genus *Gracilaira* were grown successfully, but farmers chose to grow the fast growing, terete species of *Gracilaria* locally known as GT. In the mid 1990's a program conducted identified the *Euchema isiforme* introduced from Belize as to species to replace *Gracilaria*. This was primarily because it:

- is less susceptible to the seasonal appearance of epiphytes. Epiphytes are known to reduce the quality of the GT or make its cultivation impossible.
- can remain free from the build up of silt during its period of cultivation.

Seamoss is cultivated and farmed by individuals from the areas of Aupicon, Praslin, Canelles and Laborie. Some seamoss farmers have an established market with St. Lucia Distillers, which started in 2000, for the sale of various grades of seamoss gel. Another group has market links established with Consolidated Foods Limited (the premier supermarket chain in Saint Lucia), Dilly's Supermarket, and the St. Lucia Marketing Board (a statutory entity). The remaining seamoss farmers do not have a reliable market and are thought to urgently need assistance in developing the requisite links.

### Policy and Supporting Legislation

The Fisheries Management Plan 2006 in its address to aquaculture development has as a goal the following:

- *To sustainably optimize employment opportunities for those dependent on fisheries and aquaculture for their livelihoods.*

The action plan for seamoss farming aims to improve on seamoss cultivation techniques: to:

- Undertake studies to identify and improve on the techniques for seamoss cultivation.
- Train harvesters in appropriate techniques for seamoss cultivation and in small business operations and marketing.
- Develop and implement a sustainable development program to encourage seamoss cultivation, with fiscal incentives, provisions for property rights and environmental protection measures

Interestingly, seamoss culture is currently not extensively practiced

The **2008-2013 Strategic Plan** speaks to the existence of an Aquaculture Unit (see section on administration in the introductory chapter) and states:

*“The Aquaculture Unit is responsible for promoting aquaculture in the country, and services offered include, inter alia to:*

- *Conduct research into areas of the culture of fresh water and marine species;*
- *Assist in the transfer of the technology of culturing to the relevant clients;*
- *Manage and maintain the aquaculture facilities as research, demonstration and service facilities;*
- *Develop and recommend policy and procedures for the advancement and management of aquaculture in Saint Lucia.”*

Both the **draft FMP 2006** and the **2008-2013 Strategic Plan** assign the responsibility for aquaculture development to the Aquaculture Unit of DOF.

The primary legislation governing management of the island’s marine resources is the Fisheries Act (No. 10 of 1984) and the Fisheries Regulations (No. 9 of 1994) which are based on the OECS harmonized legislation.

Other relevant legislation includes the

- **Maritime Areas Act (1984)** for marine space use and pollution;
- **the Public Health Act (1975)** for aspects of land-based sources of pollution;
- **the Solid Waste Management Authority Act (1996); the Wildlife Conservation Act (1980);**
- **the Land Development Control Act (1971);**
- **the National Conservation Act (1999)**, which deals with beach use, parks and protected areas.
- **revised Physical Planning and Development Act No. 29 of 2001**, which includes Environmental Impact Assessment regimes.

St. Lucia has an open economy which is heavily dependent on foreign trade and investment, and therefore welcomes foreign investment as a necessary input in the development process and economic modernization of the country. The GOSL has identified Agriculture, Aquaculture and Agro Processing as priority areas for investment opportunities.

## ***4.2 Aquaculture Development Status regarding Stated Policy Goals and Development Objectives***

Government sees aquaculture as an area that could contribute to diversification of the agriculture sector plus ensure better food security/sovereignty. The fallout in the banana sector makes land available for aquaculture development; however, many abandoned banana lands are now been converted to housing and or light industrial development, and as a consequence, introduces land-use resource conflicts<sup>11</sup>. Aquaculture operates on a small scale, with approximately 20 acres of ponds, in 1999, generating either cultured fish (hybrid *Tilapia spp.*) or farmed freshwater shrimp (*Macrobracium rosenbergii*)<sup>12</sup>. Nearly three quarters of aquaculture farmers were involved in other aspects of agriculture. The produce of the farmers is primarily sold to hotels and restaurants or the Saint Lucia Fish Marketing Corporation<sup>13</sup>. In terms of mariculture, several species of

<sup>11</sup> Notwithstanding the National Land Policy’s stated direction to “protect and enhance the productive potential of agricultural lands, and, whenever possible, avoid undesirable changes in land uses in order to preserve future options. In particular, it will discourage further conversion of agricultural lands to other uses and forms of development”.

<sup>12</sup> Department of Fisheries records

<sup>13</sup> Fisheries Sector Review. 1999. S. George. Background paper for the Symposium on OECS Fisheries Management and Development  
Final Country Report for St. Lucia – Formulation of a Master Plan on Sustainable Use of Fisheries Resources for Coastal Community Development



marine algae (*Gracilaria* spp and *Eucheuma*) are cultivated in a few coastal locations and used to generate a gelling substance for preparation of a popular local drink or ice cream.

The most recent aquaculture development project includes the establishment of both a tilapia and *Macrobrachium* hatchery and nursery by upgrading the existing aqua facility at Union Agricultural Station. It is the belief of the relevant stakeholders that this investment when fully operational will undoubtedly contribute to a reduction in the island's food import bill. This facility was financed by the Government of Taiwan.

### 4.3 Aquaculture and Market Characteristics

*Gracilaria* spp. is used in the preparation of traditional drinks and porridges. The product owes its high popularity due to its anecdotal aphrodisiac properties. No reliable annual production estimates are available. Although the production data has not been officially registered, seamoss cultivation in St. Lucia can be considered as commercial in terms of sales and production potential of the country. The ex-farm price is approximately US\$7.5 for a pound of dried product.

The marketable size of both cultured fish and prawns, i.e. 1 pound/fish and 10–15 prawns/pound,

**Table 11:  
AQUACULTURE PRODUCTION, ST. LUCIA, 2000-2008**

Species	Unit Cost US\$/Kg.	Production Tonnes(mt) Price (US\$)	2000	2001	2002	2003	2004	2005	2006	2007	2008
<i>Oreochromis (=Tilapia) spp</i>	2.44	mt		.643						1.079	
		US\$(x1000)		1.6						?	
<i>Penaeus</i>		mt									
		US\$(x1000)									
<i>Hoplosternum litorale</i>		mt									
		US\$(x1000)									
<i>Macrobrachium</i>	12.32	mt		.058						0.289	
		US\$(x1000)		0.713							
<i>Sea Moss</i>		mt									
		US\$(x1000)									
<i>combined fish and shrimp</i>		mt		0.7						1.368	
		US\$(x1000)		2.3							

are sold and consumed locally. The ex-farm price is US\$12 and US\$20.61 for a kilogram of live weight fish and prawns, respectively. These prices are exorbitant at best, and cannot compare favorably to US\$6.35/kg for natural catch.

### 4.4 Current Levels of Aquaculture Production by Species

#### *Inland aquaculture.*

Current inland aquaculture production is targeted at Tilapia and the freshwater prawn *Macrobrachium* spp.

The estimated production of tilapia and freshwater prawns in 2007 amounted to 2.72mt and 266 kg, respectively. The estimated area under production as of 2007 was put at 11.6 hectares with approximately 41 small farmers involved. Semi-intensive culture systems in earthen ponds are employed for the production of tilapia and shrimp.

The government owns and operates two hatcheries. It is estimated that Saint Lucia has the capacity to support 20 ha of ponds and that, given appropriate market development, there is considerable potential for increased shrimp and fish production.

Production levels are still very small and sector growth has been very slow; and this has been attributed to the inability to produce sufficient seed supply and to demonstrate financial models to prospective investors.

### ***Coastal aquaculture***

The only marine species which has received considerable attention and is currently being cultured using a simple technology is a local strain of seamoss known as GT (the terete species of *Gracilaria* sp.).

Seaweed is also cultivated within small nearshore plots. The culture of seamoss was originally carried out on floating bamboo rafts, which have been replaced since 1990 by the long-line method, mainly due to stronger resistance to wave action. Production yields of GT grown on rafts are about 2 kg fresh-weight per meter of line in two months.

At present, the total combined area under production has been estimated at 1 hectare, divided into 20 culture units. The whole sector is currently being operated by five (5) full-time and fifteen (15) part-time farmers. The majority of the culture plots are cited by DOF as being concentrated in the south-east coast and some locations in the south-west.

## **4.5 Knowledge on Aquaculture Issues by Category**

The following issues are seen as critical for sustainability of the current efforts and possible future development within the sector.

- Policy directions
- Market Analysis
- Land resource use conflicts
- Zoning
- Costs of production
  - High electricity costs
  - High feed costs
  - Land costs

<b>Table 12: Cost Structures</b>	
<b>Item</b>	<b>Cost (US\$)</b>
Electricity (/kwhr)	0.42
Gas (/litre)	1.15
Diesel (/litre)	1.12
Wild-caught fish (/kg)	1.80-2.70
Wild-caught shrimp (/kg)	N/A
Farmed fish(/kg) Tilapia	1.50-2
Farmed shrimp(/kg)	
Fish Food(/kg)	
Farmed Prawns	
Beef(/kg)	5.34
Chicken(/kg)	3.00
Pork(/kg)	5.80
Rice(/kg)	1.70
Pond construction/ha	
Land costs Lease/ha	?
Labor/week unskilled	

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

The technologies developed and/or adapted in St. Lucia for the culture of the Asian freshwater prawn, tilapia and seamoss appear to be at the right level, bearing in mind the size (i.e. relatively small-scale) of the aquaculture projects being developed.

Some applied research is still required to improve the technologies in use, such as *Gracilaria* strain improvement, prawn feed development, prawn stocking and feeding rates, etc. It is generally felt that the culture technologies of the commercially attractive species must be maintained at a level graspable and financially affordable to the small-scale farmers. Due to the over-exploitation of wild seamoss in the Caribbean, seamoss cultivation is being pursued as a means of maintaining the incomes of fisher folk and allowing regeneration of wild stocks.

A significant and immediate benefit of the new aquaculture facility (constructed by the Government of the Republic of China on Taiwan) to the farmers will be the availability of this inland fishing facility to address the demand for seed supply and provision of extension and training. The long-term plan is to establish sufficient capacity to supply baby fish/technology support and training to neighboring farmers in the Eastern Caribbean region.

#### ***4.7 Technical and Research Capabilities of Fisheries***

As stated earlier, DOF has a staff complement of approximately forty (40), within which there is a dedicated Aquaculture unit. Wide areas of competencies – primarily extension, stock assessment, marine and fisheries biology, coastal zone management, fishing gear technology, fisheries management, marine protected areas and public education – reside within DOF and inter-department cooperation further enhances the capabilities of the Aquaculture unit.

There are currently no academic institutions in St. Lucia where education and training in marine biology or related subjects such as aquaculture can be obtained.

Formal education can, however, be obtained at the University of West Indies either at the Cave Hill Campus in Barbados, the Mona Campus in Jamaica or at the St. Augustine Campus in Trinidad and Tobago. The Institute of Marine Affairs in Trinidad and Tobago is also a centre of excellence and the H. Lavitty Stoute Community College in the British Virgin Islands seeks to become such a center in the area of marine sciences.

Although specific programs in aquaculture are not available, practical training at the farmer level can be obtained locally in prawn culture at the government's Beausejour Prawn Facility in Vieux Fort, and in tilapia rearing at the small government fish hatchery located in the northern part of the island (Union Aquaculture Facility). The Vieux Fort facility, originally constructed with funds donated by the Chinese Government (Taiwan) as part of an agriculture cooperation program, has a hatchery and office/house building and four earth ponds totaling a surface area of approximately 0.5 hectares.

With regard to seamoss culture, DOF, through its Research Unit, has assisted small fishermen's co-operatives with education and training in the culture of this marine alga. Parallel to the efforts of DOF, the Caribbean Natural Resources Institute (CANARI), a non-profit organization registered in the U.S. Virgin Islands and St. Lucia, has also engaged persons on seamoss culture. The community-based resource management program of CANARI was aimed at the improvement and implementation of technologies for culturing, harvesting, and marketing of seamoss by small-scale farmers in St. Lucia and other Caribbean islands.

There are persons within DOF with the requisite skills set to support the thrust towards increased aquaculture production; such persons have received academic training within related subject disciplines at the M.Sc. and B.Sc. levels, and some persons have also benefitted from specialist aquaculture training.

Partnerships with regional and international research institutes and multilateral donor agencies can provide a platform for adaptive research programs.

In the past natural resources such as land and water were thought to be relatively abundant, and not a limiting factor for the expansion of aquaculture production; however if the necessary zoning and integrated resource management approach is adopted this might prove to be incorrect. Additionally, development was to be done within the context of global warming and its concomitant effects, chief of which is a rise in sea level.

Among the possible inland aquaculture activities, it is likely that freshwater prawn culture will expand in the near future. The main justifications for the above growth are likely to be:

- (i) the agriculture diversification program being pursued by the Government in view of the possible drop in banana price as the single European market is being formed, and
- (ii) the high local prawn price for the tourism industry.

It would appear as though there is need to review and update the aquaculture development plan and have it approved in order to provide the context for the legislative and improved institutional arrangements 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***

The Resource Management Unit (RMS) of Department of Fisheries is responsible for the FIS. In 2004, the Unit developed a Procedures Manual which outlines in detail, the collection, storage, querying and assimilation of the fisheries data. This document adequately guides the process of fisheries data management, and covers all the various elements of FIS. Once the procedures outlined in this document are properly communicated and observed, the quality of the FIS is assured.

The St. Lucia Fisheries Department has produced a Draft Strategic Plan for 2008-13. It recognizes the importance of fisheries information systems as an integral component to management of the fisheries. In the Minister's message, it states:

*"...data collection and biological assessment for individual fish stocks often need to be carried out jointly at a regional or sub-regional level."*

This sets the tone of the document as the importance of fisheries data is underscored throughout. The Strategic Plan also emphasizes the need for increased capacity and development in fisheries information and its management, in order to support the goals and objectives of the fisheries management in St. Lucia.

Under the Fisheries Act No. 10 of 1984, and the Fisheries Regulations No. 9 of 1994, every fisher must be registered and every fishing vessel registered and licensed.

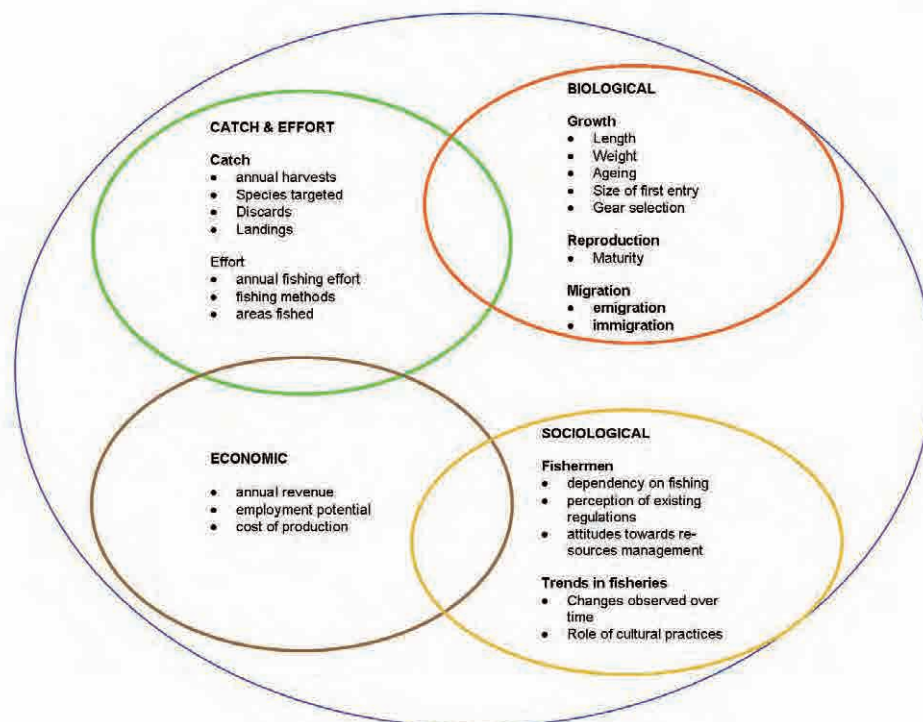
## ***5.2 Data Collection – Current Situation***

The first fisheries data collection system for the island was implemented in 1979. Since then, the system has, from time to time, been refined in response to the numerous changes in the fisheries sector with the ultimate goal of providing sound management advice. In theory, the collection aims to capture the types of data shown in the figure below. Over the past decade, limited biological data on major single fish species have been collected but with limited regularity; therefore other, more *ad hoc* collection program had to be implemented to facilitate some assessment of the status of the stocks (e.g. for wahoo as part of the CRFM assessment program).

The stated aim of the data collection system is to monitor the status of the stocks that are being exploited. However, in practice the system focused mainly on gathering data and performing simple analyses. The full potential of the system has yet to be realized due to administrative, financial and human resource constraints. One of the tasks of DOF is to collect data on catch and effort, biological data, registration of fishermen and vessels, registration of SCUBA diving establishments, sports fishing vessels and spear gun fishers, in addition to the licensing of fishing vessels. However, due to human resource and financial limitations, DOF is unable to collect the broad range of data required under each of these headings.

The Department's current data collection system is based on a stratified random sampling system of three major spatial strata: primary, secondary and tertiary landing sites based on the number of vessels operating, the fishery types and the volume of fish landed. Catch and effort data are collected from ten landing sites on a permanent basis. In past years, funding was provided for biological data collection of various fish species through the Government of St. Lucia in

collaboration with various agencies such as the CRFM. However, the collection of such data has not been sustained after termination of those externally funded projects.



Theoretical structure of data collection system

At each of the landing sites being sampled, catch and effort data are collected from every other returning vessel for fifteen (15) randomly selected days per month. Information such as area fished, species caught, gear used, hours fished, total vessels out, etc., is recorded and submitted monthly to the Data Section of DOF. The island's coastal waters are divided into two (2) zones or fishing areas for coastal and offshore pelagics (Zone A and Zone B) and three (3) zones for near shore and bank species (Zone C, Zone D and Zone E). The data collectors indicate the area fished based on these zones. In an effort to ensure the quality of the data collected, the data collectors are monitored regularly by the Department's personnel.

When data collectors submit catch and effort data, the data entry clerk first screens the data in the presence of the data collector in order to correct all errors and omissions. The data are then entered by the data entry clerk in the Trip Interview Program (TIP) in batch form by month, recording the interview number on each corresponding sheet. The TIP, developed by the US National Marine Fisheries Service's South-East Fisheries Science Center (NMFS/SEFSC), was adapted for use in the Caribbean region, with input from the OECS Fisheries Unit and CFRAMP in late February of 1992. Fisheries data which may be collected may be summarized in an inverted pyramid structure such that the amount, complexity, and cost of the information increases from one level to the next. Level 1 data describes the location, fishing mode, target

fishery, etc. for each fishing trip. Level 2 data consists of landings and associated price or value information. Level 3 data consists either of information for a composite sample or describes the kinds and numbers of individual measurements taken. Level 4 is comprised of individual length and weight measurements and sex determinations; Level 5 data consists of measurements required to determine age of fish. The data which TIP accommodates is categorized as:

1. **Background** information, which includes the identity of the data collector, place/site where collection or sampling occurred and information on the fishing vessel;
2. Information on the fishing **activity**, in other words fishing effort, gear, fishing location, landing by species, market (size) categories, and price information; and
3. **Bioprofile** data, including length/weight measurements, otolith samples etc. (Gold, 1990), which can be used for stock assessment.

A second integrity check is carried out by the Fisheries Assistant of the data section after the data has been entered into the TIP to ensure that the information is accurate and corresponds with the hard copy data sheets. Inconsistencies are recorded and later corrected by the clerk.

With respect to Licensing and Registration of fishers and vessels, every fisher must be registered and every fishing vessel registered and licensed. Information obtained at the time of registration is entered into the License and Registration System (LRS). Data entry into this system is carried out by the Fisheries Assistant. Periodically, integrity checks are carried out by the Fisheries Assistant to ascertain accuracy of the data in this database.

With the present sampling system, data are received on time and thus can be checked and entered regularly. This enables DOF to be current with information on the sector in terms of fish landings and effort.

Catch and Effort data is collected for demersals, coastal and offshore pelagic. Financial constraints do not allow for biological data collection. Data exists from 1995-current. There are nine (9) data collectors employed by the government to collect data at ten (10) landing sites, where each works 15 days/month.

### **5.3 Data Management – Current Situation**

For catch and effort data, once a batch of data has been entered, it is stored on diskettes (using WinZip) and on the Department's intranet. After the inconsistencies from the integrity checks are corrected, two copies of data are backed up on diskettes (using WinZip) and stored on-site and off-site. The location of the off-site back-up is not clear and this information was not revealed. The intranet copy is updated after the corrections are made. For all other data, the information is stored as hard copy and on the Department/ intranet.

The Data Section comprises three (3) staff members:

- Two (2) Fisheries Assistants: one is responsible for the overall day-day running of the Data Section, compilation of the annual total fish landings, supervision of the Data Section and data collectors; the other is responsible for the registration and licensing of fishers and vessels as well as the LRS and summaries of these data
- Data Entry Clerk: responsible for entering fish landings data into the TIP

The Data Section utilizes the Caribbean Fisheries Information System (CARIFIS) for data management.. CARIFIS is an upgraded combined version of TIP and LRS developed with a Microsoft Access™ “front-end” to make it more user-friendly. Data is entered daily and validated periodically or at the end of every batch (10 sites) inputted into the TIP.

The country uses TIP and LRS for entering/storing data, and Excel for reporting and analyses. CARIFIS is operational but the country needs more training to fully utilize the system; so in the meantime they continue to use TIP and LRS. The country needs a refresher course in the use of CARIFIS. So CARIFIS has a copy of the countries data in it, but if they need to find a fisher registration or a catch and effort information they look into LRS or TIP.

Summaries of landings and effort by species by site by day and by gear can be generated for the areas sampled. Total landings by species and groups of species as well as by fishery have also been generated. It is the intent of the Data Section that more detailed analyses will be performed in the future, as data personnel seek further training in this area.

Since 2004, the CRFM has held Scientific Meetings where all participating countries take data collected and have analyses such as stock assessments performed. 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 to analyze data with limited in-country capacity. St. Lucia has participated in these meetings and stock assessments on conch and lobster have been carried out.

#### **5.4 Information Dissemination**

Summaries of the data are produced and distributed in hard copies or soft copies. Data is sent to the St. Lucia Statistics Department, Agriculture Statistics Department, CRFM, FAO, ICCAT and the general public.

The information has served to advise on import licenses and permits based on sufficiently locally available fishes landed as well as determining the seasonality of certain species of fish and other trends. There needs to be closer linkages between the FIS and the management of the fisheries.

### **5. 5 Gaps in the Capacity for Management of Fisheries Information Systems**

#### **1. Human Resources**

The number of staff members in the St. Lucia DOF is reasonable to effectively collect and manage the national fisheries data. 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	1	1	Yes
<b>Total</b>	<b>11</b>	<b>16</b>	<b>5</b>	

*\* 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; to facilitate this, the data collectors usually live in the community in very close proximity to the landing site.*

*\*\*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 management the fisheries data. Though some equipment is available for use, these are not dedicated to the Fisheries Information System, and will have implications for safety of data as well as access to the data. The system requires at a minimum:

- Two (2) Desktop Workstations for data input
- One (1) Desktop Workstations for validation of data, summary statistics, and data assimilation

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- 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

## **5.6 Potential Projects for Fisheries Data Management**

These possible pilot projects are listed below in order of priority:

### **Component 1**

#### **Assessment and re-organization of the fisheries information management system**

##### **Purpose**

The fisheries information management system was instituted in 1979. Although there have been improvements in a number of areas, there is still the need to evaluate the information management system to determine its level of efficiency and effectiveness. Improvements in the system will provide an improved output of information which will contribute significantly to the overall management of fisheries and associated resources. Moreover, there is a need for informed fisheries resource management/development due to the increased dependency on comprehensive and accurate data on resources and fishery.

##### **Main Activities**

- Review and evaluate the current data collection system currently used by DOF, including an assessment of characterization of the fish landing sector as a basis on which to devise the most efficient sampling frame the catch and effort and biological sampling
- Acquire upgraded hardware and software for the better management and processing of fisheries resources data
- Capacity building and training of the DOF staff involved in fisheries data and resource management at all levels in areas such as data management and bio-statistics
- Dissemination of adequate information curtailed to each target group such as fishers, students, scientists, media and general public
- Pursue the collection of data in unexplored landing sites and fisheries resources

### **Component 2**

#### **Development of a program for the verification and re-registration of fishers and vessels**

##### **Purpose**

An updated and revised database on fishers and vessels within the fishing industry will generate more accurate information, which can be used to better serve these key stakeholders. Additionally, such a program will provide important information regarding the social and economic status of fishers as well as assist management in the decision making process.

##### **Main Activities**

- Reclassification of existing vessels
- Development of a criteria for the reclassification of various vessel types
- Acquire equipment and supplies for the re-registration program
- Undertake fisher and vessel re-registration of the various communities
- Public education and awareness of stakeholders through workshops and meetings
- Acquire upgraded hardware and software for the program
- Capacity building and training of DOF Staff as to the importance of such a program for fisheries management.

### **Component 3**

#### **Development of a program for the collection of biological data for fisheries resources.**

##### **Purpose:**

Currently, the DOF' data collection scheme comprises mainly landings and catch and effort. As such, collection of biological data will enhance the information base of the department and strengthen the management decision process for sound and sustainable fisheries.

##### **Main Activities**

- Assessment to determine which species should be focused on and which sites, sampling efficiencies, etc
- Capacity building and training of data collectors
- Capacity building and training of fisheries staff for biological analysis of the data collected and other fisheries staff
- Recruitment of additional data collectors for sampling and data collection
- Purchasing of some of the fish species for analytical processes
- Acquire laboratory and field supplies and equipment for use in the collection of biological data and samples
- Recruitment of laboratory personnel for the processing of samples and data collected
- Acquire hardware and software for data analysis and reporting
- Public education and awareness of stakeholders and the general public

## 6. RESULT OF THE BASELINE WORKSHOP

### 6.1. Output from the Workshop with the staff of Fishery Department

#### *Overview of the Workshop*

A participatory workshop was conducted in the Fisheries Division on the 28<sup>th</sup> and 29<sup>th</sup> of October 2009, in which 15 officers of DOF participated to discuss issues and the potential for sustainable fisheries development in St. Lucia (Table 13).

**Table 13: Overview of the workshop**

Date	Place	Content	Participants
25 October 2009	Department of Fisheries	- External Factor Analysis - Internal Factor Analysis	- Fisheries Officers: 15 persons
26 October 2009	Department of Fisheries	- Strategic Orientation - Problem Analysis	- CRFM: 1 person - Study Team: 2 persons

#### *Problem Analysis*

Problem analysis using the PCM method was applied to identify major issues of sustainable fisheries development for the fishing operations of local fishers. The problem analysis concluded the following major issues of fisheries development in St. Lucia:

- Conflict with other users of marine resources,
- Depletion of near-shore fish stocks,
- Lack of a reliable market system for fish products, and
- Scarcity of resources; for example, fishing materials

#### *ID/OS Analysis*

The ID/OS (Institutional Development and Organizational Strengthening) method was applied to the workshop in DOF. The workshop analyzed external and internal factors (problems, conditions, potential and so on) of DOF, and found proper strategic options in terms of sustainable fisheries development in St. Lucia. According to the basic question in sustainable fisheries management and development, external and internal factor analyses concluded the following results:

Target Organization: DOF, St. Lucia

Basic Question: How can DOF improve the sustainable management and development of the fisheries sector?

External Factors to Department of Fisheries	
Opportunity	Threat
Level of resource exploitation sustainable Involvement of fisheries community in fisheries development activities Maintain good collaborative links with fishers' organizations	More financial resources are needed Climate change Lack of political will to support fisheries management activities (political directorate)
Internal Factors of Department of Fisheries	
Strength	Weakness
DOF's mission is well defined Dedicated staff Realization that a bottom-up process works Good linkage between extension, fishers and fishing communities Good collaboration with other agencies; for example, other departments, NGOs Effective transfer of information to the public	Inadequate funds to carry out DOF work programs Proper research assets required (vessels) Insufficient staff training Inadequate equipment to perform duties Not enough staff working at DOF

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

The strategic orientation discusses the practical impact of 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 DOF might take account of enhancing the opportunities “Maintenance of good collaborative links with fishers’ organizations”, and “Involvement of fisheries communities in fisheries development activities” as effective strategic options for sustainable fisheries development.

## 6.2. Output from Workshop with Local Fishers

### *Overview of the Workshop*

Mini-workshops with local fishers were conducted on the 23<sup>rd</sup>, the 28<sup>th</sup> and the 29<sup>th</sup> of September 2009 at the following three landing sites: Soufriere (west coast); Vieux Fort (south coast); and Dennery (east coast). From 9 to 18 fishers attended the workshop to discuss their current fishing activities and identified major issues of their fishing operation (Table 14).

**Table 14: Overview of the workshop**

Date	Place	Contents	Participants
23 September 2009	Soufriere (West coast)	Fishing Ground (Mapping) Fishing Activities Income and Expenditure of Fishing Operation	- Local Fishers: 14 persons - Fisheries Department: 1 person - CRFM: 1 person - Study Team: 2 persons
28 September 2009	Vieux Fort (South coast)	Fishing Period (Seasonal Calendar) Problems / Issues of Fishing Activity and Operation	- Local Fishers: 18 persons - Fish Market Corporation: 1 person - Fisheries Department: 1 person - Study Team: 2 persons
29 September 2009	Dennery (East coast)		- Local Fishers: 11 persons - Fishermen’s Cooperative: 1 person - Fisheries Department: 3 persons - Study Team: 2 persons

### *Summary of Community*

The basic features of 4 fish landing sites were identified in the workshops as shown in Table 15.

**Table 15: The basic features of 4 fish landing sites**

Site	Number of Fishers	Number of Fishing Boats	Fisheries Facilities
Soufriere	Pirogue: 80 – 100 Canoe: 50 – 55	Pirogue: 35 Canoe: 11	Fish Landing / Market Facility
Vieux Fort	Pirogue: 300	Pirogue: 80 - 90 No canoes	Fish Landing / Market Facility
Dennery	Pirogue: 300 – 350	Pirogue: 70 - 90	Fish Landing / Market Facility

### *Present Status of Local Fishery*

Most fishing boats engage in trolling fishing around the FADs in offshore areas, and catch offshore pelagic fish, mainly dolphin fish and kingfish (wahoo) on day trips. The period of troll fishing is from November to June or July, in order to avoid the hurricane period. During the off season of troll fishing from August to October, some troll fishing boats switch to operating pot fishing or bottom long-line fishing to catch demersal fish in near-shore areas. The peak fishing period for offshore pelagic fish is February and March.

In the west coast areas, especially Soufriere, some fishers are engaged in gill-net fishing (fillet-balahoo) all year round to catch coastal pelagic fish such as robin, jack, and flying fish. The peak fishing period of coastal pelagic fish is January.

### ***Needs of Local Fishers***

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

#### **Fish Sales and Marketing:**

Tourist hotels request only big fish such as dolphin fish and snapper.

A large amount of fish come from other countries such as St. Vincent.

#### **Purchase of Fishing Gear and Spare Parts:**

Fishers usually buy spare parts and find gear individually from St. Vincent.

Fishing gear is so expensive to replace.

#### **Fishing Techniques:**

Lack of modern fishing techniques, e.g., tuna long-line, single drop-line

Technical training is not efficient.

#### **Fishermen's Cooperatives:**

All fishers should be members of cooperatives, not only boat owners.

Loan schemes are necessary to support fishers' livelihoods in the low fishing season.

#### **Safety of Fishing Equipment:**

Boats, fishing gear, gasoline are stolen at ports.

Fishing pots are often lost at sea.

### **6.3. Key issues identified in coastal resources management in the workshops**

According to results of the workshops with DOF and local fishers, several items were identified as key issues during the discussions, namely "Management of Coastal Pelagic Fisheries"; "Management of large pelagic fisheries"; and "Deployment of Artificial Reefs for Stock enhancement for lobsters and reef fishes".

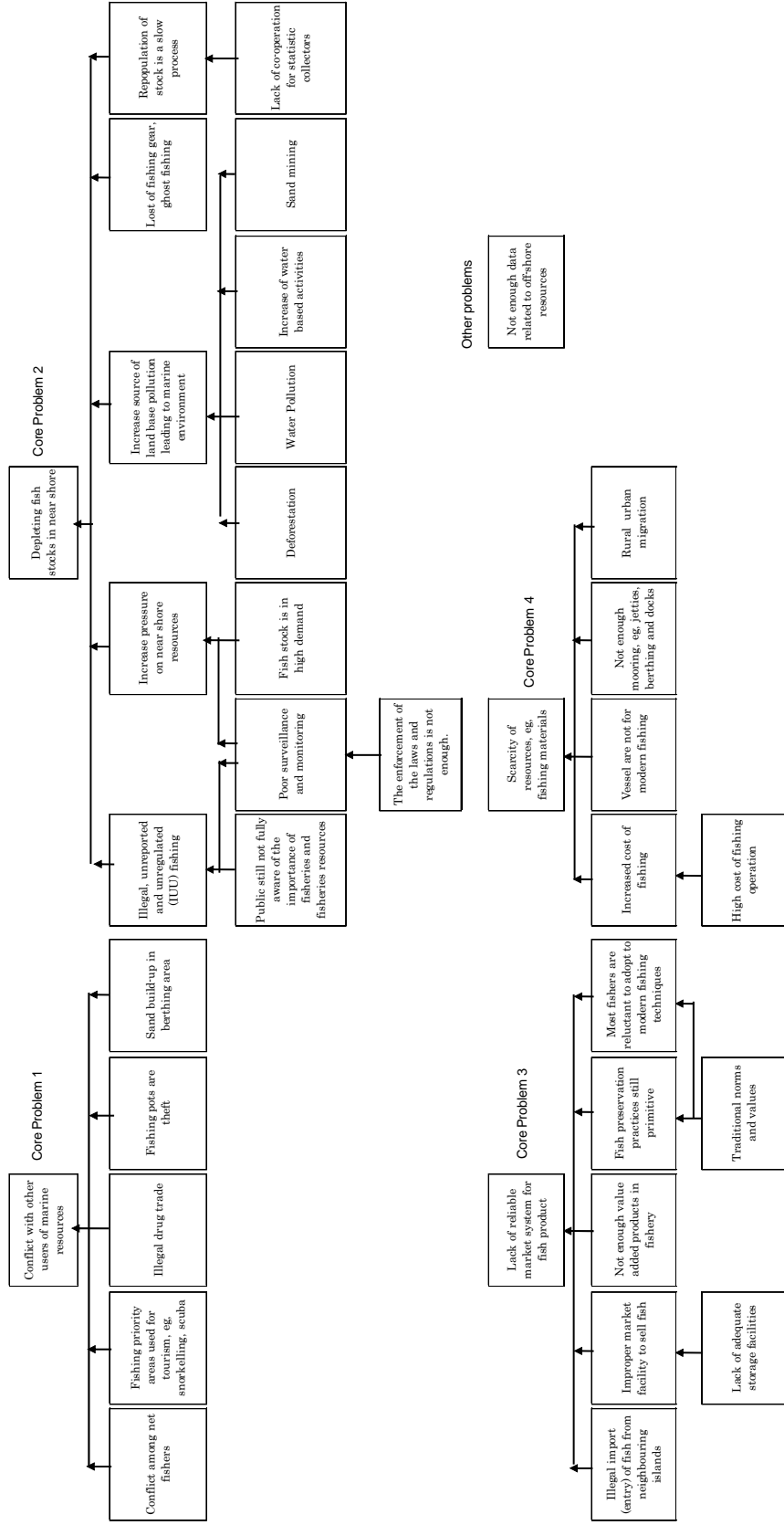
In Caribbean countries, most coastal fishermen usually move around coastal areas to catch coastal pelagic fish (balahoo, sardine, flying fish, etc.) by beach seines or fillet-balahoo, and land at any beach to sell their catch directly to locals. Therefore, it is difficult to qualify or quantify the actual fish catch. However, in Soufriere on the east coast of St. Lucia, small boats (canoes) are commonly engaged in coastal pelagic fishing and land most of the fish catch at the fishing port of Soufriere. Thus the stock of coastal pelagic fish can be effectively traced in a certain area. Due to regular monitoring activities, it is also possible to evaluate the composition of fish species and ages, and the fish stock of coastal pelagic fish in the east coast of St. Lucia.

In St. Lucia, FADs are set in offshore areas and are funded by the EU. In workshops with local fishers, some indicated a gradual decline in the fish catch around FADs as well as the high fuel cost for travel to the FAD. FADs need to be set near coastal areas, to save on the fuel cost incurred while fishing large pelagic fish (tuna, dolphin fish, kingfish, etc). In order to manage these species sustainably the fishing effort around the FADs need to be monitored. Fishers and their cooperatives also need to coordinate efforts with the fisheries department to achieve this and later act as a model of monitoring and management for others.

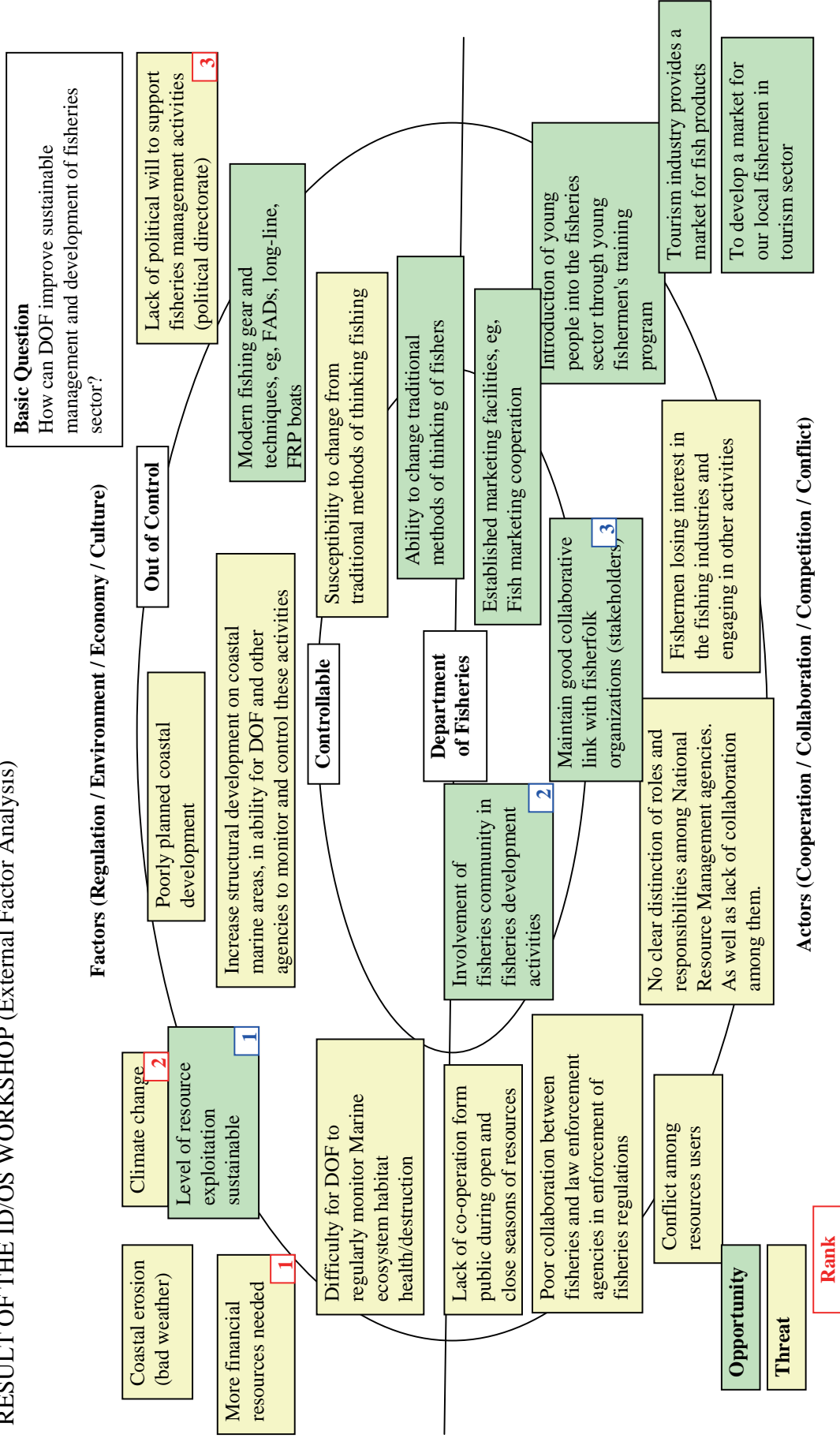
Tourism is an important industry in St. Lucia, and the lobster is an important fisheries commodity for tourists. Therefore, the fishing pressure on lobsters has increased by the breaking of the closed season and with illegal fishing. Moreover, the pressure of scuba and skin diving on coral reefs has rapidly increased, and the habitat has been seriously damaged by recent tourism development. There is also concern that the habitats of reef fish will shrink due to this coral reef damage. Thus, the effectiveness of FADs to expand the habitats of lobster and reef fish as well as serve as a management model for artificial reefs in fishermen's communities must be verified.

# RESULT OF THE PCM WORKSHOP

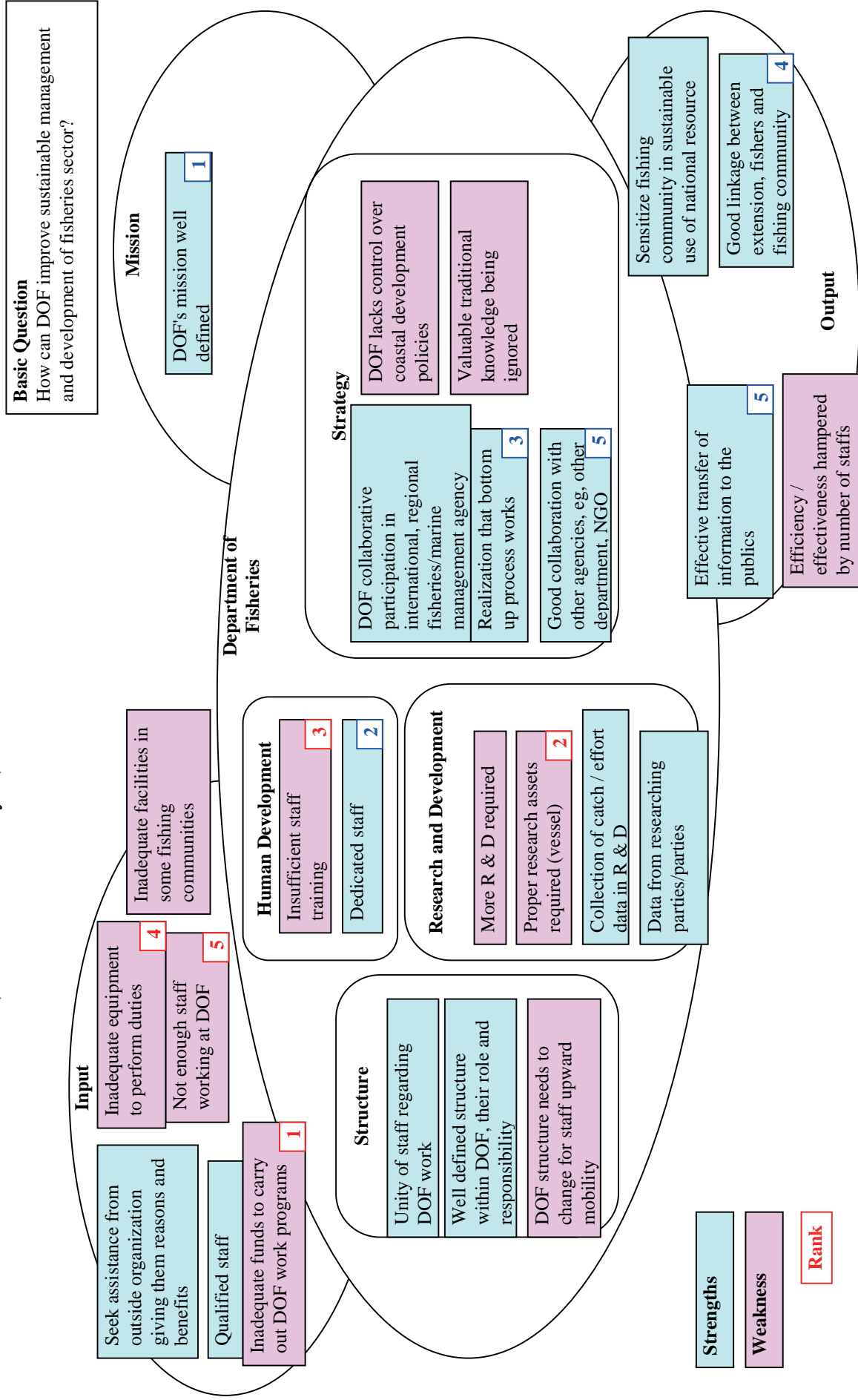
Problem Analysis  
 Project Cycle Management Workshop  
 Date: September 25, 2009  
 Place: Department of Fisheries, St. Lucia  
 Target Group: Coastal communities



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



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





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# **FINAL COUNTRY REPORT: ST. VINCENT AND THE GRENADINES**



**December 2009**

# ST. VINCENT AND THE GRENADINES

## Country Profile

Geographic coordinates	13°10'N, 61°14'W
Total area	389 sq km
Land area	389 sq km
Water area	negligible
Length of Coastline	264 km
Shelf Area	1,074 sq km
Territorial Sea	6,124 sq km
Claimed EEZ	32,320 sq km
Highest point (m)	1,234 m (La Soufriere)
Climate	tropical; little seasonal temperature variation; rainy season (May to November)
Natural hazards	hurricanes; Soufriere volcano on the island of Saint Vincent is a constant threat.
Population	120,000 (2008 estimate)
Annual Population Growth Rate	-0.344% (2009 est.)
Life Expectancy	total population: 73.65 years
Languages	English
Ethnic Mix	Black 66%, East Indian 6%, Mixed Race 19%, Carib Amerindian 2%, White (including Portuguese) 4%, Other 3% (2008 estimate)
Work force	57,520 (2007 est.)
Unemployment	15% (2001 est.)
GDP (PPP)	US\$1.07 billion (2008 est.)
GDP Growth rate	0.9% (2008 est.)
GDP per Capita	US\$10,200 (2008 est.)
Currency Unit	Eastern Caribbean dollar; US\$1 = EC\$2.68
Area of Mangrove Forests	
Percent of Mangrove Forests Protected	
Per Capita Food Supply from Fish/Fishery Products (2000)	20 kg/person
Exports	US\$193 million (2006); bananas, eddoes and dasheen (taro), arrowroot starch; tennis racquets

Sources: CIA World Factbook – St. Vincent and the Grenadines (2009); EarthTrends Country Profiles – SVG.

## 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
CPUE	Catch per Unit Effort
CRFM	CARICOM Regional Fisheries Mechanism
CTA	Technical Centre for Agricultural and Rural Cooperation ACP - EU
EU	European Union
FAO	Food & Agriculture Organization of the United Nations
GEF	Global Environmental Facility
ICCAT	International Commission for the Conservation of Atlantic Tunas
IHHN	Hypodermal Hematopoietic Necrosis
JICA	Japan International Co-operation Agency
LRS	Licensing and Registration System
MALF	Ministry of Agriculture, Lands and Fisheries
mt	Metric Ton
NFO	National Fisherfolk Organization
SVG	St. Vincent and the Grenadines
TCMP	Tobago Cays Marine Park
TIP	Trip Interview Program
TSV	Taura Syndrome Virus
UNDP	United Nations Development Program

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# CHAPTER 1: INTRODUCTION



St. Vincent and the Grenadines is a small archipelagic state situated in the south-eastern Caribbean located north of Grenada, south of St. Lucia, and west of Barbados. St. Vincent and the Grenadines is of a volcanic nature, stretching for 18 km from east to west, and 29.6 km from north to south with a total land area of 345 km<sup>2</sup>. Its coastal shelf is 7,800 km<sup>2</sup>, and the coastline of all its islands total 84 km. It has an Exclusive Economic Zone (EEZ) of 27,533 km<sup>2</sup>.

St. Vincent, the largest island, is termed the “mainland”. The nation’s capital Kingstown is located on its southwest coast and is the most prominent fishing community in the state. The Grenadines consist of thirty-two (32) small islands and cays of which seven (7) are relatively large and inhabited, namely Bequia, Mustique, Canouan, Myreau, Union Island, Petit St. Vincent and Palm Island. The country has a population of approximately 120,000 (2008 estimate) and an average annual growth rate of -0.344% (2009 estimate). The average life expectancy is 73.65 years. The capital Kingstown and suburbs has a population of approximately 19,300 (2009 estimate); the population density of Kingstown has been decreasing over the years.

## *History of the Fisheries in SVG*

Throughout the history of SVG, fish has been the main source of protein for people living close to the coast. Fishers often had enough to sell, and to give away to their families and friends.

After the Second World War the influx of fishers into the fishery increased significantly as opportunities for employment decreased elsewhere. Fish exports to Martinique and Trinidad of lobster conch and snappers took off. Fish, mostly dry salted, were also taken to the capital Kingstown on a more regular basis. Canouan emerged as an important island for the salting of fish in this era.



In the 1960's the Government increased its initiatives in developing the fisheries sector. With assistance from the UNDP and the FAO, infrastructure development at markets and training for



fishers were initiated. These developments along with regular fish trade to Martinique, Grenada and Trinidad acted as an incentive to increase fishing. This period also marked the beginning of motorization of vessels in St. Vincent and the Grenadines. Motorization represents one of the more significant historical increases in the level of fishing effort.

On mainland St. Vincent fishing was conducted mainly on the west and south coasts. Little in terms of fishing was carried out on the east coast of the island. Fish landing sites at Barrouallie, Chateaubelair and Layou consisted of a shed with running water. Kingstown was the main fish market and it was administered by the St. Vincent Marketing Board. The beach seine catching jacks, robins and other schooling species was the main fishing gear used. In Barrouallie the blackfish industry was seeing a downward trend based on increased international pressures on whaling and the apparent avoidance behaviour of mammals to the sound of boat engines.

The 1980s saw a reduction in fishing effort. This was because of increased fuel prices, increases in the priced of spare parts, engines and vessels. These led to rapid increases in the cost of fish production, hence fishers reduced their fishing effort. It was also during this period that the thrust towards fisheries management begun. Most of the legislative tools that now exist with respect to management began during this period. Heavily harvested resources such as lobster, conch and turtle were protected either by close seasons or size limits. Additionally, specially protected areas were set up. The Fisheries Act (1986) and the Maritime Areas Act (1983) were the two pieces of legislations that were set up to address some of these management issues.

The 1990s saw marked improvements in the institutional, technical and infrastructural capacities of the sector. The Fisheries Division as manager of the sector strengthened its staff by acquiring trained technical personnel in a variety of fisheries disciplines. Additionally, tuna longline fishing was officially introduced. Fisheries complexes aimed at improving the marketing and distributional capacities of the sector were built at the major fish landing sites with the help of the Government of Japan.

### ***Description of the SVG Fisheries***

The SVG fishery may be divided into the following categories<sup>1</sup>:

**Offshore Pelagic:** These are fast swimming migratory fish that inhabit the deep sea. Species include tuna, billfish, dolphin, kingfish. These species contribute approximately 35% (0.88 million pounds) of the total estimate of fish landed and marketed, realizing annual value of \$2.8.

**Inshore Pelagic:** These are near shore fish found in mid water or surface water in beach areas, often smaller than off-shore pelagics e.g. jacks, robin dodger. On average these species contribute approximately 45% (1.13 million pounds) of landings to the local market, realizing an annual value of \$3.6 million.

**Demersals:** Marine organisms dwelling at the sea bottom, e.g. rock hind, blem (queen snapper), groupers, parrotfish. These species contribute approximately 10% (0.25 million pounds) to the local market, realizing an annual value of \$0.8 million.

**Shellfish:** Shell fish are marine species living at the sea bottom and protected by a shell, e.g. lobster, conch, whelks. Average annual contribution to landings is 5% (0.13 million pounds) with an average value of \$0.4 million.

**Sharks:** Sharks are fast swimming migratory fish that inhabit the deep sea and have a cartilaginous skeletal structure. Sharks are not particularly targeted; however by-catch could be significant especially in the longline fishery. Estimated annual landings for shark are less than 20,000 pounds at a value of \$60,000.

**Turtles:** Turtles are reptiles that live in the sea but come on land to lay their eggs. Marine sea turtles are taken mostly opportunistically by fishers. Estimated annual landings are 20,000 pounds. However poaching and catch out of season would probably contribute to this figure being higher.

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<sup>1</sup> Adapted from Jardine & Straker (2003).

**Whales and Porpoises:** These animals are migratory, or pelagic in the case of porpoises, marine mammals that give suckle to their young e.g. humpback whales, blackfish. There is a traditional significance to the harvesting of marine mammals in SVG. Humpback whales are targeted in Bequia while the pilot whale and other porpoises are targeted in Barrouallie and by some Kingstown Fishers.

The fishing industry in St. Vincent and the Grenadines is predominantly small scale and artisanal, employing traditional gears, methods and vessels. The majority of fishing vessels are open and powered by outboard engines. These vessels exploit both oceanic and inshore pelagics as well as the shelf and deep slope demersals. Most fishermen are daily operators, going out to sea in the morning and returning to land in the late afternoon or evening. A typical fishing day is about eight (8) hours. Fishers generally do not take ice to sea; instead the fish caught are stored in a shaded area of the vessel.

Four types of vessel are used:

- **Transoms (Bow and Stern):** Flat transoms boats, commonly called bow and stern boats or dories are open boats 3 - 6 m (11 - 27 ft) in length with a beam of 0.9 - 2.1 m (3 - 7 ft). They are constructed from wood or marine plywood. The cigarette is one type of this vessel. The wood or plywood in many cases is covered by epoxy or fibreglass, which provides a waterproof covering. Flat transom boats have a pointed bow and flat stern or transom and are often powered by one or two outboard gasoline engines ranging from 14 - 115 horsepower. On rare occasions, oars may be the only form of propulsion. These vessels are mostly used in the lobster and conch fishery in the Grenadines. However, the older types are also used in the demersal and seine fisheries.
- **Pirogues:** Pirogues are open boats with a pointed bow and flat transom, however, the bow is much higher than the flat transom boats and they tend to be slightly larger, ranging from 7-10 m (19-30 ft) long with a beam of 1-2.8 m (4-10 ft). They are made from fibreglass and powered by one or two outboard gasoline engines ranging from 40-75 horsepower. The pirogues have a similar function to the wooden flat transom boats described above, and have replaced the flat transom boats in some fishing units. However, these vessels are predominantly used in the trolling and demersal fisheries.
- **Double enders:** Double enders or “two bows” are open wooden boats ranging from 3 - 9 m (10 - 29 ft) in length with beams ranging from 1.2 - 2.4 m (4 - 8 ft). Both ends of the boat are shaped like the bow of a boat, hence the name two bows. In most cases the only means of propulsion are oars, but occasionally, they may be powered by a small outboard gasoline engine specially rigged at one end of the boat. These engines range from 6 - 48 horsepower, but a horsepower of 15 is typical. The double is the vessel of choice in the beach seine fishery
- **Longliners:** In SVG these vessels range from 34.7ft-48.5ft in length, with beams ranging from 9.7ft-15.9ft. The main type of longliner is a Yanmar type made of glass reinforced plastic (GRP) powered by inboard diesel engines ranging from 90-190 hp. They are multi-purpose in nature and designed to operate up to 150 nautical miles from the islands with a 3-5 day stay at sea. These multi-purpose vessels are used primarily for tuna longline fishing, but may also be utilised for trolling, bottom longline fishing and angling. In most cases, they are able to house 4-5 persons below the hull superstructure. The other longliners used are standard American built longline vessels purchased in the USA.

SIZE	SIZE CLASS	NUMBER OF VESSELS	PERCENTAGE (%)
12ft & under	Class I	51	7.5
>12ft - 20ft	Class II	330	50.7
>20ft - 30ft	Class III	245	38
>30ft - 40ft	Class IV	16	2.24
>40ft - 66ft	Class V	9	1.3
<b>TOTAL</b>		<b>624</b>	

There are approximately 650 fishing vessels operating at landing sites throughout SVG. Pirogues, Bow & Stern and Double-enders dominate the fishing fleet. Most of these vessels are below 32ft in length and are constructed mainly from wood and fiberglass. Many of the

fiberglass open vessels are imported from Trinidad and Tobago. However, in Bequia the “Cigarette” made from marine ply and covered with fiberglass in some cases is constructed.

The outboard gasoline two-stroke engine is the main method of propulsion used. The horsepower used ranges from 40-65 hp. However, fishers will use more or less horsepower depending on their needs.

The landing sites are zoned and categorized (stratified). There are six (6) zones and thirty-six (36) landing sites. A site is categorized as either primary, secondary or tertiary based on three main variables, i.e., the number of fishing boats that regularly land fish at the site; the quantity of fish landed; and the level of infrastructural development. SVG has three (3) primary sites (Kingstown, Barrouallie and Owia); thirteen (13) secondary and twenty (20) tertiary sites.

#### **Zone 1: 7 Landing Sites (Calliaqua, Greathead, Indian Bay, Kingstown, Lowmans, Campden Park, Questelles)**

This zone contains the major landing sites throughout the state. All the various forms of fishing gears are used in this zone. Two of the eight fishing complexes are located in this zone, the New Kingstown Fish Market (NKFM) in Kingstown and the Calliaqua Fisheries Complex in Calliaqua. Calliaqua, Indian Bay and Greathead are more famous for their bottom line fishers, targeting, snappers, groupers, and other bottom fish. Kingstown fishers are amongst the most versatile of fishers in the state. During the early months of the year the Kingstown fishers focus their attention on tunas, dolphin fish and wahoo by trolling. From July to December effort is switched to the snappers, groupers and other demersals using simple and multiple hand lines. Beach seining is also a popular form of fishing in this area. Recent trends show that while the development is slow fishermen from this area are the most innovative, in investing in bigger vessels and improved techniques. The number of fishers operating from Calliaqua has been gradually increasing since the mid-nineties.

#### **Zone 2: 4 Landing Sites (Clare Valley, Buccament, Layou, and Barrouallie)**

These landing sites are situated on the South-Central Leeward part of the mainland. There is one fisheries complex in this zone situated at Barrouallie. Beach seining and other forms of net fisheries (gill netting, cart welling) are probably the most common form of fishing in this zone. Here robins, jacks, ballahoo and small tunas are targeted. In Barrouallie, fishing for pilot whales and small cetaceans has been long practiced.

#### **Zone 3: 6 Sites (Rose Bank, Troumaca, Dark View, Petit Bordel, Chateaubelair, Fitz Hughes)**

These are the northernmost sites on mainland St. Vincent. There is one Fisheries Complex in this zone situated at Chateaubelair. Typically the landing sites are on sheltered calm sandy bays conducive for beaching small vessels. The types of fishing practiced at this site are similar to Zone 3. Beach seines target robins, jacks, ballahoo and small tunas. However, line fishing is also popular at these landing sites.

Fishing activity at Petit Bordel has decreased over the years. Nonetheless, the number of vessels at this site has increased. These vessels however, are engaged in activities other than fishing.

#### **Zone 5: 4 landing Sites (Biabou, Sandy Bay, Owia, and Fancy)**

This zone stretches from Biabou in the south to Fancy in the north on the Windward side of the mainland. Zone 5 is known for its brave fishers who have to overcome the rough Atlantic to make a living from the sea. Fishers in this zone fish and land their catch in some of the most dangerous conditions in the state. There are one fisheries complex in this zone (at Owia). A typical landing site in this zone is a rough stony beach with no landing facilities.

Recent trends show that more and more fishers in this area are leaving the fishery, particularly the older fishers. In Biabou the fishers mainly use simple to multiple forms of line gear to catch their fish. Species targeted are snappers, groupers and other demersal species. At the other northern sites Owia, Sandy Bay and Fancy, line fishing is also practiced; however; the beach seine fishery is the main contributor to fish landings in Fancy and Owia.

#### **Zone 6: 6 landing sites (Bequia: Paget Farm, Friendship Bay, Admiralty Bay, Lower Bay, La Pompe, Mustique)**

Zone 5 is the Northern Grenadines with one fisheries complex each on Mustique and Bequia. Various forms of fishing are practiced in the Northern Grenadines. Line fishing (simple and multiple forms) is quite popular and targets snappers, groupers, parrot fish and other reef and deep slope species. Pot fishing for reef species and lobsters is also popular. Scuba diving for lobster and conch is a practice that is decreasing in popularity. Spear gun divers also shoot reef species and other reef associated pelagics. Beach seining for robins, jacks and other inshore pelagics is also widely practiced by fishers from this zone.

**Zone 6: 6 landing sites on 5 islands (Canouan, Mayreau, Petit St. Vincent, Palm Island and Union Island: Clifton, and Ashton)**

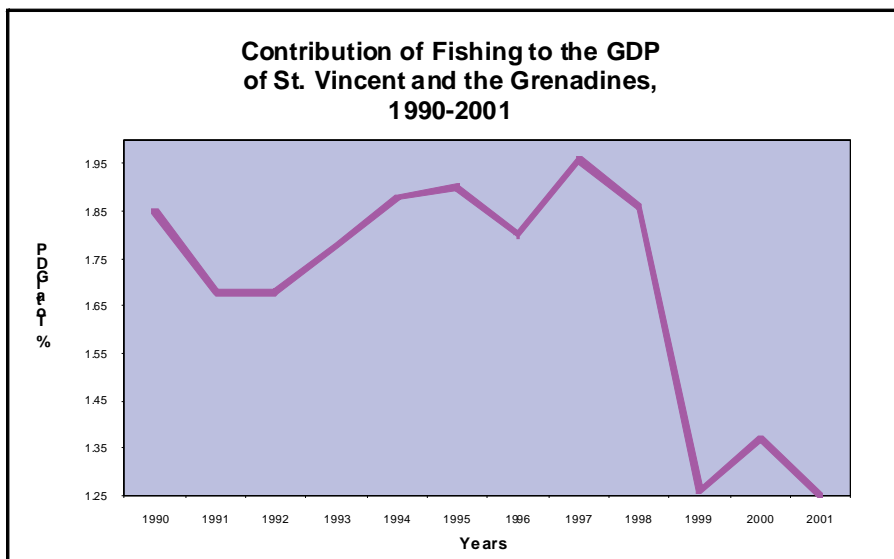
Zone 7 is the southern Grenadines with one fisheries complex each on Canouan and Union Island. Fishing for lobster, conch and demersals is predominant in this zone. Trading vessels also operate from here, buying fish directly from fishers for export. During the tourist season some vessel owners may use their boats for non-fishing activities, like as water taxis. It is one of the most dynamic zones in terms of fishers moving in and out of fishing. This movement often depends on the major activity going on in the islands at the time.

**Table 1:  
Information on Fish Landing Sites, St Vincent and the Grenadines**

Fishing Zone	Landing Site	Category	Facilities	PelagicSpecies	Fishing Gears
1	Calliaqua	Primary	Fisheries Complex	Wahoo, dolphin, tunas	Trolls
	Greathead	Secondary			
	Indian Bay	Tertiary			
	Kingstown	Primary	Fisheries Complex		
	Lowmans	Tertiary			
	Campden Park	Secondary			
2	Clare Valley	Secondary		Robin, Jacks, small tunas	Beach seines, gillnets
	Buccament	Secondary			
	Layout				
	Barrouallie	Primary	Fisheries Complex		
3	Rose Bank	Secondary		Robin, Jacks, small tunas	Beach seines, Lines
	Troumaca	Tertiary			
	Dark View	Tertiary			
	Petit Bordel	Tertiary			
	Chateaubelair	Primary	Fisheries Complex		
	Fitz Hughes	Tertiary			
5	Biabou	Tertiary		None	Multiple forms of lines
	Sandy Bay	Tertiary			
	Owia	Tertiary			
	Fancy	Tertiary			
6	Bequia	Primary	Fisheries Complex	Deep slope	Multiple & Multiple form lines
	Paget Farm				
	Friendship Bay				
	Admirally Bay				
	LaPompe				
	Mustique	Primary	Fisheries Complex		
7	Canouan	Primary	Fisheries Complex	Conch and lobsters*	Lobsters pots, traps
	Mayreau				
	Petit St Vincent				
	Palm Island				
	Union Island	Primary	Fisheries Complex		

*N.B. Primary sites have ice making, storage, fuel dispensing, retailing stalls, lockers, and docking facilities.*

Fishing Zone	Number of Vessels	Number of Fishers
1	209	652
2	132	521
3	61	340
5	40	121
6	134	401
7	75	213
Total	651	2248



*Source: Fisheries Data Information Document, St. Vincent and the Grenadines 2003*

On average the fishing industry contributes 1.7% to the GDP. This is dependent not only on earnings from fish landings, but also on the performance of other sectors in the economy. It has been long felt that this particular figure does not truly reflect to the sectors contribution. Aspects of secondary product enhancements such as the sale of fish in restaurants, investments and loans in fisheries are not truly quantified. Additionally, the contributions of the recreational fisheries (e.g. sport fishing and recreational diving) are often seen as contributions to tourism and other sectors rather than to fisheries.

With respect to the national work force 5% are employed full-time in the fisheries sector. Of this number 85% are employed solely as fishers. There are approximately 2,500 full- and part-time fishers in SVG. Fish vendors, traders, gutters and handlers make up an additional 500 persons. While there are no statistically reliable estimates for the number of fishers before the 1990s, anecdotal evidence indicates that relative to the rest of the population the percentage of full- and part-time fishers and other people in the fishery has decreased. This is particularly so in the Grenadines where fishing traditionally is the main area of employment. Today the hospitality and construction industries have overtaken fishing in providing employment in the Grenadines.

**TABLE 3:  
PROFILE OF FISHERIES SECTOR, ST. VINCENT AND THE GRENADINES**

	WEIGHT (lbs)	VALUE (\$EC)
<b>Landings</b>	2.1 million lbs	\$6.4 million
<b>Exports</b>	0.41 million lbs	\$2.06 million
<b>Imports</b>	0.78 million lbs	\$3.04 million
<b>Per capita fish consumption</b>	23 lbs annually	
<b>Socio-economic</b>	2 % contribution to GDP	
	2,500 full- and part-time fishermen	
	500 vendors, traders, gutters, etc.	
	Representing 6% of labour force.	
	651 fishing boats.	
	Average cost of fishing vessel with gear, \$1,500	
<b>Fishery Specific Information</b>	Shell fish account for 5% of landings	
	Demersals account for 10% of landings	
	Small coastal pelagics account for 45% of landings	
	Off-shore pelagics account for 35%	
	Other 5%	

The age distribution of fishers reveals that the average fisher is 46 years old. Only 5% of fishers are less than 30 years old. This represents a fairly mature working class of fishers, but it shows that recruitment of new persons into the sector is weak. With respect to educational levels, 76% of fishers have attained at least primary level education, 15% secondary and 9% post secondary.

#### ***Fishers' Organizations in SVG***

All the fishers' organizations in SVG are co-operatives, and there are four (4) in existence: Goodwill, Calfico, Barouallie and North Leeward. Of these the latter is inactive. A co-operative is in the process of being formed in North Windward, and is referred to as a pre-co-operative. The membership in 2009 is listed below in Table 4.

<b>Table 4: Co-operatives and Pre-Co-operatives in SVG: Locations and Membership in 2009</b>		
<b>Co-operative</b>	<b>Location</b>	<b>Members</b>
Goodwill	Kingstown	200+
Calfico	Calliaqua	98
Barouallie	Barouallie	18
North Leeward	Chateaubelair	14
North Windward	Fancy, Sandy Bay, Owia	20+
<b>Total</b>		<b>350+</b>

*Fisheries Division (2009)*

All the above are **supply co-operatives**, selling fishing gear and fuel to their members. There are no subsidies; all inputs are supplied at market rates. The co-operatives obtain fishing gear at wholesale prices from a supplier in Bequia. The co-operatives each operate a fishing complex built by the Japanese government under grant aid programs to the SVG government<sup>3</sup>. Each co-operative is supposed to pay an annual lease to the MALF for its complex, but often this is

<sup>3</sup> A fisheries complex was recently opened at Owia in NorthWindward (April 2009), hence the drive to establish a co-operative there.

honoured only in the breach. The co-operatives provide refrigerated fish storage at these complexes, as well as offer locker facilities for the fishers for a monthly rental.

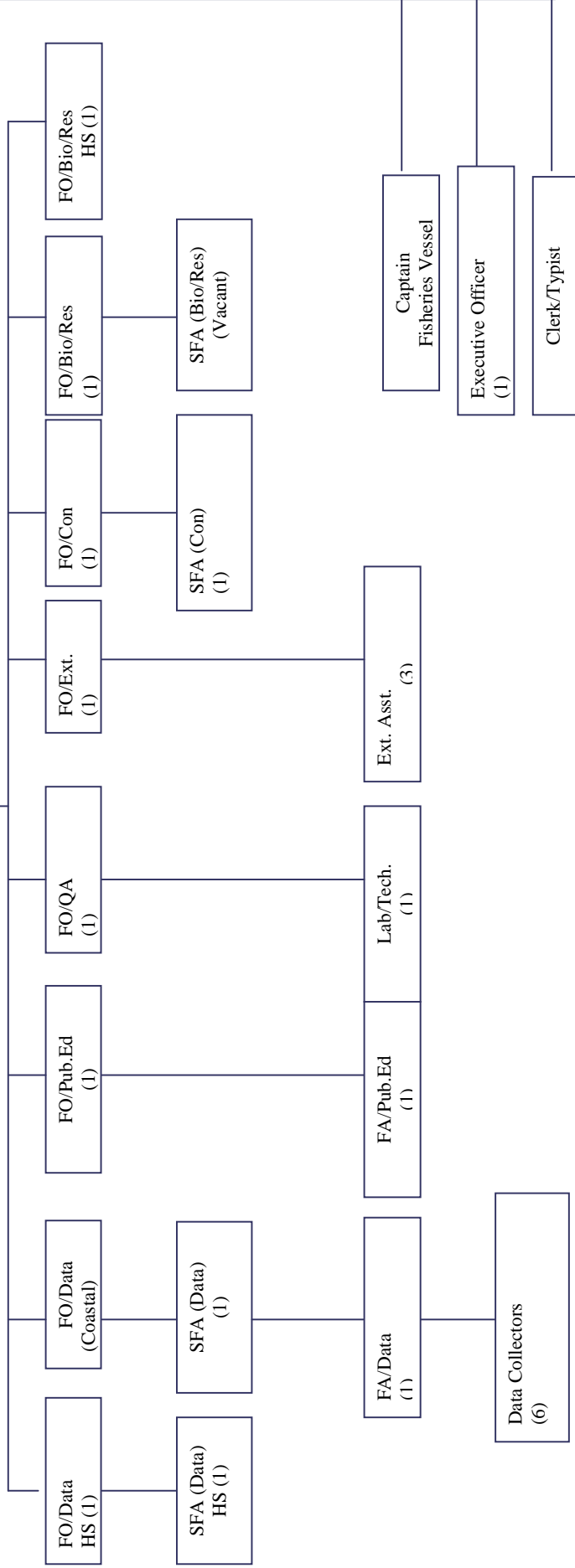
### **THE ADMINISTRATION OF FISHERIES IN SVG**

The Fisheries Division operates under the Ministry of Agriculture, Lands and Fisheries and is responsible for the overall management and development of the fisheries sector. It is comprised of six units – Biology and Research, Extension, Public Education, Data, Quality Control/Product Development and Conservation. Each unit is headed by a Fisheries Officer, with the other supporting staff being Senior Fisheries Assistants, Fisheries Assistants, Data Collectors, Typist, Junior Clerk, Boat Captain and Driver. The Chief Fisheries Officer is the Head of the Division and reports directly to the Chief Agricultural Officer (see organization Chart below).

Minister of Agriculture, Lands and Fisheries

Permanent Secretary in MALF

Chief Fisheries Officer





## CHAPTER 2: COMMUNITY-BASED FISHERIES MANAGEMENT COMPONENT

### 2.1 Coastal Community Characteristics

The archipelagic state of St. Vincent and the Grenadines consist of thirty-two (32) small islands and cays of which seven (7) are relatively large and inhabited, namely Bequia, Mustique, Canouan, Myreau, Union Island, Petit St. Vincent and Palm Island. The country has a population of approximately 120,000 (2008 estimate) most of whom live in small settlements on the coast. The 2001 census found the following households/population is the islands:

<b>TABLE 5</b>				
<b>Households/Population in St. Vincent and the Grenadines 2001</b>				
	Households	Population		
		Male	Female	Total
<b>St. Vincent</b>	27,884	50,513	49,273	99,796
<b>Bequia</b>	1,318	2,511	2,350	4,861
<b>Mustique</b>	382	422	130	552
<b>Canouan</b>	509	642	484	1,126
<b>Mayreau</b>	66	129	116	245
<b>Union Island</b>	631	877	899	1,776
<b>Prune Island</b>	24	28	25	53
<b>Petit St. Vin.</b>	12	14	12	26
<b>TOTAL</b>	<b>30,826</b>	<b>55,136</b>	<b>53,289</b>	<b>108,435</b>

*Source: Calculated from Population and Housing Report, 2001 Census.*

The Grenadines are world famous as a sailing destination, and it is not uncommon while driving along the SVG coast to see a yacht riding at anchor. All the Grenadines and indeed most of the Leeward and Windward Islands are a mecca for yachting enthusiasts who sail around, stopping where it suits their fancy to spend a day or two. One of the most popular anchoring spots where often more than 100 yachts at a time may be seen is the Tobago Cays in the southern Grenadines, and this floating town is an important source of income for residents of the nearby islands of Mayreau and Union



*About 30 yachts anchored off Baradal, Tobago Cays.*

Island. St. Vincent and the Grenadines is physically beautiful, possessing natural marine features which could support both traditional Caribbean tourism (sun, sand, sea, etc.) and the newer types of visitor experiences, emphasizing nature attractions.

Tourism has significantly changed the local economies of these coastal communities. Small guest houses offering accommodation have



*A "water taxi" assisting a yacht off the Tobago Cays.*

sprung up, as well as restaurants and water

sports operators. Grocery stores on the islands do well supplying yachts. Many fishers have become “water taxis”, collecting a shopping list from yachts and obtaining for them items such as ice, drinks, groceries and vegetables on nearby islands. The water taxis also remove garbage from the yachts to the islands for disposal (for a fee).

## FISHING DATA: THE GRENADINES

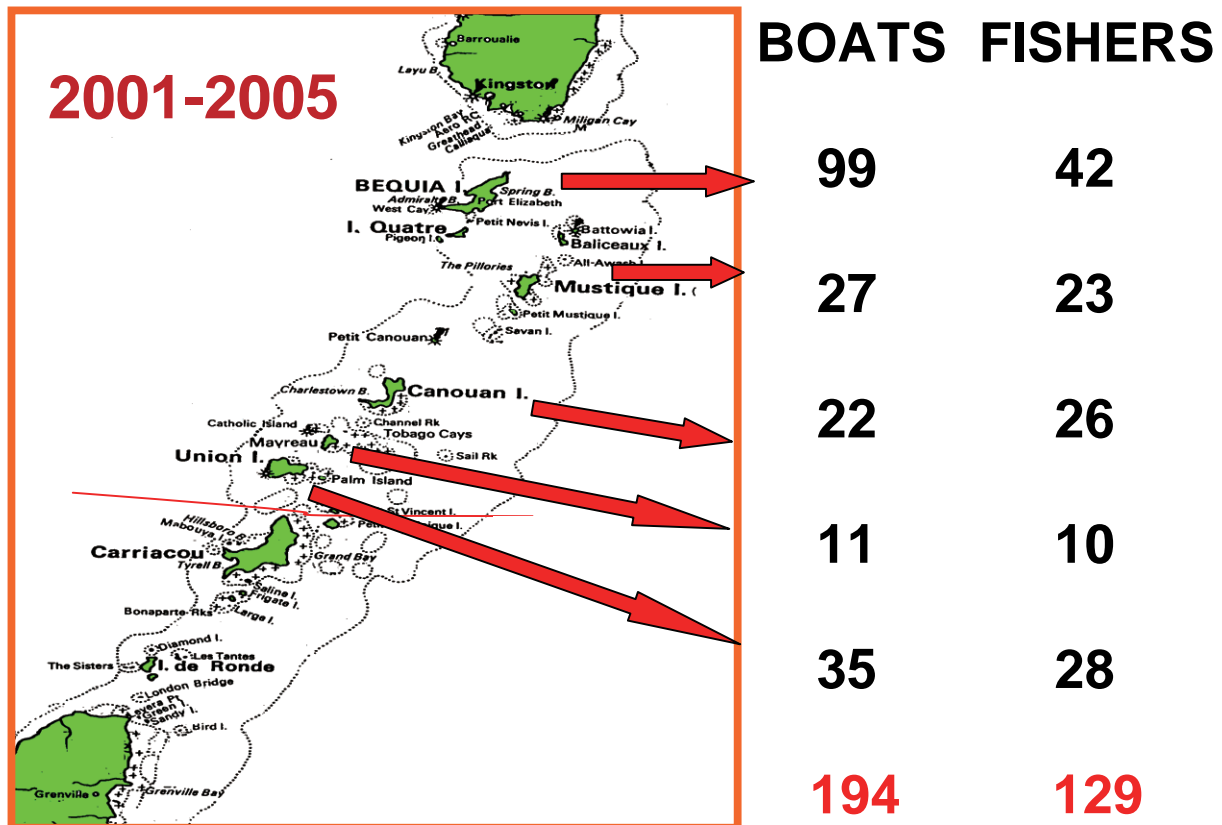


Figure 1. Fishing activity in the Grenadines of St. Vincent.

Although fishers may register their names with the FD, it must first be pointed out that there is no requirement in SVG law for fishers to be licensed, neither are they required to pay any sort of fee (resource rent) for the right to extract a valuable resource (fish) from the natural environment, nor to pay for the fish itself. SVG fishers are given the fish free of cost by the government, and they make no contribution to the enforcement effort to protect the rights of legitimate fishers, nor to the task of enforcing the laws that protect the fishery resources for the exclusive use of legitimate fishers.

Why then do fishers register at all? Because being registered entitles the fisher to certain duty-free concessions on his boat, engine and equipment.

Figure 2 gives the accumulated number of fishing boats and fishers registered in the Grenadines of St. Vincent between 2001 (when data collection began) and 2005. The number of registered fishing boats based in the Grenadines is larger than the number of registered fishers, suggesting that the number of fishers is under-reported, probably by 200%<sup>4</sup> or more. The

<sup>4</sup> Each fishing boat contains 2-3 fishers.

number of boats is likely to be accurate, since fishers will tend to register boats to get subsidized fuel from the fisheries department (which is often used to operate the boat as a water taxi).

### **Policy, Legislation, and Supporting Institutional Arrangements**

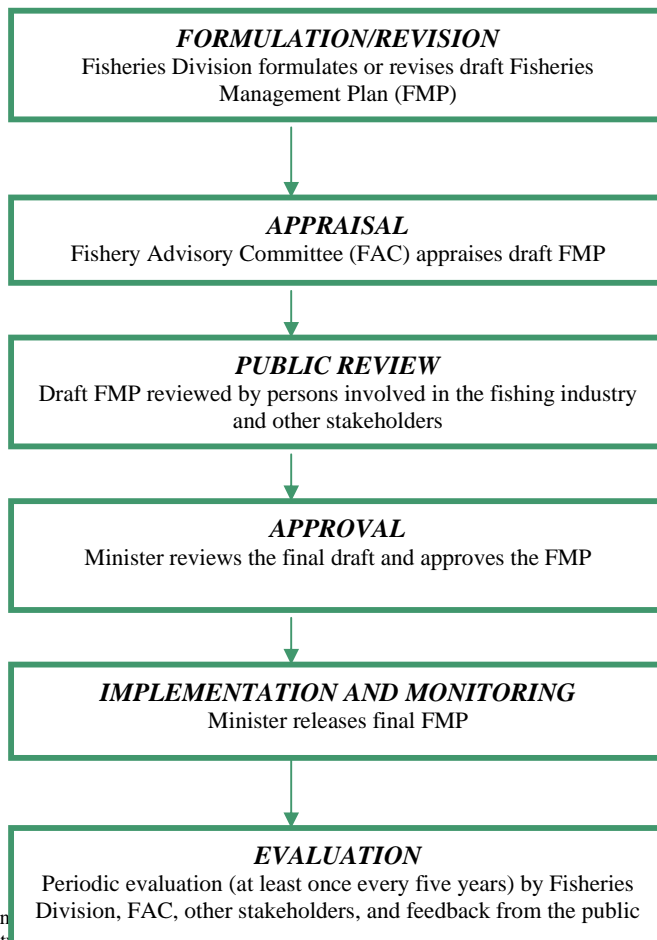
#### **POLICY**

It would appear that there is no formal SVG National Fisheries Policy in place. Possibly the SVG government is waiting for the Common Caribbean Fisheries Policy to be in place. CRFM issued the following press release in May 2009:

*“The Caribbean Common Fisheries Policy (CFP) could be finalized and ready to sign into effect by February next year if an ambitious road map set out yesterday (May 12, 2009) at the First Special Meeting of the Ministerial Council of the Caribbean Regional Fisheries Mechanism (CRFM) is adhered to by its Member States. This was revealed by the Chairman of the Ministerial Council, Montgomery Daniel, Minister of Agriculture, Forestry and Fisheries in St Vincent and the Grenadines, at a Press briefing held at the close of the meeting in the new National Insurance Service building in Kingstown. The preparation of a Common Fisheries Policy (CFP) was mandated by the CARICOM Heads of Government in February 2003, to improve the contribution of fisheries to the Region’s economic development as well as conservation and management of the fish stocks and marine ecosystems”.*

The SVG Fisheries Act 1986 requires the Chief Fisheries Officer (CFO) to “prepare and keep under review a plan for the management and development of fisheries”. This plan would perform the same function as a National Fisheries Policy, but such a plan does not exist either. The 2003 SVG **Fisheries Data Information Document** contains a flow chart describing the process by which such a Fisheries Management Plan would be prepared, which is reproduced below:

### **Fisheries Management Planning Process**



The same 2003 SVG **Fisheries Data Information Document** lists the following specific fisheries management objectives:

- Develop and increase the potential of marine living resources to meet human nutritional needs, as well as social, economic and development goals;
- Ensure that the fishing industry is integrated into the policy- and decision-making process concerning fisheries and coastal zone management;
- Take into account traditional knowledge and interests of local communities, small-scale artisanal fisheries and indigenous people in development and management programmes;
- 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;
- Promote the development and use of selective fishing gear and practices that minimize waste in the catch of target species and minimize by-catch of non-target species;
- Ensure effective monitoring and enforcement with respect to fishing activities;
- Protect and restore endangered marine species;
- 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;
- Promote scientific research with respect to fisheries resources;
- Cooperate with other nations in the management of shared or highly migratory stocks.

Only the third of these management objectives mentions the stakeholders, but does not say that they will “participate” – only that their interests will be “taken into account”. It would seem that these management objectives should be reviewed.

A draft policy document provided by the CFO states: *“In order to address its diverse tasks and responsibilities, the Fisheries Division has chosen the following statement as its mission:*

***“To effectively manage and develop the fisheries sector, in consultation with all stake-holders and within the context of economic diversification, through the sustainable utilisation of available aquatic resources, by research, technology transfer and training, in order to optimise the sector’s contribution to the national economy”.***

Such a mission statement mentions consultation up-front and gives it prominence. The draft policy document goes on to say: *“With this mission in mind, the Division sees the following vision for itself and the sector:*

***“A trained, pro-active team working towards the development of a vibrant well managed fisheries sector, in partnership with all stakeholders”.***

Again, stakeholder partnerships make it to the Vision Statement of the Fisheries Division, indicating its importance in the overall policy of the Fisheries Division.

The same draft policy document mentioned above identifies some critical local issues facing the fisheries sector; some are reproduced below:

- Inadequate human resources to accommodate the broad range of activities for which the Fisheries Division has responsibility
- Strong individualism among fisherfolk and lack of common focus.
- A measure of distrust for government-sponsored activities (fear of taxation, etc.).
- Weak management capabilities among fisherfolk, individually and collectively.
- Relatively low per capita consumption of fish and fish products, as well as inadequate distribution of such products, in relation to other meats, which are usually imported.
- Conflict among resource users – e.g. Tourism, Fisheries, Industry and agriculture.
- Weakness in enforcement mechanism for regulations, for example police and Coastguard presence in some geographical areas/inspection sites is weak or non-existent – particularly so in the Tobago Cays area and the Grenadines.
- Apparent low contribution of the fisheries sector to the national economy – where the economic evaluation is based primarily on the GDP calculations, excluding other socio-economic considerations, namely employment and income generation, value-added activities, socio-cultural).

The draft policy document shows keen perception and awareness of some of the challenges facing the effort to promote the participation of fishers, fishers organizations and fishing communities in fisheries management. Some of the strategies proposed to address these challenges are:

1. Strengthening linkages with fisherfolk organisations, promoting their development and strengthening linkages with all stakeholders.
2. Research on Socio-Economic circumstances of fishers
3. Public awareness and education programmes for police, judiciary, schools, fisherfolk, agencies, communities and the general public.
4. Training for staff and those within the industry.

The draft policy document contains a whole section on **Strengthening Fishers Organizations** and one on **Promoting Community Participation and Public Support**, placing community participation squarely on the front burner of the SVG Fisheries Division:

#### **Strengthening Fishers Organizations**

The strengthening of fisher's organizations should entail strengthening fisher cooperatives, introducing licensing systems allied to training and competency, training programs for vessel operators, and establishing functional partnerships between government and fishers organizations.

- ❑ Institutional strengthening of fisher cooperatives would entail organizational restructuring, training in leadership and institutional management.
- ❑ The licensing system would be revised as a mechanism to reinforce compliance with responsible fishing standards. Fishers should be required to have certificate of competency to be licensed. The competency would include: responsible fishing methods, basic knowledge of relevant environmental practices, and basic public health and safety standards.
- ❑ Development and implementation of training programs for vessel operators and owners would be acquired as pre-requisites for licensing of their boats. They would be trained in basic post harvest practices, environmental practices and fishing technology.
- ❑ The establishment of partnerships between governments and fishers organizations should be formalized. The partnerships should focus on joint responsibilities for shaping policies, regulations, mobilizing the fishing community, promotion of responsible fishing, fisher's welfare programs and to address all other issues affecting the sector.

### **Promoting Community Participation and Public Support**

Community participation and public support will be required to ensure that there is sound understanding of the importance of the fishing industry, enlighten consumer groups about the required fishing standards and improve public attitude to fishers. This program would entail institutional strengthening of fishing community advocacy groups, community awareness of appropriate utilization and management of marine resources, public and leadership awareness of the importance of the fishing industry.

- ❑ Development and implementation of an institutional strengthening program for fishing community advocacy organizations include Environmental NGOs, community development NGOs, and consumer groups. The program should focus on mechanisms for cooperation, training, and systems of governance and establishment of partnerships.
- ❑ Development and implementation of a public awareness program on appropriate utilization and management of marine resources will entail:
  - Public awareness of the importance of, and risks associated with fishing.
  - Development and implementation of, public education program on marine resources.
  - Implementation of an awareness program about globalization and implications for the environmental and quality assurance standards.

The same 2003 SVG **Fisheries Data Information Document** closes its overview of fishing in SVG with these words:

*“Where the sector goes from here is likely to be dependent on how well stakeholders could accept that the future of the sector depends on their active participation in the management processes. More and more international initiatives dictate to some degree what and to what levels we can harvest shared or heavily exploited resources. While we must continue to support appropriate initiatives we must develop sustainable management policies and practices of our own to ensure continued development within the sector. Failure to do this could result in social and economic dislocation and destabilization of coastal rural communities”.*

These publications and internal documents of the SVG Fisheries Division give us a clear idea of their *de facto* policies supporting the participation of fisherfolk in fisheries management.

### **LEGISLATION**

The absence of a written National Fisheries Policy means that there is the lessened opportunity to move to the next stage of changing the legal framework to give effect to the new policies.

The Fisheries Act 1986 (Act No. 8 of 1986 of the Laws of SVG) is the principal legal instrument governing the business of fisheries management and development in SVG, and although it is more than twenty (20) years old, it does contain some useful provisions to support participatory management.

Section 4 states:

- (1) The Chief Fisheries Officer shall prepare and keep under review a plan for the management and development of fisheries; (3) In the preparation and review of the fisheries plan, the Chief Fisheries Officer shall consult with the local fishermen, local authorities, other persons affected by the fishery plan and with any Fisheries Advisory Committee appointed under Section 5.

Section 5 states without giving any details that:

The minister may appoint a FAC to advise on the management and development of fisheries.

Section 18 states:

- (1) (a) The Minister may designate an area as a local fisheries management area; (b) designate any local authority, fisherman’s co-operative or fishermen’s association or other appropriate body representing fishermen in the area as the local fisheries management authority for that area.
- (2) Where there is no appropriate body representing fishermen in the area, the Minister may promote the formation of such a body.

This section is clear that the government of SVG is not tied to co-operatives as the only type of fishers’ organization, even though that is the only type of fishers’ organization now in SVG.

It must be pointed out that the principle of designating a “fisherman’s co-operative or fishermen’s association or other appropriate body representing fishermen” as “the local fisheries management authority” is already enshrined in SVG law.

Section 19 states:

*(1) A local FMA shall make by-laws regulating the conduct of fishing operations in the designated area.*

This is awesome power that the SVG Fisheries Act offers the fishing community. To date, however, the SVG government has not chosen to ask any fishing community to play this role.

Section 22 states that the Minister may declare a marine reserve; the Fisheries Act also contains some regulations which apply in marine reserves; Section 45 allows the Minister to add to them.

Section 32 states:

*The Minister may designate any person as an authorized officer.*

This Section allows the minister to designate members of the fishing community as “authorized officers”, which gives them powers to enforce fisheries laws. Should this be done, it would take participation to a new level, and would give the expression “empowerment” (so common in the development literature) new and deeper meaning.

The Fisheries Regulations 1987 (Act No. 1 of 1987 of the Laws of SVG) is important subsidiary legislation relating to fisheries. In Section 2 it defines that the National Fisheries Advisory Council of SVG shall consist of the Permanent Secretary as chairman, the Chief Fisheries Officer as secretary, three (3) professional fishermen, and any other persons the minister may designate. It then outlines its functions:

**(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 the need for any amendment to the Act or to these Regulations;**
- (d) 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 on 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.**

**(6) The Fisheries Advisory Committee may establish its own procedures.**

Currently, SVG does not have a National Fisheries Advisory Board in place.

## SUPPORTING INSTITUTIONAL ARRANGEMENTS

While the concept of participation has been embraced by the SVG draft policy and is realized in actual legislation, its practice lags far behind. The vast majority of SVG fishers are not members of a co-operative, and there is no mechanism for them to participate in fisheries management. Although the Minister may appoint a National Fisheries Advisory Board, he has not chosen to do so. There is one staff member at the Fisheries Division trained in the formation and strengthening of fishers' organizations, and she is passing on her skills to the extension staff.

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.

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

Since 2004 CRFM has committed itself to bring together representatives from National Fisherfolk Organizations (NFOs) across the region to form a Regional Network of National Fisherfolk Organizations (CARNUFO). This purpose of this body would be to establish relationships and linkages to form a network geared towards capacity building and institutional

strengthening among the fisherfolk organizations of the Caribbean region, with the overall objective being to improve earnings, foster higher standards of living of fisher folk and sustainable use of fishery resources in the Caribbean. It was determined that CARNUFO could only be established when at least 50% of the countries have NFOs.

Many countries do not have NFOs, and so to hasten the formation of CARNUFO, CRFM obtained funding from the Technical Centre for Agricultural and Rural Cooperation ACP-EU (CTA) for the **CTA/CRFM Project: Development of Caribbean Network of Fisherfolk Organizations**. The aim of the Project was to promote the formation of NFOs in seven counties: The Bahamas, Dominica, Grenada, Guyana, St Kitts and Nevis, St Lucia, and SVG.

The National Consultation to Launch a National Fisherfolk Organization in SVG was held at the conference room of the Kingstown Fisheries Complex on July 30, 2007. It was poorly attended by fishers. Of the twenty-two (22) persons present, only four (4) were from fishers organizations (only Goodwill and Calliaqua were represented); eight (8) attendees were from the SVG Fisheries Division, four (4) were from the SVG Community College and two (2) were from the Co-operative Department. A steering committee was formed to bring the NFO into existence; it has been meeting over the two years, and progress is being made.

The only fishers' organizations in SVG are co-operatives, and these manage fisheries complexes. There does not seem to be any effort being made to assist other fishers not interested in managing a fisheries complex to organize themselves into fishers' associations to lobby for the advancement of their interests. The plan is for the National Fisherfolk Organization in SVG to become a second-level co-operative. Does this close the door on membership to fishers' associations that are not-co-operatives?

As mentioned above, there is provision in law for the Minister to appoint an SVG Fisheries Advisory Board to advise him on fisheries matters; he has not chosen to do so. Should he do so, it is likely that the non-cooperative sector would not be adequately represented.



There do not appear to have been efforts to involve stakeholders other than direct resource-users in fisheries management. There has been little experimentation with other forms of participation in the management of fishery resources such as community enforcement and participatory monitoring, even though the law specifically allows this. In many respects, fisheries management in SVG is still “top-down”.

### ***2.3 Effectiveness of National- and Community-Level Participatory Approaches to Fisheries Management***

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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.

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

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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 SDEVELOPMENT COMPONENT

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

There is no current **National Fisheries Policy** for SVG; one is in draft and is in the process of being reviewed. Neither are there any current **Fishery Development Plans** or **Fishery Management Plans** for the pelagic fisheries of SVG. Possibly through this project, SVG could develop these important management tools.

The draft fisheries policy document for SVG states the following *re* pelagic fisheries:

### 5.1 **Promotion of the Expansion of the Pelagic Fishery and other Unutilized and Underutilized Resources**

This programme would entail four interventions: promotion of the use of Fish Aggregating Devices (FADS), Training in pelagic fishing gear and methods, development of a management plan and improvement of the collection of biological and catch and effort data.

- Promotion of the use of FADs should entail: development of exploration programs, development and introduction of incentives to mobilize investment, development and promotional of operation profiles to demonstrate the benefits.
- Training in pelagic fishing gear and methods should target all categories of fishers. The intervention should include development and institutionalization of the training programmes, securing co-financing for the participating fishers and establishing and strengthening designated institutions including fishers' organizations.
- The development of a management plan for pelagic fishing which should be used to guide regional policy and plans. The plan should also include a policy framework to promote private investment in pelagic fishing.
- The improvement of the collection and dissemination of biological and catch and effort data will be necessary to support sound decision making in the pelagic fisheries sub-sector.

The development of policies for private investment will be very crucial. The policy support mechanisms should include technical support services, fiscal incentives and research and development support.

Although the fisheries policy document is still in draft, there is nothing preventing these articles from being implemented.

The "*Fisheries Act of 1986, Section 4*" and the "*High Sea Fishing Act of 2000*" are two major pieces of legislation that address the development, management and regulation of fisheries and fishing-related activities in SVG. The main objective of these Acts is to:

*"Ensure the optimum utilization of fisheries resources present within the waters of St. Vincent and the Grenadines and the high seas, for the benefit of the people of St. Vincent and the Grenadines."*

The "*Fisheries Act of 1986, Section 4*" is based on the OECS harmonized legislation, and thus provides for:

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

The “*Fisheries Act of 1986, Section 4*” gives the Minister the authority to create new regulations concerning the management and the development of fisheries. Under this framework, the “*Fisheries Regulations of 1987*” were created with a primary focus on regulating small-scale fisheries in SVG.

The “*High Sea Fishing Act of 2000*” specifically provides for regulating Vincentian-registered vessels that fish on the high seas. Under this Act, monitoring of these of fishing vessels is mandatory in order to be compliant to the International Convention for the Conservation of Atlantic Tuna (ICCAT).

### **Fishery Management Plan (FMP)**

Although the Fisheries Act requires the CFO to prepare and keep under review a plan for the management and development of the fisheries of SVG, a FMP has not yet been prepared. The SVG Fisheries Act and Regulations do, however, contain management measures, like:

- Prohibiting the use of Tangle Nets in SVG waters;
- Regulating the lobster fishery by:
  - Establishing a close season: May 1 - August 31
  - Making it illegal to catch, buy, sell or possess:
    - Berried Females;
    - Soft shell (moulting) lobsters;
    - Lobsters with carapace length of less than 3.5 inches.
    - Lobster with body length of less than 9 inches;
    - Lobsters weighing less than one and half pounds;
    - Lobsters, which are not caught by hand, loop, pot or trap.
- Regulating the Conch fishery by:
  - Prohibiting to take sell, purchase or possess conch:
    - With shell of less than 7 inches;
    - That does not have a flare lip.

In general, there is an urgent need for establishing a regional management plan for coastal pelagic species. CRFM should play a leading role in the realization of such plan!

### **Enforcement of Regulations**

The government agencies responsible for enforcement of the Fisheries Act and Regulations in SVG are the Fisheries Division and the Coast Guard Unit of the “St. Vincent Royal Police”.

In general the level of enforcement is fair. Problems encountered include:

- Financial resource limitations: high cost of fuel is one of the most important constraints;
- Human resource limitations; the fisheries division has to rely solely on the coast guard to enforce regulations;
- Regulating fisheries is not a high level priority for the coast guard;
- Limitation in equipments, such as boats.

In general the level of enforcement is fair. Over time the level of compliance is getting better because of the implementation of education programs.

There is the need for funding:

- To control movement of fisheries resources, i.e. illegal fishing, across borders (particularly Barbados, Grenada and St Lucia);
- To strengthen the enforcement of fishing regulations: police and coastguard presence in some areas is weak or non-existent;
- To reduce the limitations in human resources.

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

Since SVG has neither current policy goals, policy objectives nor management objectives for its pelagic fisheries, there is nothing that can be said about their “status”.

In order to sustainably use its pelagic fisheries resources for coastal community development, the Government of SVG should embark on a programme to develop these important tools. This could be a candidate for a pilot project under this JICA/CRFM project.

The government of SVG currently has a fleet expansion programme to encourage larger boats to stay longer at sea to exploit large pelagics – mainly tunas. It is expected that demersal fishers will move into this relatively new type of fishing, as well as new fishers.

### ***3.3 Fishery and Market Characteristics***

#### **FISHERIES CHARACTERISTICS**

##### ***Exploited Species***

Table 6 summarizes the exploitation and management status of coastal pelagic fisheries in SVG.

Species	Stock Status		Fishery Status			
	Type of exploitation	Over-exploited	Developed	Sustainable	Monitored	Managed
Wahoo ( <i>Acanthocybium solandri</i> )	Artisanal	Nearly	Fully			Not
Dolphin fish ( <i>Coryphaena hippurus</i> )	Artisanal	Nearly	Fully			Not
Black fin tuna ( <i>Thunnus atlanticus</i> )	Artisanal	Nearly	Fully			Not
King mackerel ( <i>Scomberomus cavalla</i> )	Artisanal	Nearly	Fully			Not
Jack Mackerel ( <i>Trachurus spp.</i> )	Artisanal	Nearly	Fully			Not
Flying fish ( <i>Hirundichthys spp.</i> )	Artisanal	?				Not
Sardines ( <i>Sardinella aurita</i> )	N	?				Not
Scaled Herring ( <i>Harengula Jaguana</i> )	N	?				Not
Atlantic thread herring ( <i>Opisthonema oglinum</i> )	N	?				Not
Jack ( <i>Selar spp.</i> )	Artisanal	?	Fully			Not
Robin ( <i>Decapterus spp.</i> )	Artisanal	?	Fully			Not
Diamond back squid ( <i>Thysanoteuthis rhombus</i> )*	Experimental trials					
Conch ( <i>Eustrombus gigas</i> )*	Artisanal	?	Fully	Endangered		
Caribbean spiny lobster ( <i>Panulirus argus</i> )*	Artisanal	?	Fully	Uncertain		
Spotted spiny lobster ( <i>Panulirus guttatus</i> )*	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

The exploitation of fisheries resources is mostly done by artisanal fishermen. Although there are no directed fisheries in SVG, the Fisheries Division commonly distinguishes seven fishing zones.

In each fishing zone, fishers use specific gears to target specific groups of fishes, depending on the season (Table 1). For example:

- Wahoo, dolphinfish, and tunas are usually caught by Kingstown fishers (Zone 1) from January to June using trolling lines;
- Small pelagic fishes such as robins, jacks, and small tunas are mostly captured in the southern central leeward part (Zones 2) and in the northern (Zone 3) part of the mainland, using gillnets and beach seines;

Conch and lobster are mostly fished in the southern Grenadines, Zone 7, using pots and traps.

There has been experimental fishing for diamond-back squid in SVG waters, particularly in the late 1990s. Open sea trials failed because of inappropriate technology to deal with strong oceanic currents in these areas. However, trials in sheltered and low-current waters yielded relatively good CPUEs. Nevertheless, fishers are yet to be convinced on using current technology to exploit diamond-back squid, because there is no local market for this species.

### **Stock Status**

The overall status of coastal pelagic stocks in SVG is uncertain, mostly because of the regional dynamic of most species. In addition, CPUE data were not provided for the period 2003-2008 so the overall trend in catch and effort cannot be evaluated for the most recent years. Note that currently there is no biological assessment of populations in SVG, and in general, catch statistics are not reliable.

Nevertheless, the 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**

SVG is a relatively small producer of pelagic fish compared to other Caribbean nations; most fish production is consumed on the local market. In terms of revenue jacks, robins, wahoo, and dolphinfish are the four top pelagic fishes on the market (Table 7). The bulk of fish production is sold fresh or chilled in ice; a small unsold fraction is usually dried & salted in the Grenadines.

**Table 7:  
Annual Estimated Value of Landings by Species, SVG 1998-2002**

Year	Estimated value (in EC \$)								Year
	Wahoo	King Mackerel	Dolphinfish	Blackfin Tuna	Jack (Selar)	Robin	Lobster	Conch	
1998	853,987	5,758	744,076	153,508	541,999	1,101,877	499,456	256,102	4,156,763
1999	641,704	9,721	729,426	140,975	3,339,465	868,978	809,956	88,672	6,628,897
2000	<b>610,737</b>	<b>2,024</b>	<b>982,650</b>	<b>230,316</b>	<b>531,747</b>	<b>984,952</b>	<b>733,912</b>	<b>98,838</b>	4,175,176
2001	694,195	2,751	943,416	257,672	548,468	758,468	495,612	420,843	4,121,425
2002	221,284	1,249	437,571	100,330	673,552	980,119	436,347	447,855	3,298,307

Source: Data compiled from Jardine and Straker (2003).

Approximately 12% of the landings are sold to middlemen or fish traders that export them to regional and international markets. The bulk of fish exports consists of fresh pelagic fish products, along with fresh lobster and conch (Table 8). It is estimated that less than 1% of total exports in 1997 was of processed fish products. However, Table 8 shows that exports of all species decreased from 1998 to 2002. Note that no data were provided to determine whether the decline has continued in recent years. Nevertheless, increasing phytosanitary requirements in target export markets have severely affected the ability of SVG to export fresh fish products. In this context the European Union market has been lost.

**Table 8:  
Estimated Annual Fish Exports (Lbs) from SVG, 1998-2002**

Year	Estimated exportation (Lbs)							
	Wahoo	King Mackerel	Dolphinfish	BlackfinTuna	Jack	Robin	Lobster	Conch
1998	4,164		2,559	377	8,407	50,551	38,184	1,100
1999	3,935	25	1,339	73	26,830	13,646	78,907	5,010
2000	<b>873</b>		<b>331</b>	<b>440</b>	<b>43,058</b>	<b>21,619</b>	76,855	<b>10,239</b>
2001	503		2,177	50	7,352	8,176	<b>49,963</b>	78,816
2002	581		1,537	3	1,406	111	42,607	75,238

Source: Data compiled from Jardine and Straker (2003).

Further, SVG remains a big importer of processed fish products – more than EC\$1.6 million in 2002. Processed herring, sardine, mackerel and tuna are among the imported products of choice (Table 9).

**Table 9:  
Imports of Processed Fish Products, SVG, 1993-2002**

Year	Processed Fish (EC \$)			
	Smoked Herring	Dried Mackerel &Herring	Sardine	Tuna
1993	42,313	92,871	540,908	139,195
1994	56,152	476,836	515,891	104,520
1995	21,939	812,052	599,235	165,253
1996	50,507	1,247,794	637,589	179,880
1997	64,602	1,222,115	667,983	165,101
1998	122,728	963,421	690,691	219,949
1999	99,034	1,690,128	812,666	195,530
2000	87,492	1,600,000	527,293	216,439
2001	96,005	1,471,617	726,623	240,450
2002	100,131	1,871,968	673,079	211,389

Source: Data extracted from Import Information documents.

### **Funding Needs:**

- To conduct studies on the seafood market characteristics: Particularly, there is need to update information on:
  - Marketing and distribution channels;
  - Consumption and commodity flows;
  - Pricing and sales trends;
  - Consumer and buyer behavior;
  - Fishing production trends in general.
- To develop and implement a “Comprehensive seafood marketing and distribution plan” for the local, regional, and the international market.
- To continue the upgrade of marketing infrastructure;
- To improve the quality of fish products sold on the local, regional and international markets.
- To improve public awareness on marketing conditions and quality standards;
- To implement education programs for police, schools, fisherfolk and the general public.

### 3.4 Current Levels of Catch and Effort by Species

#### Effort Data

Approximately 600 licensed fishing vessels operate in SVG waters, (and 216 foreign fishing vessels on the high seas flying the SVG flag). These are generally small open boats made of wood or fiberglass, measuring 3-10m and fitted with outboard engines (6-115 hp). The most common vessels are:

- Flat transom boats: bow and stern boats or dories;
- Pirogues;
- Double enders;
- Canoes.

Table 2 above shows the distribution of fishing vessels and fishermen by Fishing Zone in 2003. At this time, 2,248 registered fishers were actively involved in the SVG fishing industry.

In recent years, a small but increasing number of longliners have been included in the SVG fishing fleet. These longliners use inboard marine diesel engines (90-475 hp) and their size ranges from 34.7 to 48.5 m. They operate mostly with surface longlines, trolling lines, bottom longlines and traps. There is also a small recreational fishery in SVG using mostly sloops and launches (i.e., Cabin cruisers and Boston whalers).

#### Catch Data

Table 10 shows that estimated catches of wahoo, king mackerel and Dolphinfish have declined substantially from 1999 to 2002. Note that estimated CPUE by the Fisheries Division for trolling lines also indicated a decrease in relative abundance for the same period of time (Table 11).

Year	Estimated Landing (Lbs)							
	Wahoo	King Mackerel	Dolphinfish	Blackfin Tuna	Jacks	Robin	Lobster	Conch
1998	144,754	1,363	29	38,591	230,053	425,470	<b>49,803</b>	45774
1999	114,379	2,311	124,991	32,790	157,912	323,908	78,906	15040
2000	103,258	499	165,468	51,604	219,538	403,861	76,906	15212
2001	125,266	559	158,690	53,840	226,930	298,776	46,364	84238
2002	35,257	218	72,949	22,847	285,223	354,747	42,607	79048

Source: Data compiled from Jardine and Straker (2003).

In contrast, landings of robins and jacks have remained fairly stable and predominant among species from 1999 to 2002 (Table 10). However, CPUE for gillnets and beach seines show opposite trends in relative abundance of species caught by these gears during this period of time (Table 11). Hence, these data may not be appropriate to make inferences on the status of robin and jack populations in SVG waters.

Gear	1994	1995	1996	1997	1998	1999	2000	2001	2002
Beach seine	577	325	441	474	242	441	222.6	346.5	352.2
Gill net	144	109	185	120	152	185	123.4	95.9	95.6
Troll	53	43	127	124	84	127	130.8	80.2	70.9

Source: Data compiled from Jardine and Straker (2003).

Note that, more recent CPUE data (2003-2008) were not provided by the Fisheries Division, hence it was not possible to evaluate the current status of the coastal pelagic fisheries in SVG.

## **Technical Assistances and Funding**

### ***Needs in technology development:***

- Funds to conduct exploratory surveys for fisheries resources mapping;
- Funds to develop efficient gear and fishing methods for the pelagic fisheries:
  - Move toward ocean-going fishing by using bigger vessels, such as long-liners;
  - Move toward more fuel efficient engines by replacing 2-stroke engines with 4-stroke diesel engines;
  - Move toward retrofitting open boats by fitting them with ice boxes to improve the quality of fish meats;
  - Use of small boats to fish with 50-hook long-lines as developed by Grenada;
- Funds to improve fuel efficiency of existing fishing vessels and reduce over-capitalization of the fishing industry;
- Funds to develop programs to promote the use of FADs, as well as research programs one estimating productivity and catch composition when fishing around FADs.
- Funds to implement training programs in pelagic fishing gears and methods;
- Funds to develop post-harvest technology in order to enhance yield and sustainability of fisheries;
- Funds to get technical assistance in applied research and in the promotion of investment in post harvest technology.

### ***Needs in institutional assistance toward:***

- Developing a fisheries management plan for pelagic species;
- Improving collection of biological and fishery data on pelagic species;
- Training of stakeholders in “quality assurance practices”, responsible fishing and environmental standards;
- Developing appropriate infrastructure for marketing distribution and testing of fish and fish products, with the main objectives of meeting international quality standards and getting more access to international market.
- To strengthen fishermen cooperatives by facilitating their restructuring and by providing training in leadership and institutional management.



# CHAPTER 4: AQUACULTURE DEVELOPMENT COMPONENT<sup>5</sup>

## 4.1 Policy, Supporting Legislation, Development Plans

### Policy and Supporting Legislation

There apparently is no policy, legislation or development plan which addresses aquaculture production in SVG directly. It is however fair to say that the existing Fisheries Act gives the Chief Fisheries Officer the responsibility to formulate an aquaculture development plan, to screen, advise and support where fit proposed aquaculture development activity.

The draft fisheries policy document for SVG states the following *re* aquaculture:

### **5.2 Developing Aquaculture**

The development of this sub-sector should span a policy framework to promote the investment, development and implementation of extension programs, development and enforcement of environmental standards and establishing guidelines for regulating the sub-sector.

- The policy framework should be designed to encourage private investment and export oriented production. It should entail fiscal incentives, technical support services, access to land/marine space, credit schemes and human skill development.
- The research and extension programs which would be spearheaded by the Fisheries Division, with support from other national and regional institutions, should entail technical packages to support investors, technical feasibility studies and technical analysis of species and development of technical competencies at selected institutions to sustain research and extension services.
- The development of environmental standards should span identification of global standards and compliance requirements, development and implementation of national standards and promotion of the standards among operators of enterprises in aquaculture.
- Consensus building sessions/consultations, as well as international and regional precedents would be used.

Although the fisheries policy document is still in draft, there is nothing preventing these articles from being implemented.

## 4.2 Aquaculture Development Status regarding Stated Policy Goals and Development Objectives

Since there is no approved National Fisheries (or Aquaculture) Policy, there are no stated policy goals or development objectives for aquaculture in SVG. Currently there is no discernable aquaculture activity in SVG. The view by the CFO that aquaculture is a development priority comes against the background of food security issues arising out of the current global food crisis and possibly to diversify the agri-sector given the fall-out in sugar and bananas.

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<sup>5</sup> St Vincent and the Grenadines was not visited by the Aquaculture Specialist. The information request sheet was never completed and returned. From a telephone conversation with the Senior Fisheries Officer

- Staff could not attend to same as they were too busy with other issues specifically budget preparation and hosting a Japanese delegation and he would try to see what he could do.
- The SFO went on to say that at present there are no aquaculture projects currently been pursued.

In this regard the following report is based on a desk top survey only.

### **4.3 Aquaculture and Market Characteristics**

Currently there is no discernable aquaculture activity in SVG. With a small population, local markets are very limited and costs of production could not justify subsistence activity.

### **4.4 Current Levels of Aquaculture Production by Species**

Currently there is no quantifiable aquaculture venture. However in the past the following interventions were made:

- In 1983 small-scale experiments on aquaculture of *Oreochromis niloticus* (from Dominica) as well as *Macrobrachium* sp. and *Atya* sp. were carried out by the Fisheries Division of the Ministry of Agriculture at the Botanical Gardens. These experiments showed positive results and generated some interest among several sectors of the population, e.g. some primary schools and private individuals.
- That same year a project from Taiwan (Province of China) was established for agricultural development, with an aquaculture component which had the objectives of
  - (i) promoting tilapia and freshwater prawn culture, and
  - (ii) transferring the technology to local technicians.

Unfortunately, this component of the project progressively faded because of lack of a local counterpart and was eventually phased out. The site at Pembroke which was used for the aquaculture demonstration site proved not to be appropriate.

- In March 2002, Mr. Lu Fong Gan, an Aquaculture Technician from the Republic of China (ROC) visited SVG, based on a request made to the Premier of the ROC by the Prime Minister of SVG during his visit to Saint Vincent in September 2001. The following are the findings of the mission:
  - *Inland Aquaculture*
    - The country is small; areas suitable to locate fresh water aquaculture are limited. In addition the size of the population is a deterrent to development of a freshwater food-fish industry that would achieve the necessary economies of scale to be profitable. However, if the focus of implementing a fresh water aquaculture activity is the provision of employment and the satisfaction of the local and tourist markets then the project can be pursued with reservation.
    - The average difference between the river beds and banks is too great and hence cost associated with water movement would make aquaculture projects un-economic
    - The soil texture is too sandy to retain water

The aforementioned difficulties can render attempts to develop on-shore aquaculture, even at a subsistence level, financially infeasible

- *Sea Cage Aquaculture*

The leeward coast of main-island, Saint Vincent, is calm with some areas having depths of approximately 10 to 30m. These conditions would seem to be suitable for sea cage aquaculture. If the objective is to establish an industrial level sea cage culture in Saint Vincent, problems of natural disasters, inadequate feed supply and the cost of providing and maintaining other infrastructure and facilities necessary for the successful operation of this industry must be solved. If the necessary facility construction and maintenance hardware have to be imported, then the investment in setting up and maintaining this type of industry would not be cost effective.

#### **4.5 Knowledge on Aquaculture Issues by Category**

Saint Vincent is constrained by the limitation of its topography, as it does not have areas that can be developed into viable fishponds. It would therefore be difficult to institute an on-shore aquaculture industry under these conditions. The country is surrounded by sea; the leeward side of the island of St. Vincent is especially suitable for sea cage culture, however, the country is prone to natural disasters, for example, hurricanes. Sources of constant feed supply need to be identified, and knowledge of the market studied, to determine which variety should be exploited. This all needs to be documented.

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

A review of the literature also indicates that small scale/subsistence aquaculture would be uneconomical.

#### **4.7 Technical and Research Capabilities of Fisheries**

The fisheries division is currently lacking in the requisite human resources and overall capacity to support Aquaculture. This is so by virtue of the limited scope for any viable development in the sector.

# CHAPTER 5: REGIONAL FISHERIES DATABASE DEVELOPMENT COMPONENT

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## ***5.1 Policy and Data Management Documents***

Generally, the policy and management objectives for the fisheries sector in SVG aim to promote “*the sustainable use of the fisheries resources to maximize the benefits to all Vincentians in the present and future*”. It further outlines the importance of the protection of the marine environment in order to maintain and enhance the carrying capacity for fishing. It also underscores the importance of considerations of essential factors such as fishing boats, gear and technology, skilled personnel and research capability. The fisheries development goals and strategies aim to ensure the “betterment of the socio-economic conditions of all stakeholders/beneficiaries within the Vincentian population”.

The Fisheries Management Objectives are as follows:

- Develop and increase the potential of living marine resources to meet human nutritional needs, as well as social, economic and development goals of the sector.
- Ensure that the fishing industry is integrated into the policy and decision-making process concerning fisheries and coastal zone management.
- Take into account traditional knowledge and interests of local communities, small-scale artisanal fisheries and indigenous people in development and management programmes
- 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.
- Promote the development and use of selective fishing gear and practices that minimize waste in the catch of target species and minimize by-catch of non-target species.
- Ensure effective monitoring and enforcement with respect to fishing activities.
- Protect and restore endangered marine species.
- 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.
- Promote scientific research with respect to fisheries resources.
- Cooperate with other nations in the management of shared or highly migratory stocks.

The document however, does not specifically address explicitly the management of fisheries statistics and information, nor its importance and use in guiding decision-making in fisheries management.

**Fisheries Data Information Document - St. Vincent and the Grenadines** by Cheryl Jardine and Leslie Straker (2003) gives an outline and some level of details on the mechanism of data collection and management in SVG. It also provides information on the fishers, socioeconomic contribution of the fisheries sector, types of fisheries and gear types used in the sector.

## 5.2 Data Collection – Current Situation

A review of the data collection situation in SVG was conducted by Mohammed et al. in 2003:

*“Prior to 1992 data collection was confined to landings at the major market at Kingstown and exports from the Grenadines to Martinique. The Barrouallie Fisherman’s Cooperative Society had historically recorded captures of whales and porpoises (Adams, 1973). In the 1960s fish landings at the market represented 60% of total landings throughout St. Vincent and the Grenadines (Vidaeus, 1969). In 1988 plans were formulated under the Organization of Eastern Caribbean States (OECS) for a revised data collection system (Morris et al., 1988). This revised data collection system was implemented in 1992 under the CARICOM Fisheries Resource Assessment and Management Program (CFRAMP) and is still in effect. A system of random stratified cluster sampling was implemented at seven zones, with catch and effort data recorded at representative sites within each zone. Landing sites are categorized into primary, secondary and tertiary sites based on the number of fishing boats landing regularly at the site, the amount of fish landed and the level of infra-structure development (Straker et al., 2001).*

*At Kingstown and Barrouallie there are two primary sites, 14 secondary sites and 20 tertiary sites. Data are also collected from trading vessels operating in the Grenadine/Martinique fish trade. Total landings are estimated by applying a raising factor to account for days when data are not recorded. A licensing and registration program is in effect and an inventory of distant water fishing vessels registered with St. Vincent and the Grenadines is maintained. The Trip Interview Program (TIP), a data management program introduced under the CFRAMP, is presently being used for data entry, management and analysis.”*

The landing sites are zoned and categorized (stratified). There are seven (7) zones and thirty-six (36) landing sites. Categorically, a site is designated as either primary, secondary or tertiary. The assignment into any one of these categories is based on three main variables, i.e., the number of fishing boats that regularly land fish at the site; the amount of fish landed; and the level of infra-structural development. There are two (2) primary sites (Kingstown and Barrouallie); fourteen (14) secondary and twenty (20) tertiary sites (see Table 1 above). Primary sites are visited 10 days/month, secondary sites 4-6days/month and tertiary sites 2days/month.

There are currently five (5) out of the required number of eight (8) data collectors, collecting biological and CPUE data throughout the state. These data collectors have been trained to take accurate and unbiased data from the fisher. Each is responsible for a given landing site zone.

The catch and effort data follows a stratified sampling methodology. In this approach the sampling frame (which is all the identified fish landing sites within the country) is first partitioned into groups or strata, and the sampling is then performed separately within each stratum. This method combines the conceptual simplicity of simple random sampling with potentially significant gains in reliability (Jardine & Straker 2003).

In this case we wish to estimate the total number of fish landed in the state. We know that more fish are landed at certain landing sites than others (e.g. Kingstown and Barrouallie). The sampling units (landing sites) are stratified prior to sampling into three groups (primary, secondary and tertiary) based on the variables mentioned above. The technique of simple random sampling is then used to select the days of the month each landing site is sampled. Sampling is not carried out on Sundays and major holidays, nevertheless, every day is considered as a potential fishing day. This simplifies data analysis and does not seem to be a great source of error since fishers fish whenever they can regardless of what day it is (Jardine & Straker 2003).

An estimate of the quantity of fish landed in the country is obtained by summing the totals of all the estimates for the individual landing sites.

**Total landings = Estimates (site1 + site2 + site3 + .....)**

**Estimate for any site = sampled weight x (# of days in month / # of days sampled)**

**Raising factor (rf) = (# of days in month / # of days sampled)**

Kingstown is the only site at which a total census is carried out. This is easily taken since the fishers must pay a landing toll for fish landed at this market. The census data is used to compare with data obtained from the sampling programme (Jardine & Straker 2003).

With the present staff shortfall, data from Bequia and Union as well as St Vincent is satisfactory with respect to the collection programme. Only Zone 2 in St. Vincent is not covered. Fishers from this zone with large catches will tend to come to Kingstown (in Zone 1) and therefore the data is captured.

The data for CPUE covers the period 1979-present; 1979-1991 is limited to Kingstown market, while 1992 to present gathers information from almost all landing sites accordingly to the sampling protocol.

### **5.3 Data Management – Current Situation**

Data are entered by the Data Management Unit on a monthly basis. CPUE data are entered into Microsoft Excel®. The TIP database previously crashed and therefore the Unit resorted to Microsoft Excel®. Socio-economic and recreational fisheries data are lacking.

CARIFIS was adopted in SVG around 2001 and was intended to replace the Trip Interview Programme (TIP) database. However, data is currently for the most part, stored in spreadsheets created in Microsoft Excel®. Only information from the fishers taken during the registration and licensing process is entered and stored in CARIFIS. The data officers cited problems with the software as the main limiting factor for the full implementation of CARIFIS.

The Data Management Unit, Fisheries Division, Ministry of Agriculture, Forestry and Fisheries is solely responsible for the FIS.

Currently the information is stored on one (1) Dell® workstation and one (1) Hewlett Packard® workstation currently present in the Data Management Unit. The data are stored on hard drives on these computers. Back-ups of data are done weekly onto a Jump Drive/Thumb Drive and sometimes on CDs. There are no external hard drives.

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 to analyse data with limited in-country capacity. SVG has participated in these meetings.

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

### **5.4 Information Dissemination**

On a regular basis, quarterly reports are prepared which are essentially limited to Summary Statistics.

Information emanating from the CRFM Annual Scientific Meetings also contains Country Reports of the Data from SVG and this report is widely circulated and available.

Agencies such as the Statistical Department request and are provided with information from the data gathered.

However, it was 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 implementation of CARIFIS around 2001 to upgrade the existing TIP and LRS Systems. However, the level of success is medium, as there were many problems with manipulating the program to acquire/extract useful queried information. This led to the limited use of CARIFIS, and the officers reverting to using Microsoft Excel® spreadsheets for the entry and storage of data. The transfer of data from the TIP database and the entry of the present catch and effort data are still outstanding.

Possible areas of improvement which can be the subject of pilot projects include:

1. Capacity Building - Improvement in the fisheries Database system to increase power and flexibility. This can be done through increased human resources, equipment etc.
2. Socio-Economic baseline survey – information on fishers etc.
3. Capturing of recreational data by sport fishers etc. and incorporation in to the information base.

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

### **1. Human Resources**

The number of staff members in the SVG Fisheries department is significantly smaller than what is required to effectively collect and manage national fisheries data. The geography of SVG also adds another dimension to the difficulty in collecting data efficiently. The table below summaries the current situation, and recommends the optimal staff complement; there is the need to reshuffle the specific roles and responsibilities of the current staff:

Position	Current Staff Complement	Recommended Staff Complement	Gap	Training Required**
Data Manager-Administrator	1	1	0	Yes
Data Collectors*	5	7	2	Yes
Data Input Clerks	1	1	0	Yes
Fisheries Statistician	0	1	1	Yes
<b>Total</b>	<b>7</b>	<b>10</b>	<b>3</b>	

\* 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 necessary 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; this has implications for the 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 ID/OS Workshop with the Staff of the Fishery Division**

#### ***Brief Overview of the Workshop***

The workshop was held in the conference room of the Fisheries Division on the 20<sup>th</sup> and 21<sup>st</sup> of September 2009, in which the Chief Fisheries Officer and 11 staff participated.

The basic question (theme) was discussed among the participants and decided as follows: "How can the Fisheries Division improve the sustainable management and development of the fisheries sector?"

#### ***ID/OS analysis***

The ID/OS method was applied to the workshop in the Fisheries Division. The workshop analyzed external and internal factors (problems, conditions, potential and so on) regarding the basic question. Thirteen opportunities and 12 threats were identified, whereupon the following 5 external factors which cannot be controlled by the fisheries division were selected as the key factors by the participants:

- A growing interest in utilizing fish in many ways by the public
- Utilization of under/unutilized species
- Illegal fishing from outside the country
- Global warming
- Hurricanes, fish kills etc. (Natural events)

In the same way, 20 strengths and 14 weaknesses were identified, whereupon the following 5 strengths and weaknesses respectively were selected as the key internal factors by the participants:

#### **(Strengths)**

- Data gathering catch, exports, etc.
- Improved fisheries facilities
- Training opportunities being made available
- Trained and experienced staff in some areas
- Training conducted for fisheries stakeholders

#### **(Weaknesses)**

- Insufficient financial resources to carry out mandate
- Sometimes a lack of cooperation and coordination in developing plans
- Staff unaware of mission and policy statement
- Data analysis limitation
- Internal communication sometimes limited (lacking)

Two external factors were then identified as indications of Strategic Options, which relate to the CRFM/JICA project.

- Utilization of under/un-utilized species
- A growing interest in utilizing fish in many ways by the public

In the same way, 2 internal weaknesses were identified, which the CRMF / JICA project will be able to assist the Fisheries Division to overcome.

- An occasional lack of cooperation and coordination in developing plans
- Data analysis limitation

#### ***Other Information***

Nine under-utilized, unutilized species were identified.

#### **Diamondback squid:**

- Fishers unaware of how to fish for squid
- No local market (Export, Linked with tourism industry)

#### **Sea cucumber:**

- Need for good management
- Dried for export market



Sea urchin:

No local market (Export market but difficult)

Octopus:

No local market (Export, Linked with tourism industry)

Spotted lobsters:

Some confusion with regulation (minimum size)

Smaller species good for market

Balahoo:

Marketing is difficult (sold as bait for sports fishers)

Sharks, Rays:

Consumers' preference (Proper handling when caught)

Flying fish:

Not targeted by fishermen, consumers' preference, no value in the local market (Suitable for processing material)

## 6.2. Output from Workshop with Local fishers

### *Fishers Brief Overview of the Workshop*

The workshop was held at 6 fishing communities as shown in Table 12 and the summary of each community were shown in Table 13.

**Table 12: Communities where workshop were held at**

Name of Fishing community	Date of Workshop	Number of Participants
Calliaqua	19th October 2009	11
Chateaubelair	20th October 2009	7
Barrouallie	21st October 2009	12
Paget Farm (Bequia)	22nd October 2009	11
Kingstown	22nd October 2009	8
Owia	23rd October 2009	4

**Table 13: Summary of the Community**

Name of Fishing Community	Location of the Community	Number of Fishing Boats
Calliaqua	S of St. Vincent	20-25 boats
Chateaubelair	NW of St. Vincent	20 boats
Barrouallie	W of St. Vincent	53-54 boats
Paget Farm (Bequia)	S of Bequia	75 boats
Kingstown	SW of St. Vincent	55-65 boats
Owia	NE of St. Vincent	38 boats

### *Present Status of Local Fishery*

Each fishing community has different characteristics in terms of the target species and fishing method, so that the utilization of the fish resources is effectively diversified.

Chateaubelair

Seine net is the most important, followed by line fishing

Barrouallie

Seine net is the most important; line fishing is larger than Chateaubelair. Blackfish fishing exists.

Kingstown

Line fishing targeting pelagic fish is the major fishing activity. Some seine nets exist.

Calliaqua

Line fishing targeting bottom fish is the major fishing activity. Palang is a popular fishing method

Owia

Line fishing targeting bottom fish is the major fishing activity. Banking is a popular fishing method, but not Palang.

Paget Farm (Bequia)

Lobster and conch fishing by diving is the most important. Banking is a popular fishing method, but not Palang. Traditional whale catch exists.

### ***Needs of Local Fishers***

Some fishing communities face resource problems. However, FADs are not popular among fishermen. FADs can create a fishing ground of offshore pelagic fish in the near coastal area.

Owia

The stock of bottom fish in their fishing area seems to be depleted because most of the fishermen are engaged in banking all year round. Banking is not popular and the average catch is now only 30 lb/day.

It is difficult for them to fish for dolphin fish, because their fishing boats are too small for fishing on the rough seas.

Paget farm

The status of bottom fish stock is similar to Owia, although they have conch and lobster resources. They rely heavily on the reef resources. Part of their fishing effort should be distributed to offshore pelagic resources to conserve their reef resources.

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

In discussions with staff of the fishery department and with local fishers, "utilizing large pelagic resources to save inshore resources" was selected as a key issue. It contains the following 3 approaches:

(1) FADs introduction approach:

- To formulate a basic strategy for the FADs deployment to create a new fishing ground effectively
- To establish a FADs management body by fishermen for the purpose of assembling, deploying, monitoring, maintaining, and repairing them
- To develop an efficient FADs structure suitable for each target species and area

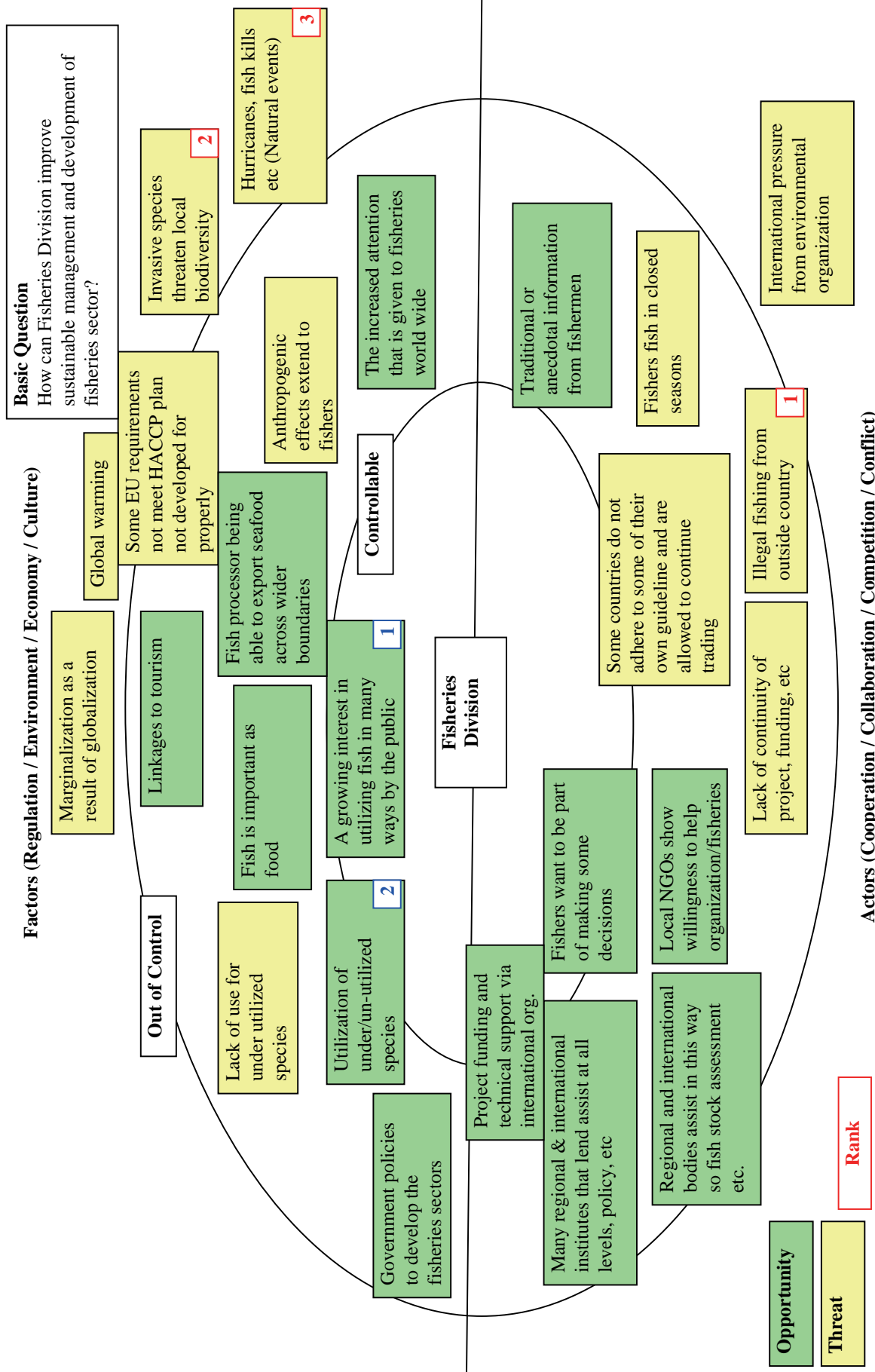
(2) Unutilized species development approach:

- Research and Development (R & D) of diamond back squid on fishing, processing and marketing
- R & D of flying fish on processing and marketing

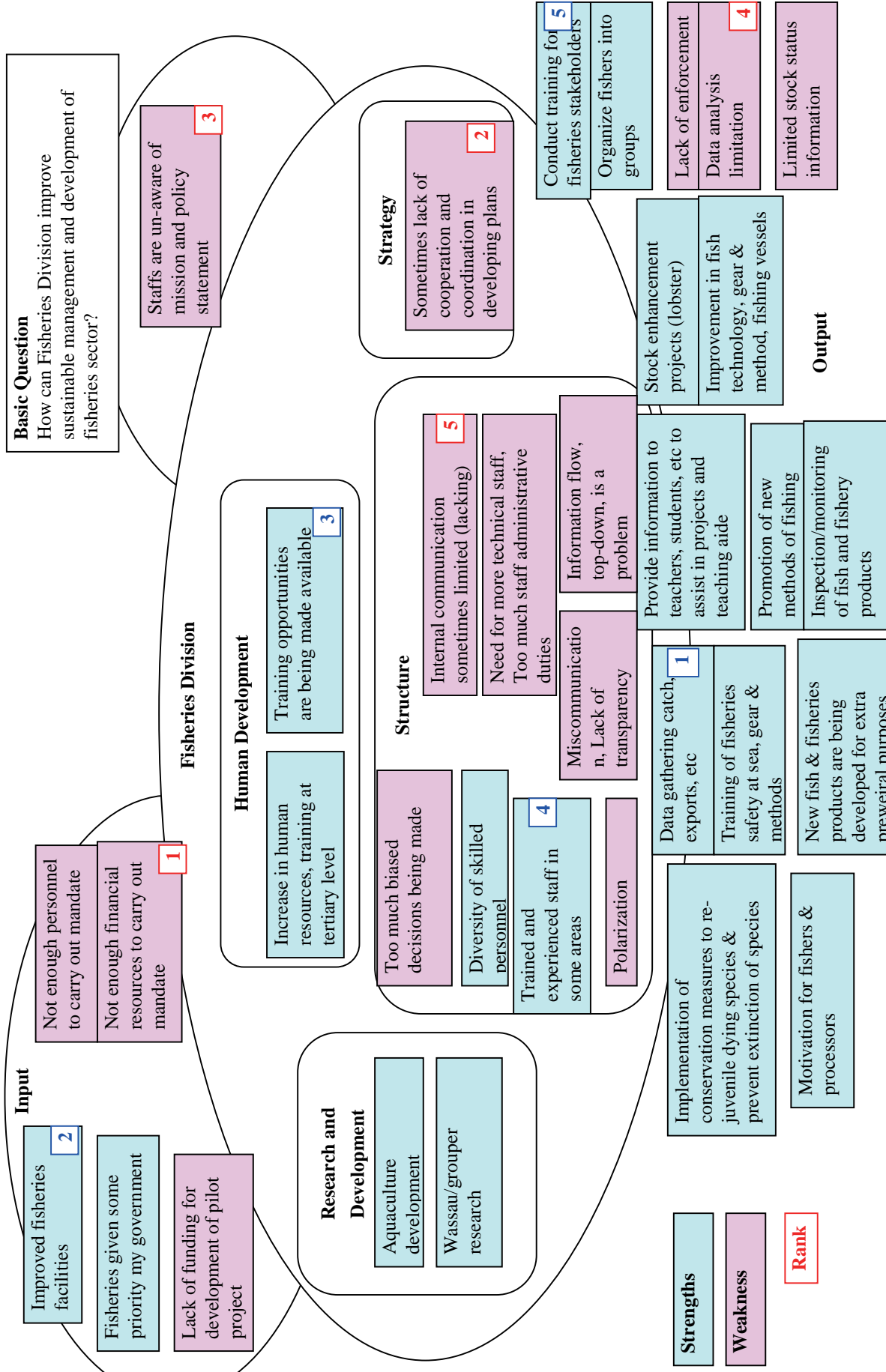
(3) Resource monitoring approach:

- Periodic measurement of fish size and maturity for major species
- Periodic data collection of CPUE for major species
- Training of data collection and analyzing for staff of the fisheries division and local fish landing center

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



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



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# **FINAL COUNTRY REPORT: SURINAME**



**October 2009**

# SURINAME

## Country Profile

Geographic coordinates	4°00'N 56°00'W
Total area	163,270 sq km
Land area	161,470 sq km
Water area	1,800 sq km
Length of Coastline	620 km
Shelf Area	56,885 sq km
Territorial Sea	8,999 sq km
Claimed EEZ	119,050 sq km
Highest point (m)	1,230 m (Juliana Top)
Climate	Suriname has a tropical humid climate moderated by trade winds. The short rainy season is December-January; the long rainy season is April-July. Suriname lies outside the hurricane zone.
Natural hazards	Much of the coastal belt is low-lying and prone to flooding.
Population	492,829 (2004 Census)
Annual Population Growth Rate	1.3%
Life Expectancy	71 years (2003)
Languages	Dutch is the official language; also spoken is Surinamese (Sranan Tongo), Javanese, Sarnami, Hindustani, English
Ethnic Mix	Hindustani (East Indian) 27%, Creole 18%, Javanese 15%, Maroon 15%, Mixed 12.5%, Amerindians 3.7%, Chinese 1.8% (2004 census).
Work force	156,700 (2004)
Unemployment	9.5% (2004)
GDP	US\$4.254 billion (PPP) 2008 estimate
GDP Growth rate	6% (2008 estimate)
GDP per Capita	US\$8,900 (PPP) 2008 estimate
Currency Unit	Suriname Dollar (SRD); US\$1 = SRD\$2.78
Area of Mangrove Forests	1,088 sq km
Percent of Mangrove Forests Protected	36%
Per Capita Food Supply from Fish/Fishery Products (2000)	25 kg/person
Exports	alumina, gold, crude oil, lumber, shrimp and fish, rice, bananas valued at US\$1.391 billion (2006 estimate)

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

## Abbreviations and Acronyms

CARICOM	Caribbean Community
CARIFIS	Caribbean Fisheries Information System
CFRAMP	CARICOM Fisheries Resource Assessment and Management Programme
CRFM	CARICOM Regional Fisheries Mechanism
EEZ	Exclusive Economic Zone
EU	European Union
FAC	Fisheries Advisory Committee
FAO	Food & Agriculture Organization of the United Nations
FD	Fisheries Division
FMP	Fisheries Management Plan
GEF	Global Environmental Facility
GOS	Government of Suriname
HACCAP	Hazard Analysis and Critical Control Points
IHHN	Hypodermal Hematopoietic Necrosis
IICA	Inter-American Institute for Co-operation in Agriculture
JICA	Japan International Co-operation Agency
MAAHF	Ministry of Agriculture, Animal Husbandry and Fisheries
mt	Metric Ton
NIMOS	National Institute for the Environment and Development in Suriname
SSA	Suriname Seafood Association
TIP	Trip Interview Program
TSV	Taura Syndrome Virus
UNDP	United Nations Development Program



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# CHAPTER 1: INTRODUCTION



Suriname is located in the north-eastern part of South America; Guyana is on its western border and French Guiana is on the east; the Atlantic Ocean is to the north and Brazil is to the south. [It is off the map above further to the east of Guyana.] It is mostly covered by tropical rain forest, containing a great diversity of flora and fauna. Suriname is the smallest sovereign state in terms of area and population in South America. It is the only Dutch-speaking region in the Western Hemisphere that is not a part of the Kingdom of the Netherlands. Suriname is diverse ethnically, linguistically, and religiously. Most of its population lives along the coast. It became independent in 1975 and is a member of the Caribbean Community (CARICOM).

The country has seven (7) major rivers which form four (4) major estuaries: from west to east they are the Corantijne River (on the border with Guyana) and the Nickerie River (which enter the Atlantic Ocean in close proximity to form the Corantijne-Nickerie estuary); the Coppename River and the Saramacca River (which enter in close proximity to form the Coppename-Saramacca estuary); the Suriname River and the Commewijne River (which enter in close proximity to form the Suriname-Commewijne estuary) and the Marowijne River (on the border with French Guiana) which forms the Marowijne estuary where it joins the Atlantic Ocean (See Figure X on the following page). Suriname and France agree that their common border is the Marowijne River, but cannot agree which tributary forms its headwaters; this has led to a current and long-running border dispute.

## *Description of the Fisheries*

In terms of scale, the fishing fleet of Suriname may be divided into industrial and artisanal. In terms of fishing grounds, the fishing industry of Suriname may be divided into marine (the Atlantic Ocean) and riverine (the rivers described above).



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### ***The Fleet***

All the industrial fishing vessels in Suriname operate in the marine fishery, while the artisanal fleet operates both in the coastal and inland waters.

The fleet consists of trawlers, snapper boats, open or decked wooden vessels and canoes (see Table 1); they are multi-species and multi-gear. Trawl net operators include shrimp trawlers and different types of finfish trawlers. Large stern trawlers using high opening trawls were introduced in 1993; part of their catch consists of finfish species (small sandy-bottom demersal fish) that had been little exploited by other vessels; the other part includes soft-bottom demersal

fish that had been historically exploited; this fleet catches both demersal and pelagic species. There are differences in trip length: an average trip is two weeks. Licenses are given to these boats to operate outside the 15 fathom line over the entire EEZ. In 2002, three stern trawlers started to exploit small pelagics, which led to by-catch of large coastal pelagics and some demersal species. These vessels are still in operation.

**Table 1:  
Classification of Fishing Fleets Operating in Suriname**

Fleet category	Type of vessel	Type of gear	No. of licences (2005)
Industrial fleet	Outrigger trawlers	Shrimp trawl	67
		Finfish trawl	15
		Seabob trawl	30
	Stern trawlers	High-opening trawl	5
	Snapper boats	Hook-and-line	57
	Shark and Tuna	Long-line	9
Artisanal fleet	Guyana boats	Drifting gillnet	390
		Njawarie (banknet)	15
		Longline (bottom)	2
	Korjaal (canoes)	Large fuiknet (Chinese seine)	53
		Medium fuiknet (Chinese seine)	116
		Small fuiknet (Chinese seine)	192
		Drifting gillnet	100
		Longline (bottom)	21
		Kieuwnet (fixed gillnet)	63
		Haritete (river seine)	8
	Small canoes or beach-based	Drag net	2
		Spannet (fixed gillnet)	5
Cast net		--	

Source: FAO (2008) Table 3.

Outrigger trawlers exploiting finfish are converted shrimp trawlers, and are generally owned by Surinamese nationals. As this fleet exploits species found in shallow waters, there is conflict with the artisanal coastal fleet. The minimum depth is set at 10 m. The converted shrimp trawlers operate in shallow waters between 10 and 20 m depth, catching mainly demersal species. Outrigger trawlers, exploiting shrimp, are almost totally foreign owned and operated. Outrigger trawlers exploiting seabob emerged in 1996, and a precautionary approach is recommended until the potential of the resource has been estimated and the impact of this new fishing activity on other resources and other fleets has been investigated. The fishing zone is set beyond 10 m depth. Outrigger trawlers exploiting deepwater shrimp target scarlet shrimp; the potential yield of this resource is not yet known, and hence a precautionary approach is recommended. The snapper fishery is owned and operated by foreign fishers. The snapper fishing grounds are distributed between 50 and 80 m depth. The snapper boats catch *Lutjanus purpureus*, *L. synagris*, *Rhomboplites aurorubens*, other snappers, mackerels (*Scomberomorus* spp.) and small-sized Serranidae. They make use of vertical hook-and-lines, because traps are forbidden.

Tuna trawlers began operation in May 2001. Two North American vessels caught tuna in and out of the EEZ of Suriname. These vessels ceased operation for unknown reasons.

The **artisanal fleet** is divided into coastal and inland fleets. The coastal drifting gillnet ("drijfnet") fishery, is carried out by two types of boats using a similar fishing gear: the so-called "Guyana boats" (with or without deck). It is estimated that the MSY of the target resource – large demersal finfish – has been reached, and already exceeded in recent years. All the decked gillnet boats use 20 cm-mesh stretched polyethylene nets. Open Guyana-type boats also use polyethylene nets of 12 to 17 cm stretched mesh, while gillnets operating in estuaries use different sizes of nylon nets.

In the river mouth, fishing is done by canoe-type boats using Chinese seines. There are three (3) types of polyethylene nets of different sizes. The categories are large (FJ, for finfish), medium (FK) and small (FN for seabob, white belly shrimp and juvenile fish caught together in the net).

Fixed gillnets used in the lagoons are made of a number nylon nets of 20 m length. The nets are attached to poles both top and bottom. The mesh size ranges from 3 cm to 4.5 cm.

River seine boats use gillnets with mesh size ranging from 5 to 6 cm. The net is set in a circle using one boat.

### ***The Fisheries***

The fishing industry of Suriname may be divided into the marine sector (in the Atlantic Ocean) and the riverine sector (in the rivers described above).

The majority of the fish landing sites are in the capital, since all processing plants are located there.

All landing places are in the four estuaries of the country:

**Table 2:  
List of Landing Sites for the Marine Fishery**

Landing site	Type: primary or secondary	Strategy <sup>(1)</sup>	Stratum	District
006. Visserij Centrum Commewijne	P	C	03. Commewijne left bank	COMMEWIJNE
010. Central Market Paribo	P/S	C+	06. Central Market Par'bo	PARAMARIBO
011. Platte Brug	P			
012. Boonskreek/ Nene Steiger	P	C	07. Paramaribo North	PARAMARIBO
013. Bisoen steiger	P	C		
014. Blauwgrond	P	C		
015. Clevia Sluis	P	C		
016. Bethesda	P	C	08. Paramaribo South	
017. CEVIHAS	P	A		PARAMARIBO
017. TASA	P	A		
018. Jaha fish	P	A		
019. Holsu	P	A		
018. Niekoop Steiger	P	C		
019. Kamal Kanaal	P	C		
020. Jasodra	P	C		
036. SAIL	P	A	Paramaribo	PROCESSORS
037. SUJAFI	P	A		
038. SIS	P	A		
021. Boskamp	P	S	09. Boskamp	SARAMACCA
022. Huwelijkszorg	P	S	10. Saramacca river	
024. Calcutta	P	S		
028. Totness Kanalen	P	S	11. Coronie canals	CORONIE
029. John	P	S		
030. Burnside 2	P	S		
031. Burnside 1	P	S		
033. Central Market Nickerie	P/S	C+	13. Central Market Nickerie	NICKERIE
034. Zeedijk	P	C+	14. Zeedijk Nickerie	

NOTES: (1) S = effort and landing per unit effort (lpue) collected certain days (entire day); A = effort and lpue data supplied by plant or administration; C = effort by complete census, lpue sampled; C+ = effort and lpue by complete census.

Fishing has become increasingly important, both on inland waterways and at sea. The chief commercial catch is shrimp, which is exported. In 2000, the freshwater catch was 200 tons, and marine landings amounted to 16,000 tons; shrimp production totaled 1,650 tons that year.

The Fisheries Service, founded in 1947, has worked to develop the fishing industry. Exports of fish and fish products in 2000 amounted to nearly \$4.8 million. Japan is the largest market for Surinamese shrimp.

In Suriname the major fisheries resources are the marine resources, which are exploited by shrimp trawling fleets, finfish trawling fleets, Red snapper & Mackerel handliners and Large Pelagic longliners. In the coastal area large canoe type vessel with inboard and outboard engines operate using drifting gillnet, pin seine and the bottom longlines.

Fixed gillnets used in the lagoons are made of number nylon nets of 20m in length. The nets are attached to poles on the top side as well as the bottom side. The mesh size used ranges from 3 cm up to 4.5 cm.

<b>Table 3: Inland Fishing</b>	
Driftnet	<i>Cynoscion</i> spp., <i>Arius</i> spp., shark, <i>Elops saurus</i> , <i>Centropomus</i> spp.
Chinese seines	<i>Xyphopenaeus kroyeri</i> , <i>Nematopalaemon schmitti</i> , <i>Macodon ancylodon</i> , <i>Nebris microps</i> , <i>Cynoscion</i> spp., <i>Arius</i> spp.
Lagoon gillnet	Mugilidae, <i>Megalops atlanticus</i> , <i>Tilapia mossambica</i> , Arridae
River seines	<i>Plagioscion surinamensis</i>
Other	<i>Ucides cordatus</i> , Callichthyidae, Erithrinidae, <i>Aequidens</i> spp.

Source: FAO (2008) Table 8.

### Importance of Fisheries

The contribution of the Fisheries sector to the GDP of Suriname (at Constant Prices) declined between 2002 and 2006 by 22.1% in absolute terms. In percentage terms over the same period it declined from 2.48% to 1.51%.

<b>Table 4: Contribution of the Fisheries Sector to GDP (Constant Prices), Suriname 2002-2006</b>					
<b>YEAR</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
% of GDP	2.48%	2.36%	2.01%	1.85%	1.51%
SR\$ '000	113	114	105	102	88

Source: Torres et al. (2007).

An idea of direct employment in the fisheries sector may be obtained by examining the number of licenses and crewmembers. There is more employment in the artisanal fisheries (4,900); the industrial fisheries has 1,200 jobs.

<b>Table 5: Estimated Number of Jobs in the Suriname Fisheries Sector, 2007</b>					
<b>Sub-sector</b>	<b>Jobs</b>				<b>Note</b>
	<b>Direct</b>	<b>Processing</b>	<b>Indirect</b>	<b>Total</b>	
Fisheries	6,350	1,050	200	7,600	Industrial, artisanal and inland Fisheries
<b>TOTAL</b>	<b>20,095</b>	<b>2,575</b>	<b>2,500</b>	<b>25,170</b>	For all of Suriname

Source: National Report – Suriname (n.d.)

## FISHERS ORGANIZATIONS IN SURINAME

There are no primary artisanal fishers' organizations in Suriname, neither co-operatives nor any other form of association. They have never been encouraged by the government, nor have the fishers themselves sought to form them.

Suriname has two national umbrella groups – one for the industrial fishery and one for the artisanal fishery. The Suriname Seafood Association (SSA) represents the owners of industrial fishing vessels, while the *Visserscollectief* or Fishers Collective (FC) represents the owners of artisanal fishing boats.

Both associations represent the owners of capital, not the boat captains or crew members. In a real sense the fishers of Suriname have no organization to represent their interests.

Surinamese law does not require fishermen in Suriname to obtain a license in order to fish; only boats are required to have a license. The Suriname Maritime Authority has to inspect each fishing boat and “pass” it before it can receive a license to be used for fishing. In the Maroni River area (on the border with French Guiana) where the residents are predominantly Amerindian, few fishing boats are licensed; they catch river fish and sell them mostly in French Guyana.

The vast majority of fish workers in Suriname (some say as high as 90%) are foreigners, mostly Guyanese nationals. Fishing is not a traditional occupation in Suriname, and Surinamers are not usually willing to leave their wives and children at home to go to sea for two weeks at a time. Surinamese waters are a fecund fishery, and once foreign investors assembled the industrial fleet, there was an immediate shortage of labor. Some Guyanese have taken up legal residence in Suriname, and some are migrant workers, staying for two to three months at a time.



On the industrial fishing boats (trawlers) the fishers are wage-workers; they do not share in the catch, and they are not organized into unions to represent their interests in terms of pay and working conditions. Most of them are Guyanese nationals illegally working in Suriname. Due to this they are unlikely to join a union if any existed.

Most of the artisanal fishers are also Guyanese, and they sell to the processors. Some fishers had tried to organize themselves to get a better price; the processors responded by offering higher prices to non-members, and when the organization fell apart they resumed their low prices.

The fact that no fishers' license is required suits everyone. It suits the Guyanese since they can more easily remain undetected as they earn a living without a work permit; it suits the boat-owners because they are able to get labor which is scarce. Further, because they employ illegals, they can pay them less which suits the processors because they can pay less for the fish they buy. And it suits the government, which has less paperwork.

The Suriname Fishers Collective has about one hundred artisanal boat-owners as members. They are drawn mostly from Commewijne, but some are from Paramaribo; two members come from Saramacca and one is from Nickerie.

About five to six fishers work in an artisanal fishing boat at a time. They do not work for wages like in industrial fishing boats, but work on a share system. After the owner sells the fish, and the costs are taken out, the rest is called the “profit”. Half the profit goes to the owner and the other half is divided equally among the captain and crew. The owner usually gives one-tenth

of his share to the captain as a sort of commission. The artisanal fishing enterprise works like a partnership between the owner, the captain and the crew.

It is a tradition in Suriname (and Guyana) for the owner to give the crew a “first cut” of about SR\$200, an advance on their share of the profit, even before the boat leaves port. Rarely the crew member takes the first cut and disappears; sometimes they give it to their families, but often they spend it off on alcohol and drugs.

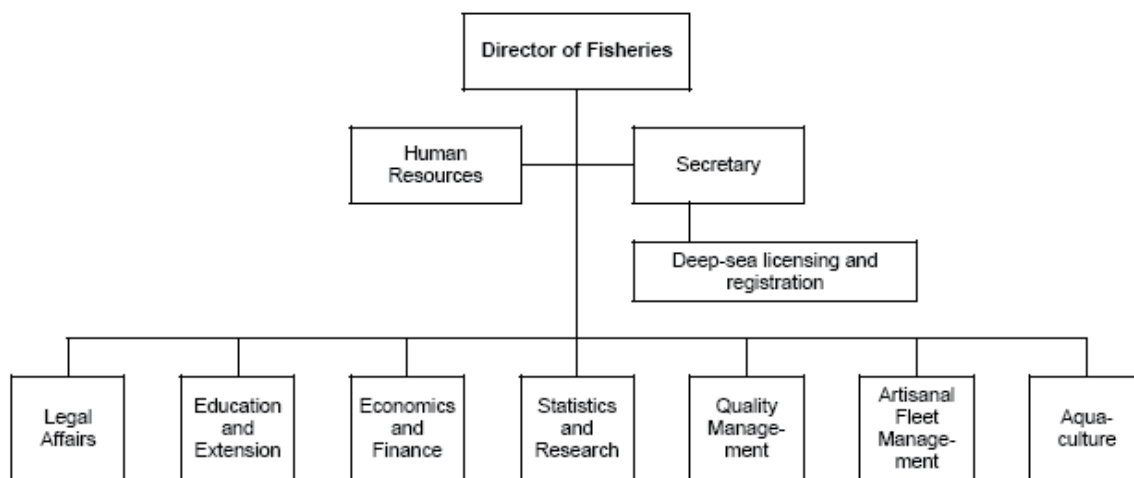
Neither boat-captains nor crew members are members of the Suriname Fishers Collective; only the boat-owners. The membership fees are SR\$50 per month. Since August 2009, this has been reduced to SR\$20 per month due to the economic downturn.. A few boat-captains and crew members come to meetings, and they could join if they wished, but they usually don't. One reason is financial, and another is because many of them are illegally working in Suriname and are transients. Another, it is said, is because many of the Guyanese are not well educated, and are not suitable people to members of the Collective. Most crew members attended primary school, but never finished. Most captains finished primary school and have some secondary education.

Fish landing sites in Suriname are to be licensed, and a fishing boat license states at which location the fish are to be landed. There are dozens of unlicensed landing sites in Suriname, many in backyards that front on the rivers. Data collectors from the FD only go to licensed landing sites.

### **THE ADMINISTRATION OF FISHERIES IN SURINAME**

The Suriname Fisheries Department, a unit of the Ministry of Agriculture, Animal Husbandry and Fisheries (MAAHF), oversees the fishing sector. The Department is organized as pictured below:

***Organigram of the Fisheries Department***





# CHAPTER 2: COMMUNITY-BASED FISHERIES MANAGEMENT COMPONENT

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## 2.1 Coastal Community Characteristics

Suriname is the smallest sovereign state in terms of area and population in South America. Most of its population (about 85%) lives along the coast; and most in Paramaribo. The major coastal settlements (going from west to east) are:

- Nieuw Nickerie - 13,400 population
- Totness - 1,800 population
- Boskamp -
- Paramaribo - 218,500 population
- Nieuw Amsterdam - 4,900 population

In addition there are towns along the inland waterways of Suriname which have significant numbers of people who fish:

- Albina - 4,100 population
- Bitagron - 4,934 population
- Brownsweg - 2,400 population
- Brokopondo - 2,100 population
- Onverwacht - 2,000 population
- Lelydorp - 17,700 population
- Groningen - 3,100 population

Suriname is not a fishing nation. Persons along the seacoast or near rivers may catch fish to eat, but not commercially as an occupation. The area along most rivers is heavily used for subsistence agriculture in the interior. Surinamers are not usually willing to leave their wives and children at home to go to sea for two weeks at a time. The vast majority of persons who catch fish for a living are foreigners, mostly from Guyana. Many are illegal aliens.

## 2.2 Policy, Legislation, and Supporting Institutional Arrangements

### POLICY

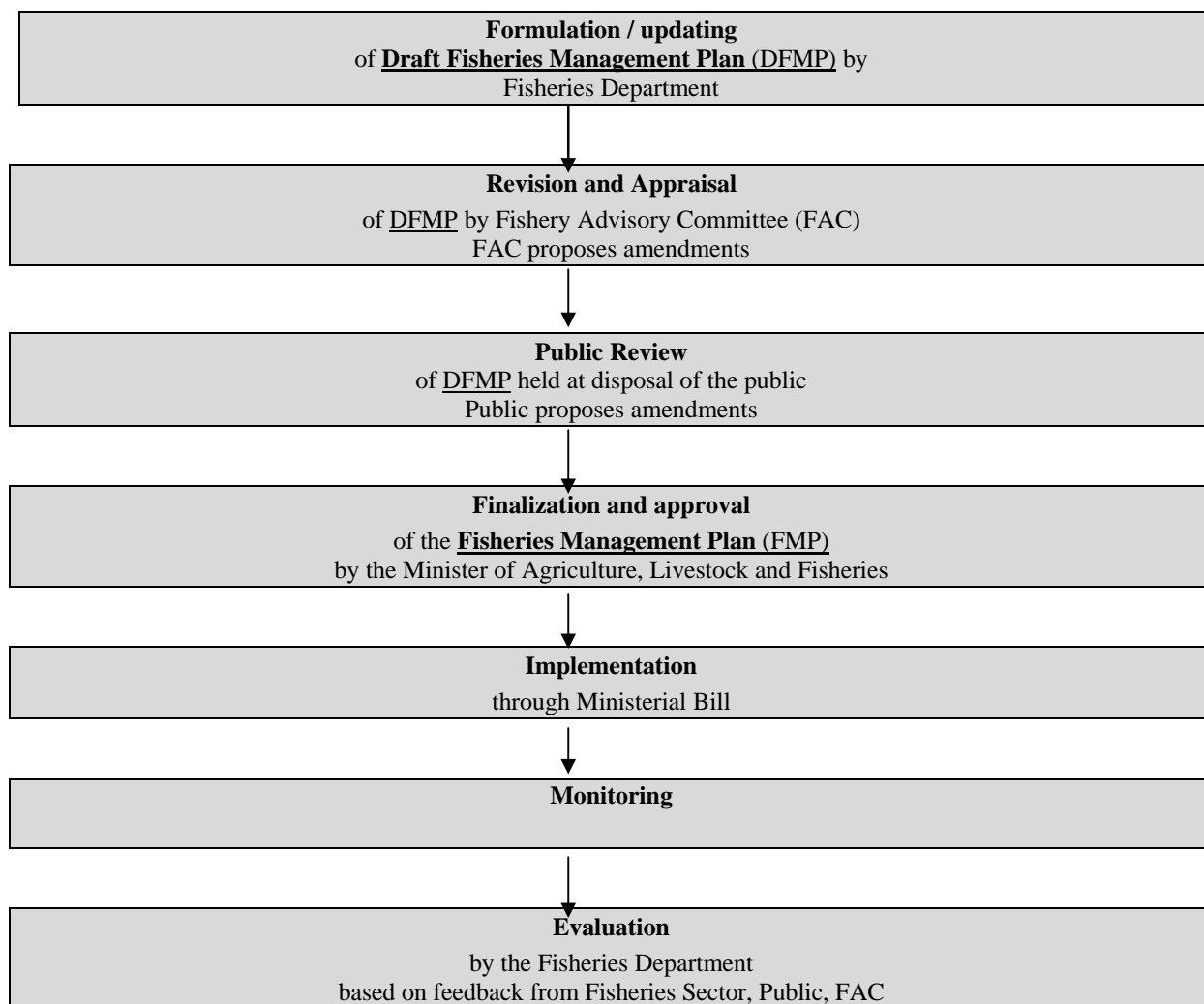
The GOS has chosen not to prepare a National Fisheries Policy for Suriname. In 1993 the first draft of a Fisheries Management Plan (FMP) for Suriname was prepared which might serve the same function; it was updated in 1998 and again in 2000<sup>1</sup> but a decade later it still has not been adopted.

The procedure through which the *Draft FMP* is generated, discussed, amended and approved (thus becoming a Fisheries Management Plan) and then implemented and evaluated is schematically depicted in the overleaf. The FD formulates the draft which is then appraised and revised by the Fishery Advisory Committee (FAC) The FAC is the main mechanism for consultation with the different groups involved in the fisheries sector (the stake holders). The draft then undergoes a period of public review, during which amendments may be proposed. The responsible Minister then finalizes and approves the plan (no longer a draft) and promulgates it by a Ministerial Order. The FD then implements it, under the monitoring and evaluating eye of the FAC.

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<sup>1</sup> See Charlier (2000).

The above procedure has been stymied because the FAC has not been appointed; and the FAC has not been appointed because the enabling legislation has not yet become law.



*Schematic describing the process for approving and implementing the Suriname Fisheries Management Plan.*

Suriname did not participate in CFRAMP, the precursor project of the CRFM, which took the participating countries through the process of stakeholder participation in fisheries management planning and implementation. The draft FMP for Suriname is bereft of any reference to stakeholder participation in the process.

The following box contains an extended quote from the **National Report – Suriname** which expands on the 2000 draft Fisheries Management Plan for Suriname. The document contains both flaws and omissions.

The plan would commit Suriname to manage its fisheries to obtain:

- Maximum Sustainable Yield to promote food security;
- Maximum Economic Yield to promote a positive trade balance; and
- Maximum employment in the fishery to reduce unemployment and poverty.

Modern fisheries science understands that all three of these laudable objectives cannot be achieved at the same time; since they fall at different points on the Surplus Production Model curve representing different levels of fishing efforts.. One has to choose between them, or to choose which will take precedence.

Notably absent from the 2000 draft FMP for Suriname is any reference to stakeholders and stakeholder groups, except for the reference at the end to resolve conflicts between them. The plan promotes the old-style top-down approach to fisheries management. Suriname is a prime candidate for implementation of initiatives under this JICA-CRPM Master Plan Project which seeks to promote the participation of fishers, fishers' organizations and fishing communities in fisheries management.

## **B. National Fisheries Policy and Management Objectives**

The role of the fisheries sector could be expressed as followed:

- Assurance of reasonable animal proteins (fish production) for the local population. There should be enough healthy and safe food for everybody at anytime that should be derived from own fish production. Food security and safety are the leading themes of the policy.
- Provides jobs (primary and secondary level). Create more qualitative job opportunities and reasonable incomes. Diversity of the sector is also important.
- Creates a balance of payment through export of fish and shrimp products
- Contribute to the GDP of the country
- Contribute to the national budget through fees and income tax.

Stimulate and support new fishing techniques to increase production on a sustainable level. The exploitation of the non-traditional species, such as small and large pelagics is promoted. Artisanal fishermen still using traditional methods and are reluctant to use new techniques. There is need for knowledge and awareness on new views on quality, competing cost price.

It is difficult to identify universal management objectives that would be valid for all resources. On the contrary, the objectives and/or their priority order will vary with the type of resource and the type of fishery, and so will the strategies and the types of measures to be taken to achieve them. There are, however, global objectives that are pursued by fishery management as a whole in Suriname, such as:

- Long term conservation of the resources.
- Maximisation of the long-term production of fish; contribution to the protein supply to the local market; production of affordable protein. These objectives can be seen as different expressions of achieving MSY (Maximum Sustainable Yield). It should be noted that MSY estimates, when they are derived from survey data, as in Suriname, tend to be optimistic, and therefore should be treated with caution.
- Maximisation of the long-term economic yield (MEY): the level of harvest required to achieve this objective is always lower than the MSY level.
- Contribution to the trade balance; generation of foreign currency; maximisation of exports. These objectives may coincide with MSY or MEY.
- Contribution to employment; maximisation of the number of households making a living out of the fishery, directly or indirectly; maintaining or improving living standards of the communities that depend on fishing and related activities.
- Solution of conflicts between different exploitation modes and/or stakeholders.

The Ministry of Agriculture, Animal Husbandry and Fisheries (MAAHF) has made up an Agricultural Sector Plan, a document that includes all projects to be conducted over the period of 2006-2010. The following projects are selected for Fisheries.

- **The Fish Inspection Institute** (established in April 2007): All arrangements have been made and the equipment needed will be bought. The institute will be located at Cevihas, Bethesda.
- **A new Fisheries Act**: this act will replace the Decree C-14 for marine fisheries. There is a draft act since 1995, which has been delayed for several reasons.
- **An Aquaculture Act**: this is new, but there is an earlier draft dated 2004. Changes are being made to get this act passed by the Assembly.
- **National Residue Plan** for fisheries products: this laboratory facility is very important in the aquaculture sector.
- **Fish Disease Monitoring Plan**: also important in the aquaculture sector.
- **Integrated Rice-Fish culture**: in the district of Nickerie.

None of these projects are directly consonant with the community-based fisheries management component of this JICA-CRPM project.

## LEGISLATION

The legislation governing fisheries in Suriname are:

1. **The Fish Stock Protection Act:** effective in 1961 it was last revised in 1981. This Act contains the procedure for obtaining fishing licenses in the inland waters of Suriname.
2. **The Sea Fisheries Act:** effective in 1980 and was last revised in 1981. This Act contains the procedures for fishing in the Territorial Waters and the Exclusive Economic Zone.
3. **The Fish Inspection Act:** effective in 2000. This Act contains the guidelines for exporting fish and fish products to the European Union, Canada and the United States of America.
4. **The Fish Inspection Decree:** effective in 2002. This Decree is to implement some of the articles of the Fish Inspection Act.

A new Sea Fisheries Act was drafted and was submitted to the Parliament in 1998; since then it has not been tabled for discussion. The proposed new legislation makes provision for the establishment of a Fisheries Advisory Board with elaboration by the Fisheries Department of an FMP to discuss management issues in detail. The FMP can propose regulations on such matters as the classification of vessels and gears, the delimitation of fishing grounds, the implementation of closed seasons and/or areas, and fishing rights, etc. The new draft Fisheries Act is available only in Dutch, and therefore detailed assessment of its contents was not possible.

The 2000 draft FMP for Suriname contains the following:

*“Fisheries evolve continuously, and the pressure to which given resources are subjected is likely to change over the years, generally towards a more intensive exploitation, making new regulations necessary. On the other hand, there are still many gaps in our knowledge of the resources and their utilisation. Regulations that can be proposed today are based on the best current knowledge and derived from a precautionary approach. As future investigations provide more and more detailed information on the stocks, the socio-economic characteristics of groups involved in their exploitation, etc., it will become possible to adapt and improve management.*

*“Enforcement capacity is subject to change as well. Regulations that would be pointless today because their observance cannot be controlled might be considered at a later stage. On the other hand, even carefully selected regulations may prove, once implemented, less efficient than expected, or they may have unforeseen, unwanted side effects. The collection of data for the assessment of the (results of) regulations must be built in any management strategy, and such assessments will play an important role in fine-tuning these regulations.*

*“All this indicates that legislation needs to be flexible, able to adapt quickly to a changing situation. In this new approach, the Fisheries Law itself is only providing a general legal framework, and leaves most details for less permanent application decrees like Ministerial Bills, derived from the Fisheries Management Plan. This document is the third Draft Fisheries Management Plan for Suriname (the first one was written in 1993). It is intended to be updated and complemented every year, starting from 1999, and to gradually become a comprehensive summary of the current situation of the fisheries as well as an efficient instrument in the hands of the Government.”*

The document clearly recognizes the importance of policy and legislation being able to quickly evaluate its effectiveness to change tack, and also to be able to adapt to new situations. The slowness with which the GOS has so far approached fisheries policy and legislation does not inspire confidence that annual management plan reviews are sustainable.

On January 7<sup>th</sup> 2005 the **Board of Deliberation for Coastal & Marine Fisheries** was inaugurated at the ministry of Agriculture, Animal Husbandry and Fisheries, according to article 26 of the Sea Fisheries Act of December 2001. The main duty of this board is to advise the minister on fisheries matters such as licenses and fishing regulations, and would seem to perform the same functions as National Fisheries Advisory Boards in other CARICOM countries.

## **SUPPORTING INSTITUTIONAL ARRANGEMENTS**

It would seem that in Suriname the concept of stakeholder participation in fisheries management is yet to be fully embraced in official policy and legislation. Although there is some consultation with the two umbrella organizations (the SSA and the FC), only the boat-owners are represented at the table.

There is no policy to encourage the formation of local fishers' organizations.

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.

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

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As mentioned above, there are no primary fisherfolk organizations (i.e. at the landing-site level) in Suriname. The umbrella organizations (equivalent to secondary associations) have individuals (as opposed to primary organizations) as members. There is no thrust to form primary fishers' organizations in Suriname; indeed there is no felt need to do it.

These umbrella organizations do not have rank-and-file fishers as members, but solely boat-owners. Therefore there is no mechanism for dialogue and interaction with rank-and-file fishers and fishing communities.

There is provision for the appointment of a Suriname Fisheries Advisory Board to advise the Minister responsible for fisheries. The difficulty in appointing such a Board without primary fisherfolk organizations is that there is no easy way to obtain genuine representatives from all the elements in the fisheries sector.

There has been no experimentation with forms of participation in the management of fishery resources such as community enforcement and participatory monitoring. In many respects, fisheries management in Suriname is still a "top-down" approach

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

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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.

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

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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

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

There is no current **National Fisheries Policy** for Suriname. In 2000 a draft FMP for Suriname was prepared, but a decade later it still has not been adopted.

A specific requirement of the new draft “*Fisheries Act of Suriname*” is that the “Chief Fisheries Officer shall develop a **Fisheries Management Plan** (FMP) every year, with its’ main goal to “*review the situation of the fishing industry and to settle most daily management details and concrete regulations.*” In preparation for the passage of the new “*Fisheries Act of Suriname*”, the 1998 FMP was reviewed in 2000. The Act has not been passed, and so the requirement to review the plan annually is not yet law.

The 2000 FMP seeks in general to:

- (1) Maximize the long-term production of fish, the contribution of protein supply to the local market, and the production of affordable protein;
- (2) Maximize the long-term economic yield (MEY). Note that the level of harvest required to achieve this objective is always lower than the MSY level;
- (3) Contribute in increasing the level of employment in Suriname, by maximizing the number of households making a living out of the fishery, directly or indirectly; and maintaining or improving living standards of the communities that depend on fishing and fishing related activities.

The 2000 FMP defined and reviewed 16 “Fisheries Management Units.” A management unit is a group of species that are managed under similar regulations due to their biological and life history characteristics. The small and large pelagic fish are the two management units of interest to this baseline survey. Under this framework the FMP seeks:

- The development of small pelagic fisheries in Suriname as a potential source of protein for industrial use.
- The development of large pelagic fisheries, such as wahoo, king mackerel and dolphinfish for the production of fish meat as export commodities.

### ***Effectiveness of the FMP***

The FMP is not being implemented (it is still a draft). While most exploited stocks are in decline, the number of licenses never decreased as recommended under the plan for the Fisheries Management Units.

### ***Realization of FMP objectives:***

The proposed objectives have not yet been adopted after a decade. Even so, efforts could have been made to work towards them. In general, the efforts have been poor!

## **LEGISLATION**

The *draft “Fisheries Act of Suriname”* is proposed legislation that addresses the development and management of fisheries, and the regulation of fisheries and fishing-related activities in Suriname. This law was drafted and submitted to the Surinamese Parliament in 1998, but has not

yet been approved. The Act makes provisions for the Minister responsible for fisheries to create a Fisheries Management Plan (FMP) that should address:

- (1) Major issues concerning the development and management of fisheries in Suriname waters;
- (2) The creation of regulations concerning the:
  - Classification and licensing of fishing vessels;
  - Licensing of fishing and fishing related activities;
  - Identification of fisheries and the delineation of fishing grounds;
  - Implementation of closed seasons and areas to protect and conserve fisheries resources;
  - Determination of Total Allowable Catch for each exploited fish population;
  - Definition of fishing rights and the establishment of a Fisheries Advisory Board.

However, since 1980 Surinamese fisheries have been formally regulated by “Decree C-47” and its various revisions, such as the 1992 and the 2001 amendments.

A specific requirement of the draft Fisheries Act is that regulations be discussed with all sectors involved in the fishing industry, and thereafter implemented through Ministerial Bills issued by the Minister responsible for fisheries. Although the Fisheries Act has yet to be enacted, the first ministerial Bill was created in 1993, with the requirement of being reviewed and updated every year starting in 1999.

### ***Enforcement of Regulations***

The responsibility for the enforcement of fisheries legislation falls to:

- (1) The Surinamese Police supported by a Military Unit from the Ministry of Defense;
- (2) The Fisheries Department: 5 employees.

The military generally enforces fishing regulations at sea. This unit reports all violations to the Police, which is responsible for fining and processing all legal actions against perpetrators.

The fisheries division enforces all regulations concerning the artisanal fisheries; particularly, it enforces regulations pertaining to the use of landing sites, fishing boats, fishing gears, and fishing licenses.

In general the *level of enforcement* is fair. *The level of compliance* is excellent within the industrial fisheries, but generally fair in the artisanal fisheries.

*Problems:* the police are not pro-active in term of enforcing fishing regulations, because of lack of resources. They act only when violations are reported by the military; therefore they don't actively work on preventing illegal fishing and the violation of fishing regulations in Surinamese waters.

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

Since Suriname has no current policy goals, policy objectives nor management objectives for its pelagic fisheries, there is nothing that can be said about their “status”. A National Fisheries Policy for Suriname needs to be developed, and the various draft management plans and draft legislation need to be updated and promulgated.

In order to sustainably use its pelagic fisheries resources for coastal community development, the Government of Suriname should embark on a program to realize these important tools. This could be a candidate for a pilot project under this JICA/CRFM project.

### 3.3 Fishery and Market Characteristics

#### FISHERIES CHARACTERISTICS

##### *Exploited Species*

There are no activities targeting pelagic fishes in Suriname (Table 6). Pelagic fish such wahoo, dolphinfish are taken mainly as by-catch in the snapper hand-line fishery, the gillnet fishery, and the shrimp and fish trawl fisheries (Table 1). Further, there is also occasional poaching of these fish by non-nationals of Suriname; longline vessels from Venezuela and other foreign vessels often operate illegally in Surinamese waters. Small coastal pelagic fishes are an integral part of the trawl catches (*i.e.* shrimp, fish, stern, and sea-bob trawlers). However, catches of these small pelagics are usually entirely discarded at sea, although some Chinese nets (small and medium *fuiknets*) often land minor quantities of these catches.

**Table 6:  
Status of coastal pelagic fisheries in Suriname**

Species	Stock Status		Fishery Status			
	Type of exploitation	Over-exploited	Developed	Sustainable	Monitored	Managed
Wahoo ( <i>Acanthocybium solandri</i> )	Bycatch	Not	Under			To be
Dolphin fish ( <i>Coryphaena hippurus</i> )	Bycatch	Not	Under			To be
Black fin tuna ( <i>Thunnus atlanticus</i> )	Bycatch	Not	Under			To be
King mackerel ( <i>Scomberomus cavalla</i> )	Bycatch	Not	Under			To be
Jack Mackerel ( <i>Trachurus spp.</i> )	Discard/Bycatch	Not	Under			To be
Flying fish ( <i>Hirundichthys spp.</i> )	Discard/Bycatch	Not	Under			To be
Sardines ( <i>Sardinella aurita</i> )	Discard/Bycatch	Not	Under			To be
Scaled Herring ( <i>Harengula jaguana</i> )	Discard/Bycatch	Not	Under			To be
Atlantic thread herring ( <i>Opisthonema oglinum</i> )	Discard/Bycatch	Not	Under			To be
Jack ( <i>Selar spp.</i> )	Discard/Bycatch	Not	Under			To be
Robin ( <i>Decapterus spp.</i> )	Discard/Bycatch	Not	Under			To be
Diamond back squid ( <i>Thysanoteuthis rhombus</i> )*	N	?				
Conch ( <i>Eustrombus gigas</i> )*	N	?				
Caribbean spiny lobster ( <i>Panulirus argus</i> )*	N	?				
Spotted spiny lobster ( <i>Panulirus guttatus</i> )*	N	?				

##### Notes:

\*: These species are not 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: These species are not exploited in the fishery or no catch records are available.

##### Stock Status

Although largely discarded at sea, small pelagic fishes constitute the largest fish biomass in Suriname waters. Nansen (1988 cited by Charlier 2000) estimates the MSY for the small pelagics in Surinamese coastal waters to be 200,000.00 mt, compared to 10,000 mt for the large pelagics (Table 7). In general, the pelagic stocks of Suriname are under-exploited; however there is a need to conduct surveys to understand the impact of by-catch and discards on the overall health of these stocks.

**Table 7:  
Delineation of Pelagic Fisheries and Estimation of their  
MSY in Surinamese Waters**

Management Unit	Depth zone(m)	Fishing Area	MSY(mt)
Large pelagic	0 - 50	39,000 Km <sup>2</sup>	10,000
Small	0 - 50	39,000 Km <sup>2</sup>	200,000

Source: MSY estimates by Fridtjof Nansen (1988) cited by Charlier 2000.



## MARKET CHARACTERISTICS

A decade ago coastal pelagic fishes were practically unknown on the domestic market of Suriname. Although a mature local market has yet to be developed, several species have been recently introduced as smoked products with some success. There seems to be great potential for developing an export market for king mackerel (*Scomberomus* spp.).

Fish processing in Suriname takes place in both artisanal and industrial processing plants. The artisanal plants are small-scale family operations that process a fraction of the artisanal catch. Although a license from the government is required, these traditional producers are not always registered. Some of the ethnic foods produced by the artisanal processing plants are:

- *Trie*: whole juveniles fishes salted for 2-3 days and dried under the sun; mainly consumed on the local market;
- *Smoked fish*: whole fish gutted or split on the back, and then smoked on a barbakot (open fire) or in an oven; produced for local and export market;
- *Salted fish*: gutted and cut fish; rubbed in salt and laid on a tray for one or more days under the sun to dry; produced for local and export markets;
- *Tingie fisie*: the fish is not always gutted, but when it is gutted the intestines are removed via the opercular apparatus; then the fish is salted and dried as for salted fish; produced mainly for the local market.

Industrial processing plants are large scale operations that require high levels of investment and technology. Fish are mostly processed in these plants for export and sold (frozen, smoked, or chilled) in ice products. Suriname is a major exporter of fish products to the Caribbean, North America, Europe and Asia. In 2005, regional and international exports of marine products were estimated at 1,199,066.80 Kg, representing a net value of US\$14,335,334.75.

### **3.4 Current Levels of Catch and Effort by Species**

#### **Effort Data**

The number of fishermen and boats in a fishery may be used as an indicator of fishing effort. The fishing industry in Suriname is very diverse, but in term of catch and effort it can be largely categorized into two fleets: an industrial fleet and an artisanal fleet. Industrial fishing is done on a large scale, requiring high levels of investment in fishing materials and equipment (Table 1). In contrast, artisanal fishing is done on small-scale, requiring smaller amounts of investment. As pelagic fishes are captured mostly as by-catch or discarded at sea, the effect of fishing on the abundance of these species is not well understood. Small amounts of kingfish (wahoo and king mackerel) are reported caught in the bottom trawl (more than 11,194 kg in 2008) but these species remain largely unexploited in Surinamese waters.

#### **Catch Data**

Coastal pelagic fishes in Suriname are taken as bycatch or discarded at sea. The small pelagics are totally discarded. Therefore no data is available on the pelagic catch in Suriname.

#### **The Contribution of Pelagic Fisheries to the Belize Economy**

As there is no fishery for pelagics in Suriname, this sector makes no significant contribution to the economy either by exports or imports.

## **Fishing Technology Improvement**

### ***Large Pelagics***

The exploitation of pelagic fish is impaired by the lack of appropriate technology and the absence of a local market. Further, because there is not a national fleet that specifically targets these species, knowledge on their abundance is very limited. Thus the fisheries department should seek to:

- Conduct experimental surveys to assess the overall abundance of these species;
- Conduct experiments in technology development to determine the most appropriate/innovative fishing methods ;
- To develop more fuel efficient boats and increase fishing productivity.

### ***Small Coastal Pelagics***

The major issue is the lack of appropriate technology to exploit these species. Because of the low value of these fishes, the development of low cost-technology for their exploitation will be required. Further, technological development should aim at producing animal feeds from the fish caught rather than producing fish for human consumption.

## **Technical Assistance and Funding**

Funding will be needed to:

- Afford consultancies to help investigate the possibilities of exploiting pelagic resources in Surinamese waters;
- Conduct technical and economic feasibility studies on developing pelagic fisheries in Surinamese waters;
- Provide financial incentives to investors interested in developing commercial operations on the pelagic species.

## **Technical and Research Capabilities**

Because there is no fishing effort directed on the pelagic fishes, the Suriname FD has developed little research and technical capability in managing pelagic fisheries. Hence in the near future, the FD will need funds:

- To conduct experiments and surveys to assess pelagic fishes in Suriname waters;
- To train staff in the biology of pelagic fishes, particularly to enhance knowledge in taxonomy and fish identification;
- To continue recording by-catch information related to pelagic fishes captured from non-targeted fisheries;
- To continue recording discard information related to small pelagic fishes captured from non-targeted fisheries;
- To establish better observer programs for the monitoring of by-catch and discards, and the collection of information on the geographical distribution of pelagic catches;
- To conduct exploratory fishing or experimental commercial fishing on pelagic fishes, involving both the private and public sectors;
- To collect socio-economic data to determine the opportunities and limitations of developing a pelagic fishery in Suriname marine waters.

# CHAPTER 4: AQUACULTURE DEVELOPMENT COMPONENT

## *Introduction*

Suriname has been blessed with vast fisheries resources with an estimated yield of 19,000 mt with a value of US\$33 million in 2006, a figure that is approximately 56 % of the combined total of agricultural exports.

The high yield from the capture fishery and the relatively small population has been cited as the main disincentive for local small-scale aquaculture production. Notwithstanding this, there have been several attempts at aquaculture both at the commercial and subsistence levels. Projects thus far have had varying success rates.

## **4.1 Policy, Supporting Legislation, Development Plans**

### **Policy and Supporting Legislation**

There is National Fisheries Policy contained in the National Agriculture Policy, which seeks to achieve the Millennium Development Goals, and can be summarized as follows:

- Assurance of reasonable levels of animal protein (fish production) for the local population at any time, thus ensuring food security and that availability should be safe.
- Job creation
- Contribute to GDP
- Help to support national budget through user fees and taxes.
- Diversification of sector.

The 2000 draft Fisheries Management Plan contains **management objectives** which are so structured to support global fisheries management objectives, key to which is sustainable exploitation of the resource. The MAAHF has prepared an Agriculture Sector Development Plan 2006-2010 which contains the following projects for the fisheries sector:

- Fish Inspection Unit; established 2007, located at Ceivhas, Bethasda.
- New Fisheries Act to replace Decree C-14 for marine fisheries. To date the act is still in draft; however it has been submitted to the House of Assembly.
- Aquaculture Act to be passed; it has been in draft since 2004; it is to be modified and placed before the House of Assembly.
- National Residue Plan for fisheries products; this facility deemed as important for the Aquaculture sector as it is in keeping with Eco-labeling, Global Gap certification, HACCAP and general requirements to key maintenance of High phyto-sanitary standards and environmental best management practices.
- Fish disease and monitoring plan seen as important to the Aquaculture sector.
- Integrated Rice-Fish culture in Nickerie.

Notwithstanding the absence of an Aquaculture Act, the **Fish Inspection Act 2002** (which governs the export of fish and fisheries products) and the **Fish Inspection Decree 2002** (to implement some of the articles of the Fish Inspection Act) do regulate the sustainable development of aquaculture activity in Suriname. Not so much from a production/integrated resource management frame, but rather by focusing on post-harvest activities.

## *Institutional Support for Aquaculture in Suriname*

### *Institutions Involved In Aquaculture Development*

The Fisheries Department of Suriname has a branch dedicated to the development and support of the Aquaculture sector.

The **Board of Deliberation for Coastal and Marine Fisheries** was inaugurated according to Article 26 of the Sea fisheries Act of 2001. This board has as its main responsibility to advise the Minister on Fisheries Matters, inclusive of aquaculture licensing and fisheries regulations.

The National Institute for the Environment and Development in Suriname (NIMOS) under the relevant acts has a responsibility for the approval of projects.

The Ministry of land, Forest Management and Rural Planning exercise authority over the acquisition of land, and Zoning.

The competent authority of Industrial Quality in Fishery and Aquaculture (VKI) monitors trade effluent parameters.

## *4.2 Aquaculture Development Status regarding Stated Policy Goals and Development Objectives*

Development plans and policies are only at the draft stage, and existent production practices are very small and were established prior to drafting of the policy. However discussions with stakeholders indicate that there is consensus on the gravamen of the policy.

The development of capacity and the ability to produce seed stock are viewed as priority objectives, and the FD indicates that they aggressively pursuing this issue. Exactly how they have approached this was not divulged.

## *4.3 Aquaculture and Market Characteristics*

All aquaculture products produced by small scale operators are sold locally as fresh produce and there is no value added. Of special mention is the year round high demand for *Haplosternum Littorale* (Soke kwi kwi/Cassadura) which is considered a local favorite, most delectable to the palate. See Figure 1 for price details.

The market characteristics of larger commercial operators are uncertain, except to say that most of the product (marine shrimp and tilapia) is exported. Of interest is that Suriname is a former Dutch colony and there is a large population of Surinamese resident in Holland; this relationship presents market access/channel into the Netherlands.

The Fish Inspectorate and National Residue Monitoring program implemented in 2007 has resulted in the development of systems/standards for post-harvest management that satisfy most if not all of the requirements of access of fish products into the EU and USA markets.

Additionally, commercial aquaculture facilities in existence have attained Global Gap aquaculture certification.

The large natural fishery/catch has resulted in the development of the fish and sea food processing sector which can extend itself to the aquaculture sector.

Tilapia and marine shrimp are in large abundance within the natural catch, and a direct consequence of this is depressed prices for product within local markets, which limits the potential for production for the local market. In addition to depressed local prices, cheap supplies of tilapia and shrimp products from China have resulted in reduced profit margins for commercial producers. An increase in production volumes from additional acreage is critical for sustained market penetration/presence.

One approach to achieve this expanded production is the development of mother-satellite farm linkages; exact models that could be utilized should hinge on early stakeholder participation.

#### **4.4 Current Levels of Aquaculture Production by Species**

##### ***Commercial Marine Aquaculture***

Aquaculture activities worthy of mention started in the 1990's with the culture of *Litopenaeus vannamei* and red hybrid tilapia. These commercial farms located in the Commewijne area, have enjoyed some measure of success and presently (2009) are still in operation.

Production data Table 8 does not capture any information for small scale production.

**TABLE 8:  
Year to date Aquaculture production data**

SCIENTIFIC NAME	Quantity (Tonnes) / Price/Kg	2001	2002	2003	2004	2005	2006	2007	2008
Oreochromis (=Tilapia) spp	T	54	54	F	...	...	-	1	10
Oreochromis (=Tilapia) spp	USD	1.6	1.6	...	...	...	-	2	2.28
Penaeus vannamei	T	368	368	260	288	242	180	51	28
Penaeus vannamei	USD	7.4	7.4	4.03	4.03	4.2	5.47	5.29	5.92
Macrobrachium rozenbergii	T								0.4
Macrobrachium rozenbergii	USD								17
Hoplosternum littorale	T								0.16
Hoplosternum littorale	USD								30

There however is mention of difficulty being experienced, particularly the high cost of feed (US\$0.60) which for the most part is imported. Given the national aquaculture development objectives there is a clear need at this stage of development for the Government to engage aquaculture sector stake holders specifically to:

- i. Present / stage aquaculture development objectives.
- ii. Identify critical issues impacting on sector/firm level performance.
- iii. Prioritize areas for short /medium term intervention.
- iv. Formulate strategy modality of intervention.
- v. Seek requisite funding.

##### ***Small Scale Aquaculture***

Small-scale aquaculture does exist, and this for the most part, is restricted to Integrated farming systems (Rice – Fish). Fish species currently produced in the rice fields are tilapia, cascadura and freshwater prawn. These production systems and methodologies came out of an FAO project in 2004 where five small-scale rice farmers were introduced to rice-fish production to increase plot yields and as part of an integrated pest management strategy. There was no access to the project report/summary, and except for the fact that seed stock was wild-caught, no further details of the production process are available. The project is considered successful, as the number of farmers now engaged in this production methodology has increased from five (5) to nineteen (19) from 2004 to the present.

Production factors which limit profitability of this system are attributed to

- Poor field construction
- Unavailability of fish seed supply
- Lack of organized marketing efforts.

#### ***4.5 Knowledge on Aquaculture Issues by Category***

In recognition of the

- finite boundary for exploitation of local fish stocks
- Need for diversification of agricultural sector
- Need for Rural development
- Food security
- Hatchery reared seed stock

and in keeping with national policy objectives, a case can be presented to justify further aquaculture development for Suriname. There is however, a general lack of capacity, evidenced by lack of human resources, appropriate infrastructure and a dedicated team geared towards stewardship and sector development. Such a finding is also reflected in the **Proceedings of the First Workshop on Fisheries Management in Suriname 1998**.

Important to the overall development of aquaculture is a detailed and critical analysis of past failures. Some of the factors coming out of discussions with stakeholders are as follows:

- Lack of clear and specific goals
- Poor stakeholder linkages/communication
- Poor marketing efforts
- Lack of zoning
- Mercury levels in rivers
- Theft

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

Though there have been successes at integrated rice-fish farming, there were no available reports in English that document the experiences/methodologies used. Rice fish production is however limited by high levels of predation from birds and other forms of wildlife.

In addition, the infrastructure design and construction limit the efficiency of the existent farms; hence within the current context, integrated systems operate at the subsistence level.

Unavailability of regular supplies of seed stock of cascadura, freshwater prawns and monosex strains of fast growing tilapia species further compound the problem. Certainly, a national effort targeted at effective seed production of the aforementioned species would be of tremendous benefit to the Suriname aquaculture sector.

Below Table 9 are some cost structures which could be considered where any aquaculture development activity is proposed for any country.

**Table 9:  
COST STRUCTURES**

<b>INPUT</b>	<b>US\$</b>
Electricity (Kwh)	0.12
Gas (Liters)	0.93
Diesel (Liters)	0.99
Wild caught fish (/Kg)	1.2 – 3.50
Wild caught shrimp(/Kg)	4.75
Farmed fish(/Kg) Tilapia	2.50
Farmed shrimp(/Kg)	3.70
Fish Food(/Kg)	3.25
Beef(/Kg)	1.80
Chicken(/Kg)local	1.45
Pork(/Kg)	\$
Rice(/Kg)	0.50
Pond construction/Ha	5,600
Land costs: Lease/Ha (government)	?
Labour/week unskilled	70

#### ***4.7 Technical and Research Capabilities of the Fisheries Division***

Technical and research capabilities are, at present, very limited within the newly established Fisheries Division (FD). The FD Organigram (Figure X ) shows that only two staff members are assigned to the Aquaculture Unit, and they are expected to work within other areas of the Fisheries Department. The manager of the aquaculture unit has a M.Sc. in aquaculture, but is heavily burdened with day-to-day management activities within the FD. Understaffing in the Aquaculture Unit means that it is unable to properly focus on the development of the industry. Extension services are provided by the Fisheries Division; however there is no one with aquaculture expertise assigned to the extension branch.

Education and training facilities in Suriname are restricted to a B.Sc. with a major in Fisheries & Aquaculture at the University of Suriname. To date there have been five (5) graduates from this program..

Though there is no existent infrastructure for Research and Development (R&D), there is a clear role for facilities/programs capable of supporting a thrust towards aquaculture development. Short term efforts in this regard can be achieved through formation of partnerships with institutions within or outside the CARICOM in the areas of training, R&D, farm level and processing facilities.

Reference to inter-department co-operation was viewed favorably; however under-staffing and lack of resources was cited as a hindrance.

# CHAPTER 5: REGIONAL FISHERIES DATABASE DEVELOPMENT COMPONENT

## 5.1 *Policy and Data Management Documents*

The GOS has not chosen to prepare a National Fisheries Policy for Suriname. In 1993 the first draft of a Fisheries Management Plan (FMP) for Suriname was prepared which might serve the same function; it was updated in 1998 and again in 2000<sup>2</sup> but a decade later it still has not been adopted.

Generally, the policy and management objectives put forward in the 2000 draft FMP aim to promote the sustainable use of fisheries as well as equitable benefit sharing. The draft Fisheries Management Objectives in Suriname are as follows:

- Long term conservation of the resources.
- Maximization of the long-term production of fish; contribution to the protein supply to the local market; production of affordable protein. These objectives can be seen as different expressions of achieving MSY (Maximum Sustainable Yield). It should be noted that MSY estimates, when they are derived from survey data, as in Suriname, tend to be optimistic, and therefore should be treated with caution.
- Maximization of the long-term economic yield (MEY): the level of harvest required to achieve this objective is always lower than the MSY level.
- Contribution to the trade balance; generation of foreign currency; maximization of exports. These objectives may coincide with MSY or MEY.
- Contribution to employment; maximization of the number of households making a living out of the fishery, directly or indirectly; maintaining or improving living standards of the communities that depend on fishing and related activities.
- Solution of conflicts between different exploitation modes and/or stakeholders.

The draft document however, does not address explicitly the management of fisheries statistics and information, nor its importance and use in guiding decision-making in fisheries management. Though it refers to measures such as MEY and MSY as useful indicators, very little weight is placed on the development, management and maintenance of effective and comprehensive fisheries information systems in the policy documents.

There is no separate discreet Policy or Procedures Manual for the management of the Fisheries Information System. The working document they have used has been the “**Review of Data Collection and Management Systems of the Marine Fisheries in Suriname, Integrated Caribbean Regional Agriculture and Fisheries Development Program – Fisheries Component**” written by Robin Mahon (2001). This report has formed the current Policy and Procedures for fisheries information.

The Mahon (2001) document covers all the elements required for the management of fisheries information in Suriname. It addresses the types of data, the collection mechanisms, and the assimilation of the data into useful information to adequately inform management of the fisheries. It also entails a list of recommendations to improve the data management in Suriname. Since 2001, though there has been some improvement in the data collection, adequate implementation of the recommendations from this report is lacking. The Mahon (2001) report

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<sup>2</sup> See Charlier (2000).



outlines the data collection from the known landing sites; however, this would have to be adjusted as it does not capture all landing sites in Suriname, as well as the landing sites in Guyana from fishing in Suriname. A survey is pending to account for all landing sites in Suriname. Collaboration between the Surinamese and Guyanese government is needed.

## **5.2 Data Collection – Current Situation**

There is legislation that dictates that fishers must provide log books and access to fisheries data by the Fisheries Department. Confidentiality of the data provided by the fishers, especially sensitive data such as catch by an identified fisher, is provided for by legislation. This is embedded in the Statistical Law of Suriname.

The data collection methodology is described in Mahon (2001) and is adequate to address the data needs for management of the fisheries in Suriname.

Generally, catch and effort data is the only data that is currently collected. The number of landing sites has been significantly underestimated, and landings of fish in Guyana and French Guiana caught in Suriname waters are not recorded. There is need to conduct a survey of all landing sites and to develop a comprehensive program of sampling from these sites. Once this survey is done, then the sampling protocols can be adjusted to meet the needs for the management of the fisheries.

There are some biological data in the system, but this has several temporal gaps and some instances of missing fields. The consistency of the collection of this data has been unsatisfactory. Most of the biological data collected has been on shrimp.

There are currently twenty-one (21) staff members hired to collect data by the Fisheries Department, eighteen (18) of whom are dedicated to collected fisheries data only. The number of data collectors appears to be adequate or the number of landing sites sampled; however, this may need to be revised after the survey of all the landing sites has been completed. Similarly, the distribution of the data collectors should be revisited after the process.

Catch and Effort data present in the system dates back to 1990. There are some gaps in the data; however, these gaps are not very significant. Other types of data, especially biological data, have been very inconsistent and short-lived.

## **5.3 Data Management – Current Situation**

The entity solely responsible for the management of the FIS is the Research and Statistical Department - Fisheries Division, Ministry of Agriculture, Animal Husbandry and Fisheries. Data are entered by the Department on a monthly basis from the field data sheet submitted by the data collectors. All data are entered and stored into Microsoft Excel®.

TIP and CARIFIS were not fully adopted in Suriname. The Data Manager cited data input efficiency and lack of training of personnel in the system as limitations for the adoption of CARIFIS in Suriname. Currently the FD has no IT personnel, and severe lack of computer hardware.

Despite these limitations, data that are collected in the field are usually entered into the system within one month. The data is superficially validated upon entry, and again while in the system prior to assimilation.

Currently the information is stored on two (2) workstations present in the Data Management Unit. These machines are not dedicated to the FIS. The data are stored on hard drives on these computers. There is no back-up system in place for the safety of the data. The Data Management Unit has no external hard drives which could be used for this purpose.

Each year since 2004, the CRFM has held a Scientific Meeting where participating countries take data collected and have analyses such as stock assessments done upon them. 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 data. Suriname has participated in these meetings.

Apart from Summary Statistics, no other treatments are conducted on the data in-house. Only summary statistics are done on the data, and are used to compare catch and effort spatially and temporally.

Past data such as biological data, should be compiled and assimilated to provide some information on the fisheries.

#### ***5.4 Information Dissemination***

Publications emanating from the CRFM Annual Scientific Meetings contain Country Reports of the data from Suriname and this report is widely circulated and available.

Agencies such as the Statistical Bureau in Suriname 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.

By law, the Fisheries Consulting Body is responsible for every major decision in fisheries. This body comprises all stakeholders; however, the representation of stakeholders seems biased towards large scale operators, as opposed to artisanal fishers. Apart from this mechanism, no other sharing of fisheries information occurs in such a setting.

The management goals are not intimately linked to the structure of the FIS, and as such, cannot advise management decisions appropriately.

#### ***5.5 Past Projects in Fisheries Data Management***

Suriname joined CARICOM in 1995, and as such did not have the opportunity of participating in the CARICOM Fisheries Resource Assessment and Management Program (CFRAMP) which began in 1992.

## 5.6 Gaps in Capacity for Managing Fisheries Information Systems

### 1. Human Resources

The number of staff members in the FD of Suriname is significantly smaller than what is necessary to effectively collect and manage their data. The geography of Suriname also adds another dimension to the difficulty in collecting data efficiently. As there is currently the need to conduct a landing site survey, the following capacity recommendation is based on the current needs, and may need adjustment after this survey. The table below presents the current situation as well as the staff complement recommended here; there is the need to reshuffle the specific roles and responsibilities of current staff:

Position	Current Staff Complement	Recommended Staff Complement	Gap	Training Required**
Data Manager-Administrator	1	1	0	Yes
Data Collectors*	21	25	4	Yes
Data Input Clerks	1	2	1	Yes
Fisheries Statistician	0	2	2	Yes
<b>Total</b>	<b>23</b>	<b>30</b>	<b>7</b>	

\* 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, which has implications for the safety of data as well as access to the data. The system requires at a minimum:

- One (1) Server dedicated to 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 Fisheries Department

#### *Overview of the Workshop*

A two-day participatory workshop was held with officers of the Department of Fisheries on 9 and 10 October 2009 to analyze the current issues of fisheries development in Suriname as shown in Table 10. Two participatory methods, ID/OS (Institutional Development and Organizational Strengthening) and PCM (Project Cycle Management), were applied to analyze the workshop. Japanese study members and a CRFM counterpart managed the analysis and discussion in the workshop as moderators.

**Table 10: Overview of the workshop**

Date	Place	Content	Participants
9 October 2009	Department of Fisheries	- External factor analysis - Internal factor analysis	- Fisheries officers: 12 persons - CRFM: 1 person
10 October 2009	Department of Fisheries	- Strategic orientation - Problem analysis	- Study Team: 2 persons

#### *Problem Analysis*

Problem analysis using the PCM method was applied to identify the major issues of sustainable fisheries development in the aspect of fishing operation of local fishers. The problem analysis concluded the following major issues linked to fisheries development in Suriname:

- Fishing boats are not safe.
- Fish catch declining in coastal areas
- Conflict with industry fisheries
- Difficult for fishers to prepare a starting cost for fishing activities
- Fish prices are intentionally restricted to a low level
- Poor hygiene for fishing operations; and
- Fishers are poorly organized

#### *ID/OS analysis*

The ID/OS (Institutional Development and Organizational Strengthening) method was applied to the workshop in the Fisheries Division. The workshop analyzed external and internal factors (problems, conditions, potential and so on) of the Department of Fisheries, and found proper strategic options in terms of sustainable fisheries development in Suriname. According to the basic question of sustainable fisheries management and development, external and internal factor analyses concluded the following:

Target Organization: Department of Fisheries, Suriname

Basic Question: How can the Department of Fisheries improve the sustainable management and development of the fisheries sector in Suriname?

External Factors to Department of Fisheries	
Opportunities	Threats
Fishing license system in place International agreement and arrangement Some fisheries organizations exist Start of a national disease monitoring program Good potential for small-scale aquaculture programs	Political influences Lack of knowledge about fisheries management system Decreasing fish stocks Lack of enforcement of the rules Illegal boat fishing
Internal Factors of Department of Fisheries	
Strengths	Weaknesses
A data collection system exists Good laboratory for quality inspection Training opportunities are available for staff Personnel are motivated Public awareness programs are conducted	Authorization of fisheries matters is unclear Fragile structures Weak recruitment policy Bad management policy No monitoring of progress

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

The strategic orientation discusses the practical impact of the key 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 “Good potential for small-scale aquaculture programs”, and overcoming the threat of a “Lack of knowledge about fisheries management system” as effective strategic options for sustainable fisheries development

## 6.2. Output from the workshops with local fishers

### *Overview of the workshop*

Mini-workshops with local fishers were held in two fishing communities, Neiuw Nickerie and Boskamp, based on the following schedule (Table 11). Some visual tools of rapid rural appraisal (RRA) were utilized, such as seasonal calendar and mapping.

**Table 11: Overview of the workshop**

Date	Place	Contents	Participants
7 October 2009 10:00 - 12:30	Neiuw Nickerie	Fishing Ground (Mapping) Fishing Activities Income and Expenditure of Fishing Operation	- Local Fishers: 14 persons - Fisheries Officers: 3 persons - CRFM: 1 person - Study Team: 3 persons
8 October 2009 13:00 - 15:30	Boskamp	Fishing Period (Seasonal Calendar) Problems and Issues of Fishing Activities and Operation	- Local fishers: 23 persons - Fisheries Officers: 4 persons - CRFM: 1 person - Study Team: 3 persons

### *Summary of the Communities*

The basic features of 2 fish landing sites were identified in the workshops as shown in Table 12.

**Table 12: Summary of the community**

Site	Number of Fishers	Number of Fishing Boats	Fisheries Facilities
Neiuw Nickerie	Big Boat (Drift net): 600 Small Boat (Seine net): 160 Small Boat (Fuik net): 160	Big Boat (Drift net): 100 Small Boat (Seine net): 80 Small Boat (Fuik net): 80	1 Fish Processing Factory (small-scale, private)
Boskamp	Big Boat (Drift net): 20  Small Boat (Drift net): 30 - 40  Small Boat (Fuik net): 50 – 80	Big Boat (Drift net): 10  Small Boat (Drift net): 15 - 20  Small Boat (Fuik net): 30 - 40	1 Ice Making Plant (public)

### *Present status of local fisheries*

Local fishing activities can be roughly classified into three types, coastal, estuary, and swamp and river. Large boats (about 50 feet long) mainly operate in coastal areas and use long drift nets to catch catfish and croakers. Basically, fishing operations in coastal areas are conducted year-round.

Small boats (about 30 feet long) mainly operate in estuary, swamp, and river areas, and use short drift nets or fuik nets (Chinese purse seine) to catch tilapia, shrimp and other small fishes. Fishing in fuik nets is mainly conducted year-round in Neuw Nickerie, and in the rainy season (from May to October) in Boskamp.

In Boskamp, the local fishers, who operate river and swamp fishing, use different mesh-sizes of drift nets in accordance with the seasons. They use small mesh-size nets in the dry season, and large mesh-size nets in the rainy season, because the target fish species change according to the season.

### *Needs of Local Fishers*

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

**Fish Sale and Market:**

When a large amount of fish is landed, it is difficult to sell all the fish, despite lower prices

Fish prices are often arranged by fish exporters

**Fishing Net Purchase:**

It is difficult to find and purchase small mesh-size nets (less than 2 inches) for using cod end of fuik nets

Fishing nets and equipment are so expensive for fishers

**Ice Supply:**

Capacity of ice production is insufficient, especially in high fishing season

The ice price should be lower

**Fishermen's Cooperative:**

There is no fishers' cooperative in the area

It is difficult for fishers to get bank loans

**Fishing Ground Management:**

Fishers from other area including Guyana often enter the fishing areas of the communities

Those who hire Guyanese crews and Guyanese boats are given fishing licenses

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

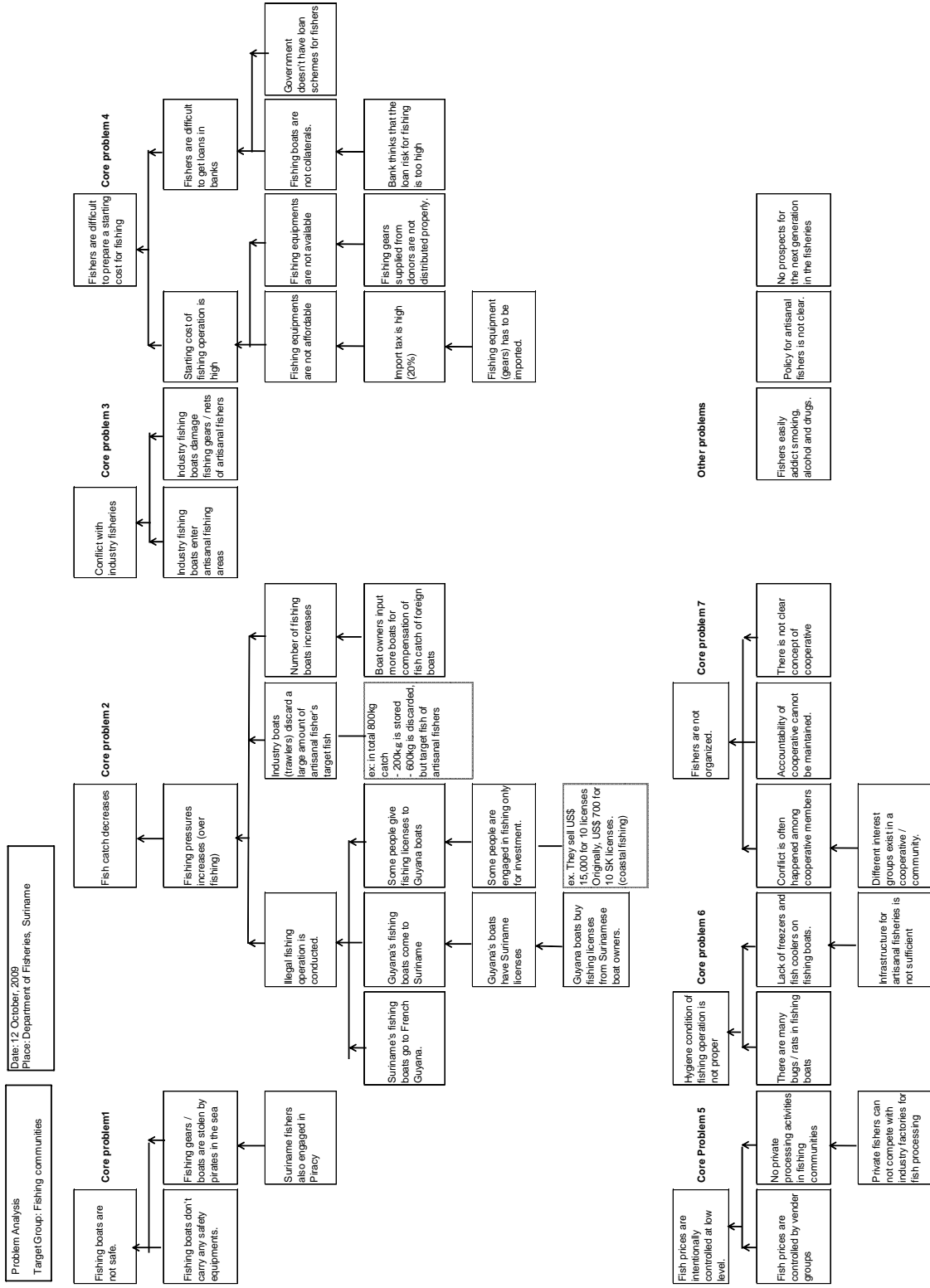
In discussions with the staff of fishery department and with local fishers, 3 items were identified as key issues, namely "Improvement of statistical data collection and analysis"; "Fisheries management in fishing community"; and "Small-scale fish aquaculture development".

In Suriname coastal bottom fish such as croakers and catfish, are mainly caught by Guyana type boats, and once frozen are exported to the Caribbean, USA, and EU. The Department of Fisheries strives to establish a method and system of data collection and analysis of the fish catch via technical support of FAO (ARTFISH), but currently collects fish catch data from fishing boats at fish landing sites on a daily basis. However, it is not easy to collect exact information on the fish catch from coastal fishing boats; therefore, the actual coastal fish catch has possibly been underestimated. Most coastal fishers stated decreasing fish catches of croaker and catfish recently; however, the Department of Fisheries faces a serious difficulty in making a proper fishing management decision on the basis of accurate statistical results.

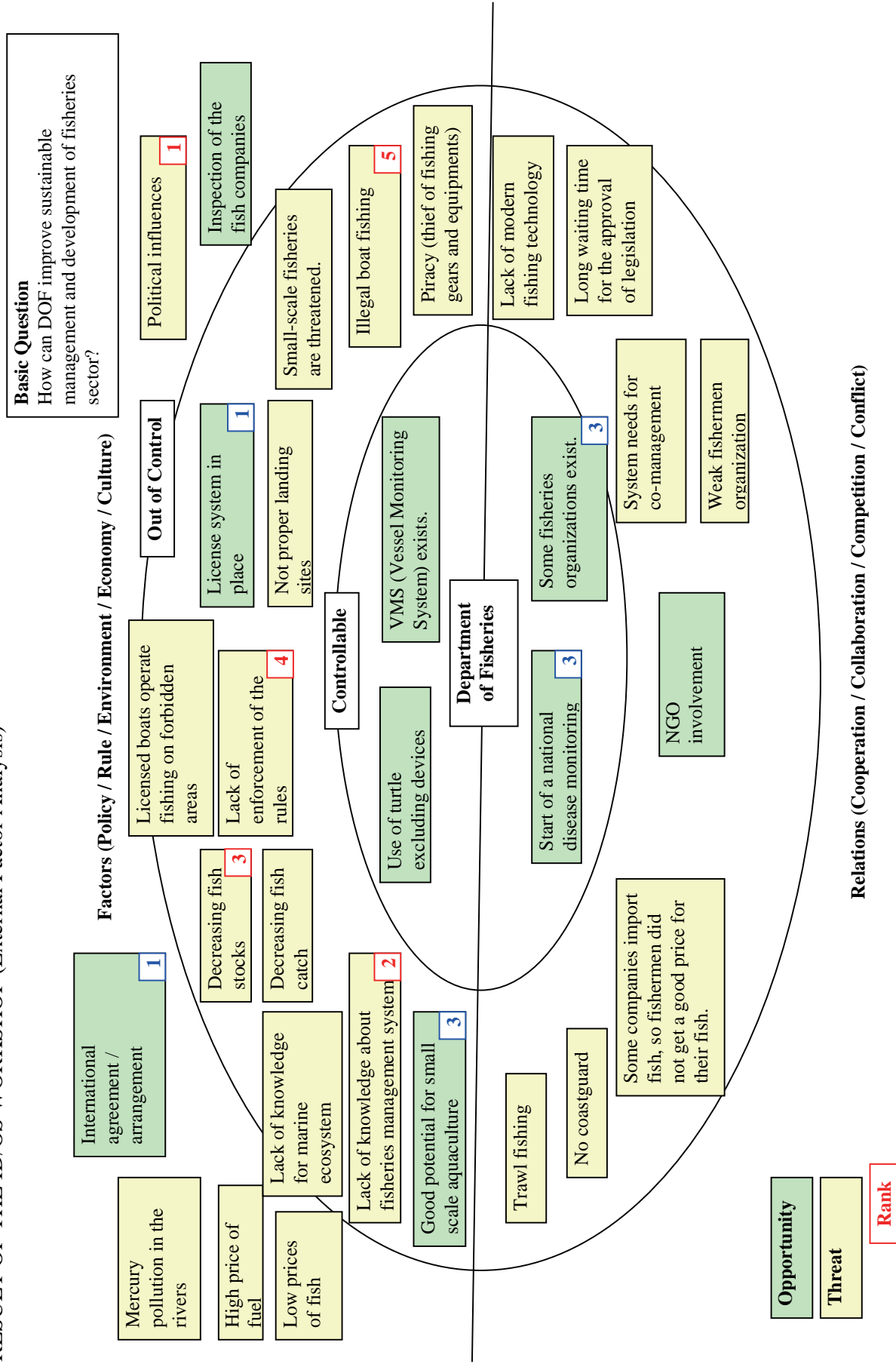
As there are no fisher cooperatives or associations in fishing communities in Suriname, local fishers individually engage in fishing activities without any cooperation with other fishers in the community. Recently, fishing boat owners have added more fishing boats to increase fishing efforts in coastal areas resulting in more profits from their fishing operation. This increase results in overfishing in coastal fishing grounds. If boat owners and local fishers fail to collaborate or engage in voluntary fisheries management at a community level, it will be difficult to stop the decline of fish stocks in these coastal areas in the future.

In Suriname, many rice farmers are gradually scaling down rice production leaving many rice fields abandoned or unutilized. Livestock culture is also prevalent in Suriname and currently leaves livestock manure dumped on land and not well utilized. At present, the Fisheries department has plans to rehabilitate part of the rice fields and canals of an old agricultural center in Orissa for aquacultural purposes, and is considering the preparation of technical support for small-scale aquaculture promotion. Tilapia, catfish, and Kwie-kwei (local freshwater fish) are regarded as target fish for this aquacultural development.

# RESULT OF THE PCM WORKSHOP

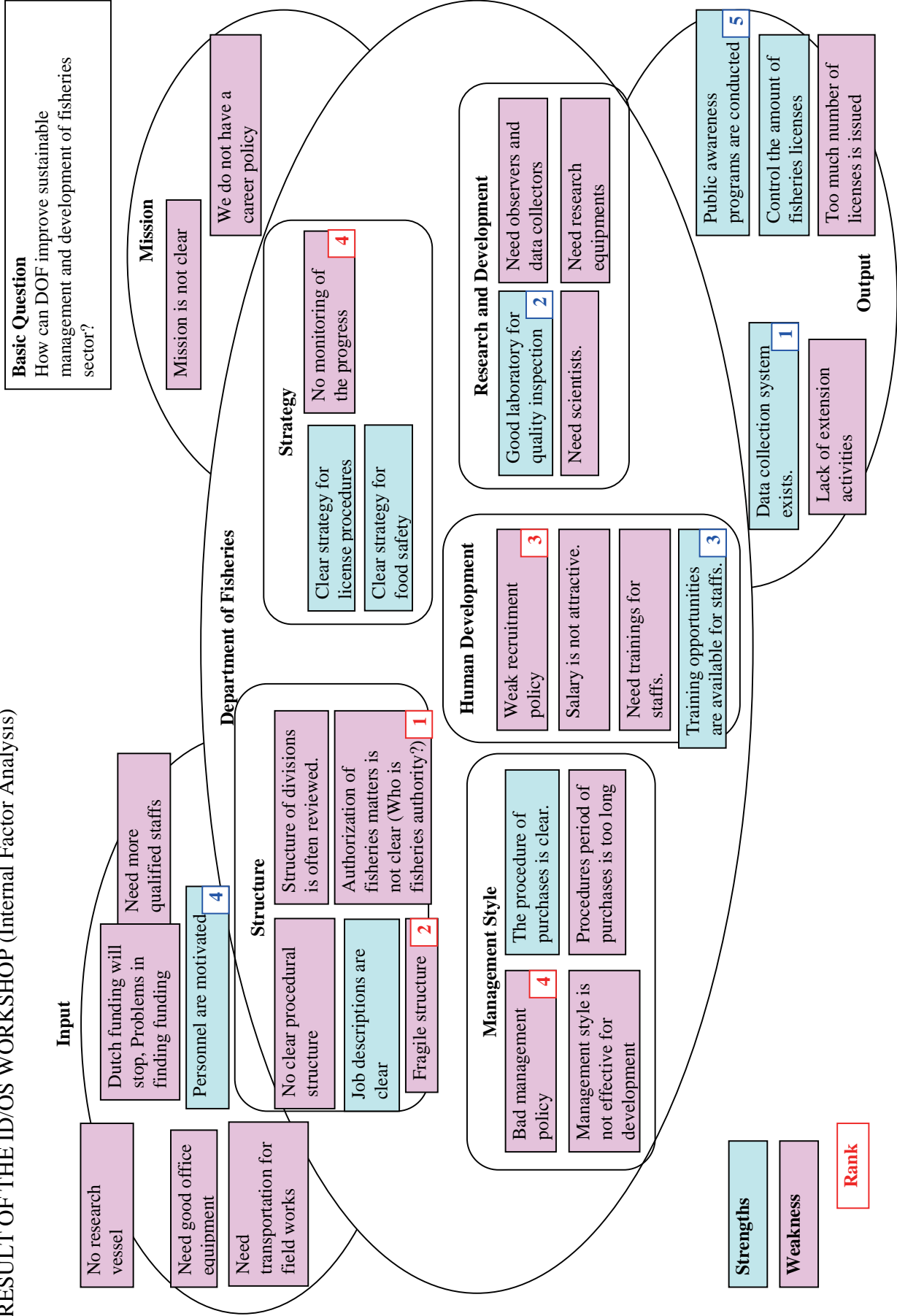


# RESULT OF THE ID/OS WORKSHOP (External Factor Analysis)





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



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# **FINAL COUNTRY REPORT: TRINIDAD AND TOBAGO**



**October 2009**

# TRINIDAD AND TOBAGO

## Country Profile

Geographic coordinates	11°00'N, 61°00'W
Total area	5,128 sq km
Land area	5,128 sq km
Water area	0 sq km
Length of Coastline	704 km
Shelf Area	22,624 sq km
Territorial Sea	12,974 sq km
Claimed EEZ	60,659 sq km
Highest point (m)	940 m (El Cerro del Aripo)
Climate	tropical; rainy season (June to December)
Natural hazards	outside usual path of hurricanes and other tropical storms
Population	1,229,953 (July 2009 est.)
Annual Population Growth Rate	-0.102% (2009 est.)
Life Expectancy at birth	total population: 70.86 years
Languages	English (official), Caribbean Hindustani (a dialect of Hindi), French, Spanish, Chinese
Ethnic Mix	Indian (South Asian) 40%, African 37.5%, mixed 20.5%, other 1.2%, unspecified 0.8% (2000 census)
Work force	620,800 (2008 est.)
Unemployment	5.5% (2008 est.)
GDP (PPP)	\$29.01 billion (2008 est.)
GDP Growth rate	3.5% (2008 est.)
GDP per Capita	\$23,600 (2008 est.)
Currency Unit	Trinidad and Tobago dollar (TTD); US\$1 = TTD\$6.2896 (2008 est.)
Area of Mangrove Forests	51 sq km
Percent of Mangrove Forests Protected	6%
Per Capita Food Supply from Fish/Fishery Products (2000)	15 kg/person
Exports	petroleum and petroleum products, liquefied natural gas (LNG), methanol, ammonia, urea, steel products, beverages, cereal and cereal products, sugar, cocoa, coffee, citrus fruit, vegetables, flowers

Sources: *CIA World Factbook – Trinidad and Tobago (2009)*; *EarthTrends Country Profiles – T&T*

## Abbreviations and Acronyms

AMA	Aquaculture Management Authority
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
CPUE	Catch per Unit Effort
CRFM	CARICOM Regional Fisheries Mechanism
EMA	Environment Management Authority
EU	European Union
FAD	Fish Aggregating Device
FAO	Food & Agriculture Organization of the United Nations
FIS	Fisheries Information System
FMP	Fishery Management Plan
FMSEU	Fisheries Monitoring Surveillance and Enforcement Unit
GEF	Global Environmental Facility
ICCAT	International Commission for the Conservation of Atlantic Tunas
IHHN	Hypodermal Hematopoietic Necrosis
IMA	Institute of Marine Affairs
JICA	Japan International Co-operation Agency
LRS	Licensing and Registration System
mt	Metric Ton
SIDC	Seafood Industry Development Company
TIP	Trip Interview Program
T&T	Trinidad and Tobago
TSV	Taura Syndrome Virus
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Program
WCAFC	Western Central Atlantic Fisheries Commission

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# CHAPTER 1: INTRODUCTION



The Republic of Trinidad and Tobago is an archipelagic state situated at the south-eastern end of the eastern Caribbean island chain on the continental shelf off Northeast South America, some 8 miles east of Venezuela. The islands lie downstream of the outflow of seventeen (17) South American rivers, including the Amazon and the Orinoco, and at the confluence of major ocean currents such as the North Equatorial current. This has influenced species diversity and marine habitat types, which range from coral reefs to muddy bottom, including brackish water. Not only has this contributed to the high productivity of surrounding waters, particularly around Trinidad, but it has also limited the extent of coral reefs, which are more abundant off Tobago.

## *History of the Fisheries in Trinidad and Tobago*<sup>1</sup>

Fisheries attracted little attention following the establishment of the Trinidad Department of Agriculture in 1908, within which fisheries administration was imbedded. Commercial fishing was mainly of a subsistence nature. One central market existed in Port of Spain. Despite the high retail price of fish, the fishers were disadvantaged by the low prices they received from the ‘middle-men’, which may have acted as disincentive to fisheries development. Despite the apparent abundant resources around Trinidad, development of the fishing industry was further hindered by lack of capital and inappropriate technology. As a result, Trinidad was dependent on imported processed fish, mainly from Canada and Venezuela.

Compared to other colonies in the British West Indies, Trinidad and Tobago suffered the most severe depletion of market availability of fresh fish at the onset of the Second World War due to

<sup>1</sup> Adapted from Mohammed & Chan A Shing (2003).

gear shortage, transportation problems and lack of infrastructure. Moreover, the situation was exacerbated by the transfer of labor from the fishing industry to the more lucrative military bases in Trinidad, and the exclusion and closure of fishing areas in military training areas.

To increase food security following WWII, a development program was implemented. Fleet mechanization was promoted with the introduction of outboard engines; larger vessels were constructed, and more fuel-efficient inboard engines introduced. Existing fishing gears were considered antiquated, and fishing trials were conducted with a variety of new gear types, e.g., trammel and shark nets, bottom-longline (palangue), multiple troll lines, purse seines, and driftnets and gillnets; a subsidy program was considered to promote the adoption of more efficient gear. The development program also included trials in fish processing, and experimentation with



extraction of shark liver oil, as well as introduction of nets for the capture of turtles. Fish depots were established at Toco, Matelot, Grande Rivière, Sans Souci and Cumana and ice storage promoted. Despite these developments, however, the fishing industry was still largely of a subsistence nature by the late 1940s. Already there were reports of environmental concerns associated with the high level of discards from the beach seine fishery targeting shrimp, and pollution from the petrochemical and agricultural industries in the Gulf of Paria. The shrimp fishery, particularly off Cedros, had expanded considerably following WWII due to relocation of fishers displaced for the construction of a military base.

During the 1950s, development efforts initiated earlier continued. Subsidization of the industry increased, with the introduction of a fuel tax rebate system in 1956 facilitated under the Fishing Industry Assistance Regulations of 1952, and a loan scheme in 1957 to promote the entry of more boats into the fishery. The use of small outboard motors with lower operation costs was promoted. The adoption of arrow-head fish-pots (early 1950s), and trawl nets (1954) were the major gear introductions in the 1950s, and an 18 m motor launch acted as a mother-ship for five artisanal trawlers operating in the Gulf of Paria.

Due to the development of the fishery off the south coast, increased catches of fish were realized, which accounted for about 28% of total landings by the 1960s. The fleet still consisted mainly of artisanal pirogues, most of which were mechanized as a result of duty free engine imports. A single, large sized trawler commenced operations in the Gulf of Paria, but contributions to overall landings were negligible. At this time also, severe marketing problems acted as a disincentive to development, causing some fishers to limit their catches. Most boats operating off the south-western peninsula switched from targeting fish to shrimp, as they began to exploit the waters in the channel between Trinidad and Venezuela. The establishment of a shrimp processing plant at Cedros, which provided a guaranteed shrimp market and boat servicing facilities, promoted development of the shrimp fishery. Shrimp, being a high priced commodity, also made the switch in target species more profitable. A locally owned company provided landing and processing facilities for some sixty (60) international trawlers, mainly of American origin, which fished along the continental shelf off the north-east coast of South America, as well as three locally owned large trawlers which caught shrimp off the Guianas. Following a temporary termination of the loan scheme for artisanal vessels in 1966, the development of the fleet of large trawlers (over 21 m) was promoted through a similar incentive. By 1972, however, the loan scheme for artisanal vessels and vessels targeting the deep-sea fishery, was re-instituted.



Between 1966 and 1972, fuel rebate subsidies amounted to over US\$570,000; the exemption of purchase tax on boats and engines over the same period was over US\$1.3 million. By the beginning of the 1970s, fish landings had increased to a level which facilitated, for the first time, the export of more than 455 t of fish to Canada, England and other countries. Local investment in the industry was high, with only 20% of total investment contributed by government. Fishers received higher prices for their fish, and efforts focused on development of the inshore fishery. Imports were however, still substantial. During the 1970s, there was considerable fisheries infrastructural development on both islands.

Trinidad and Tobago faced new challenges in the 1980s, with the restrictions on fishing areas for the offshore fleets and added responsibilities for conservation, assessment and management of its marine resources under UNCLOS. Following the loss of access of the local fleet of large trawlers (10) to traditional fishing grounds due to declarations of EEZs, access was negotiated for waters of French Guyana through an arrangement with the European Community. Vessels were, however, limited to the capture of 76 t within a 600 day period.

### **Fishery development in Tobago**

The main gear utilized during the 1940s were the beach seine for targeting pelagic species off the north-west coast, and the bank line for targeting deep water snappers off the west and south-east coasts. As in Trinidad, new gear was introduced in Tobago during the 1950s. These included gillnets for catching flyingfish in the local 'drifting' fishery, and 'tight lining' (fishing at night with lights) for the capture of large pelagics. Fishpots were introduced earlier, but the bamboo used for construction was replaced by chicken wire. Foreign fleets from Grenada and SVG also operated from the capital city, Scarborough, during the 1950s and 1960s.



During the 1970s the Tobago Fisheries Division, after a period of experimentation, introduced fish aggregating devices (Drift-type FADs) to the drifting fishery. These increased catches considerably, and were rapidly adopted by the fleet. They continue to be used in the drifting fishery. The Tobago Fisheries Division embarked on an awareness campaign in 1973 to increase the local demand for flying-fish, by introducing the processing methodology to the public. The fibreglass pirogue introduced in 1977, eventually replaced the wooden boats because of lower maintenance costs. Following the establishment of the National Fisheries Company Ltd. (NFC) in Trinidad, a Collector Vessel System was implemented towards the end of the 1970s. Industrial vessels from the NFC were stationed off south west Tobago and purchased flying-fish and associated species directly from the fishing boats at sea. This system was successful in increasing catches from 1979-1981. During the late 1970s two other fish processing plants were set up in Tobago.

In the 1980s, through a project funded by the UN, demersal longlines were introduced for the capture of sharks and other demersal fish. The existing longline fishery benefited from the change in technology. Three other fish processing plants were established in the 1980s, and two others in the 1990s. Towards the end of the 1980s, ice-boats were introduced to the flying-fish fishery. The fleet of ice-boats increased to 10 vessels by 2001, and Trinidad and Tobago became a member of the Western Central Atlantic Fisheries Commission *Ad-Hoc* working group on

flying-fish. Trinidad and Tobago was also a participant in a regional project aimed at assessment and management related research on the flying-fish fishery in the eastern Caribbean.

The fishing industry in Trinidad and Tobago is still mostly a multi-species multi-gear artisanal fishery, but includes multipurpose vessels, and semi-industrial and industrial trawlers and longliners. The FAO estimates that in oil-rich Trinidad and Tobago, fisheries contribute 0.3% to the total GDP

### **THE ADMINISTRATION OF FISHERIES IN TRINIDAD AND TOBAGO**

The Fisheries Division is a sub-sector of the Ministry of Agriculture, Land and Marine Resources. The Division is charged with the responsibility to oversee all aspects related to the sustainable management and development of the fisheries sector. It has three (3) functional units: Administration, Extension and Research. There is also a fisheries training institute "Caribbean Fisheries Training and Development Institute (CFTDI)". The organisational structure of the Division continues to evolve in order to discharge its numerous activities in a dynamic environment. The Division collaborates with the Marine Affairs Section of the Tobago House of Assembly, other state organisations, relevant para-statal organisations such as the Institute of Marine Affairs and the Environmental Management Authority (EMA); a number of non-governmental organisations such as the Trinidad and Tobago Game Fishing Association and Fishing associations and cooperatives. The Division is specifically responsible for:

- The assessment, management and conservation of the marine fisheries resources of Trinidad and Tobago.
- Providing specialised information services on marine fisheries of Trinidad and Tobago.
- Extension services to the fishing industry and aquaculture.
- Training to fishermen, persons involved in marketing and aquaculturists on fishing methods and gears, fish handling and processing.
- Administering the fisheries regulations, in accordance with the existing Fisheries Act Chapter 67:51; Control of Importation of Live Fish Act Chapter 67:52; Archipelagic Waters and Exclusive Economic Zone Act, No. 24 of 1986; Fishing Industry (Assistance) Act 1955 Chapter 85:03.
- Implementing state obligations under regional and international conventions concerning fisheries or related matters.

## CHAPTER 2: COMMUNITY-BASED FISHERIES MANAGEMENT COMPONENT

### 2.1 *Coastal Community Characteristics*

The archipelagic state of Trinidad and Tobago consist of two main islands, each with quite different geological features, and ethnic and economic profiles. The northwest peninsula of Trinidad was once connected to the South American mainland; as a result, it is the only island of the Lesser Antilles that has indigenous South American animals living on it, including jaguars, boa constrictors, bushmasters, and fer-de-lances. Tobago is really an extension of the Grenadine chain of islands and is coralline in origin.

Trinidad has almost equal numbers of citizens of African and East Indian origin, while the residents of Tobago are predominantly African in origin. The economy of Trinidad is dominated by oil and the petrochemical industry, while Tobago is a typical Caribbean tourism destination with sun, sand and sea, etc. Both islands have significant coastal fishing communities.

According to the CRFM website there are 110 fish landing sites across Trinidad and Tobago, and approximately 8,000 fishers (over 80% full-time).

According to the FAO website there are an estimated ninety-eight (98) fish landing sites around the coastlines of the islands of Trinidad and Tobago and about 4,000 fishers in Trinidad and 1,100 in Tobago.

It must first be pointed out that there is no requirement in T&T law for fishers to be licensed or registered, neither are they required to pay any sort of fee (resource rent) for the right to extract a valuable resource (fish) from the natural environment, nor to pay for the fish itself. T&T fishers are given the fish free of cost by the government, and they make no contribution to the enforcement effort to protect the rights of legitimate fishers, nor to the task of enforcing the laws that protect the fishery resources for the exclusive use of legitimate fishers.

Why then do fishers register at all? Because being registered fishers are entitled to certain duty-free concessions on boats, engines and equipment; only a small fraction of the reported numbers register, and not every year (see Table 1). This makes management of the fishery that much more difficult.

<b>YEAR</b>	<b>NEW REGISTRANTS</b>	<b>RENEWALS</b>	<b>TOTAL</b>
<b>2001</b>	251	627	878
<b>2002</b>	203	335	538
<b>2003</b>	268	326	594
<b>2004</b>	260	438	698
<b>2005</b>	370	490	860
<b>2006</b>	322	468	790
<b>2007</b>	337	470	807

*Source: Fisheries and Aquaculture Statistics (2008)*

**TABLE 2:  
Number of Vessels by Home Port,  
West Coast,  
Trinidad, 2003**

HOME PORT	VESSELS
Alcan	107
Bamboo	8
Bonasse	32
Brickfield	25
Cacandee	7
Cap de Ville	5
Carenage	26
Carli Bay	20
Claxton Bay	24
Clifton Hill	1
Cocorite	40
Coffee Beach	6
Columbus Bay	2
Fanny Village	1
Fullerton	28
Gasparee	2
Granville	4
Island Property Owners Association	19
La Brea	5
La Soufriere Maritime Limited	11
L'Anse Mitan	15
Marabella	6
Monos	7
Mosquito Creek	1
N.P. Fishing Complex	26
Orange Valley	21
Otaheite	38
Point Cumana	2
Point Ligoure	1
Port of Spain Fish Market	36
Power Boats Mutual Facility Ltd.	60
Pt. Coco	6
Regents Park (P-a-P)	2
San Fernando	45
St. Margaret's Bay (Gulf)	2
Ste. Marie	12
Tardieu Marine	3
Tropical Marine	4
Caribbean Fisheries Training & Development Institute (CFTDI)	3
Vessigny	5
Yacht Club	6
Waterloo	6
<b>West Coast (43)</b>	<b>680</b>

Source: 2003 Fishing Vessel Census for Trinidad

**TABLE 3:  
Number of Vessels by Home Port,  
South, East, North Coasts,  
Trinidad, 2003**

HOME PORT	VESSELS
Chatham	2
Erin	49
Grand Chemin	45
Guayaguayare	18
Icacos	61
La Retraite	25
L'Anse Mitan River	12
Merac	1
Morne Diablo	29
<b>South Coast (9)</b>	<b>242</b>
Balandra	10
Cumana	5
Grand Lagoon	11
Manzanilla	3
Mayaro	10
Ortoire	26
Plaisance	9
Salybia	3
St. Joseph Estate	3
<b>East Coast (9)</b>	<b>80</b>
Blanchisseuse	27
Damien Bay	13
Grande Riviere	1
Las Cuevas	46
Maracas	31
Matelot	13
Sans Souci	4
Toco	16
<b>North Coast (8)</b>	<b>151</b>

Source: 2003 Fishing Vessel Census for Trinidad

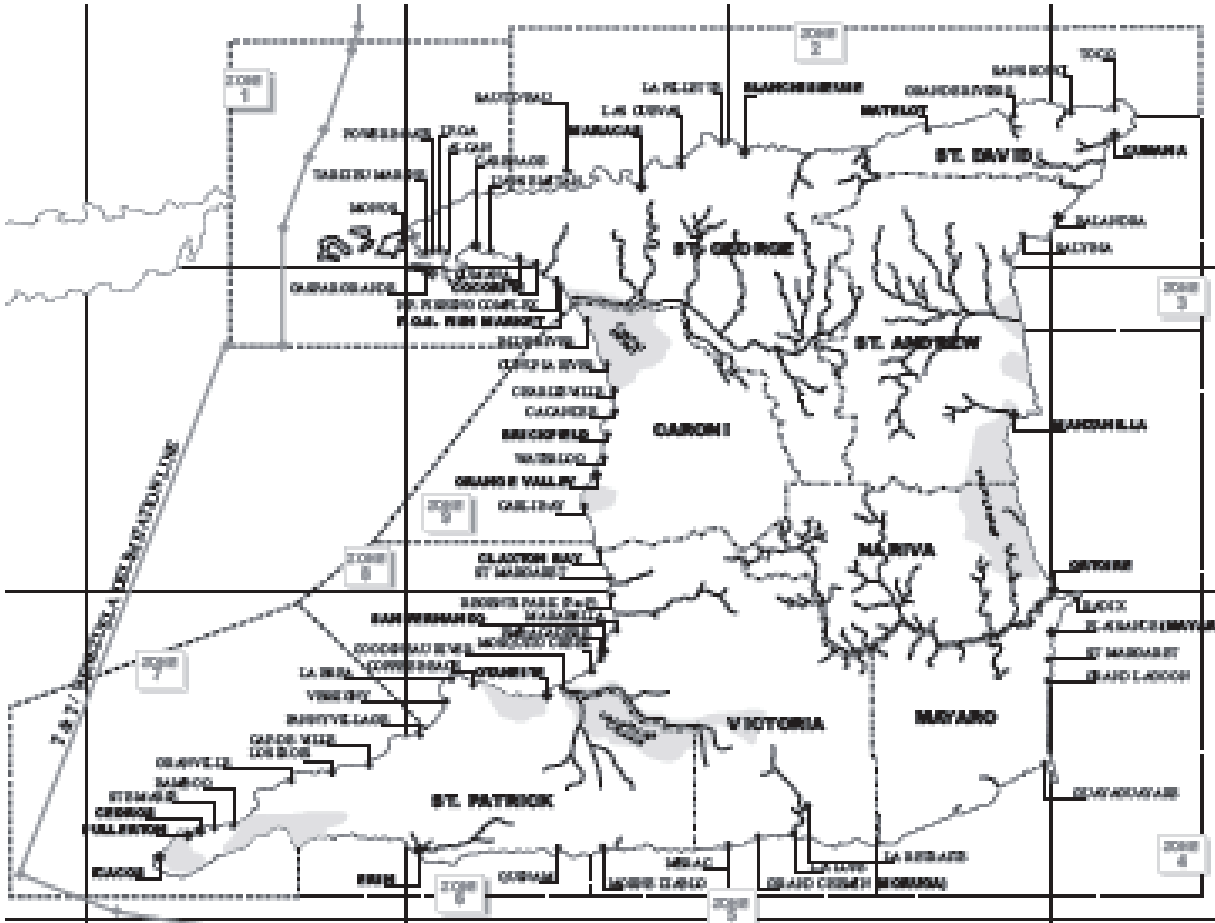
**TABLE 4:  
Number of Vessels by Home Port,  
West, South, East, North Coasts,  
Trinidad, 2003**

COAST	VESSELS
West Coast	680
South Coast	242
East Coast	80
North Coast	151
<b>Grand Total</b>	<b>1,153</b>

Source: 2003 Fishing Vessel Census for Trinidad

The 2003 Vessel Census for Trinidad identified 1,513 fishing vessels based at sixty-nine (69) home ports across the island of Trinidad. The home ports on the **west coast** with the most registered vessels were Alcan (107), Power Boats Mutual Facility Ltd. (60), and San Fernando (45); on the **south coast** Icacos (61), Erin (49) and Grand Chemin (45) have the most boats; on the **east coast** Ortoire (26) has the most, while Las Cuevas (46) has the most on the **north coast**.

## MAP OF TRINIDAD SHOWING LANDING SITES



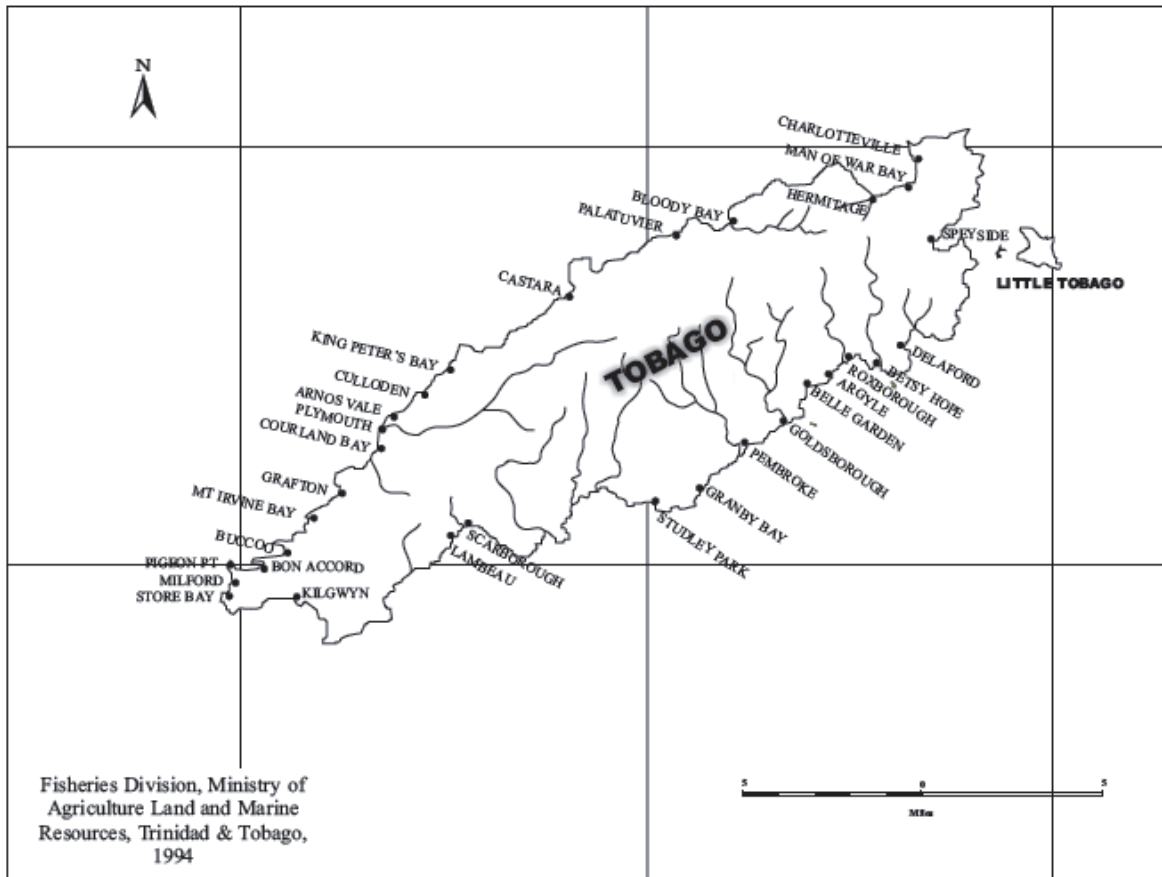
*Copied from a map produced by the Fisheries Division (1994).*

One wonders what the relationship might be between the home ports for registered fishing vessels and fish landing sites. The 1994 Fisheries Division map reproduced above shows that the majority of fish landing sites on the island of Trinidad are on the west coast, which corresponds with the home port information from the **2003 Fishing Vessel Census for Trinidad**.

A similar map produced in 1994 by the Fisheries Division for Tobago shows that there are about thirty (30) landing sites on the island, viz:

Charlotteville	Arnos Vale	Store Bay	Belle Garden
Man of War Bay	Plymouth	Kilgwyn	Argyle
Hermitage	Courland Bay	Lambeau	Roxborough
Bloody Bay	Grafton	Scarborough	Betsy Hope
Palatuvier	Mt. Irvine Bay	Studely Park	Delaford
Castara	Buccoo	Granby Bay	Speyside
King Peter's Bay	Pigeon Point	Pembroke	
Culloden	Milford	Goldsborough	

## Map of Tobago showing fish landing sites.



According to FAO (2006) fish catches are landed in ninety-eight (98) sites along the coast of Trinidad and Tobago. Sixty five (65) of these sites are located on the island of Trinidad, of which:

- 39 sites are situated on the sheltered west coast, in the Gulf of Paria;
- 9 sites on the east coast, which is opened to prevailing wind of the Atlantic Ocean.
- 9 sites on the North coast, where the Atlantic Ocean and the Caribbean sea meet;
- and 8 sites on the South coast, within the Columbus channel which separated Venezuela from Trinidad and Tobago.

Thirty three (33) landing sites are located on the island of Tobago, of which;

- 19 sites are situated on the West coast along the Caribbean sea side;
- And 14 sites on the East coast, which is open to prevailing winds of the Atlantic Ocean

These sites comprise beaches with no infrastructure (tertiary landing sites), along with sites containing landing ramps, jetties and facilities for storing the gear, equipment and personal effects of fishermen (secondary landing sites). Very few contain facilities for retail and wholesale of fish, with storage and ice making facilities (Primary landing sites). These primary landing sites are mostly located on the western coastline in the Gulf of Paria, which is more amenable to infrastructural development because of better sea conditions (FAO 2006).

Tietze, Haughton & Siar (2006) state that “*There are an estimated 1,570 fishing vessels in the national fleet of Trinidad and Tobago, of which 1,491 are artisanal vessels operating in in-shore coastal waters, 35 are semi-industrial, multi-gear vessels operating in in-shore and offshore areas, and 25 are industrial vessels operating off the west and south coastal of Trinidad*” (p. 93).

This compares favourably with the **2003 Vessel Census for Trinidad** which identified 1,513 fishing vessels based at sixty-nine (69) home ports across the island of Trinidad only. Clearly most of the fishers are registering their fishing vessels to avail themselves of the government subsidies.

According to the CRFM website, there are 212 fishing trawlers in Trinidad and Tobago, of the following four types:

- Type I: 6.7-9.8 m. in length; 2 X 56 Hp outboard; manually operated net (113 vessels);
- Type II: 7.9 - 11.6 m. in length; 137 Hp inboard diesel; single net/manually operated (66 vessels);
- Type III: 10.4 -12.2 m. in length; 176 Hp inboard diesel; single net/hydraulic winch; electronic fishing aids/communication equipment (10 vessels);
- Type IV: 21.6 - 22.5 m. in length; 365 Hp inboard diesel; Two nets/hydraulic winch; electronic fishing aids/communication equipment; some refrigeration (23 vessels).

### ***Fishers' Organizations in Trinidad and Tobago***

According to FAO (2008) there was an estimated thirty-six (36) Fishermen's Cooperatives and Associations either functional or inactive in 2003. On the island of Trinidad, twenty-four (24) organizations were identified, with 17 active and the other seven (7) considered inactive. In Tobago, a total of twelve (12) were identified, with ten (10) active and two (2) being inactive.

### **Fishermen's Associations/Cooperatives in Trinidad, 2003**

1. Almoorings Fishing Cooperative Society Ltd.
2. Blanchisseuse Fishing Association
3. Brickfield Fishermen's Association
4. Cacandee Fishing Association
5. Carenage Fishermen's Association
6. Carli Bay Fishing Cooperative Society Ltd.
7. Cedros Fishing Cooperative Society Ltd.
8. Claxton Bay Fishermen's Association
9. Cocorite Fishing Association
10. Erin Fishing Association
11. Fishermen and Friends of the Sea (NGO)
12. Icacos Fishing Association
13. Las Cuevas Fishing Association
14. Longliners Association
15. Morne Diablo Fishing Association
16. Moruga/Grande Chemin/La Ruffin Fishing Association
17. National Organization of Fishing and Allied Cooperative Society Ltd.
18. North Coast Multi-purpose fishing Cooperative Society Ltd
19. Orange Valley Cooperative Society Ltd
20. Otaheiti Fishing Association
21. San Fernando Fishing Cooperative Society Ltd
22. Trinidad and Tobago Game Fishing Association
23. Trinidad and Tobago Trawler Association
24. Waterloo Fishing Association

## **Fishermen's Associations/Cooperatives in Tobago, 2003**

1. South West Tobago Fishermen's Association (Milford/Pigeon Point)
2. Parlatuvier Fishermen's Association
3. Castara Fishermen's Association
4. Tobago Fishing Cooperative Society Lt. (Charlotteville)
5. Roxborough Fishermen's Association
6. Speyside Fishermen's Association
7. Black Rock/Plymouth Fishermen's Association
8. Barbados Bay Fishermen's Association
9. Studley Park Fishermen's Association
10. Pigeon Point Fishermen's Association
11. All Tobago Fisherfolk Association
12. Belle Garden Fishermen's Association

*Source: FAO Website: Fisheries and Aquaculture Profiles: Trinidad and Tobago (2003)*

Tietze, Houghton & Siar (2006) state that: "**Fisherman's Organizations**. These are of two types, fishing associations and fishing cooperatives, and they are generally composed of fishers that operate from a particular beach, landing site or fishing area. They were traditionally formed to give fishers a collective voice and lobbying power for matters that directly impact their fishing activities and livelihoods. However, individual members of each of these groups are often involved in different fisheries.

*Of the two, cooperatives are the more organized, with formal registration at the Ministry of Labour, and are managed by a board of directors. Fishing associations are informal groups, with no legally binding commitments. In 1998 an umbrella organization of fisheries related groups – the National Organization of Fishermen and Allied Cooperatives Society Ltd – was formed to co-ordinate representation of the fisheries sector. Its effectiveness has been severely limited by a general lack of organization at all levels in the industry and poor representation in the fishing communities.*

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

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

## **2.2 Policy, Legislation, and Supporting Institutional Arrangements**

### **POLICY**

It would appear that there is no formal National Fisheries Policy for Trinidad and Tobago in place.

In 2001 under the UNC government of Prime Minister Basdeo Panday, the Ministry of Food Production and Marine Resources produced a **Sector Policy for Food Production and Marine Resources**. The government has changed since then and the PNM government of Prime



Minister Patrick Manning now forms the government, and no new sector policy has been issued. One is not certain if the priorities and strategies in this policy document are being followed, but relevant sections are, nevertheless, reproduced.

In Section 5 entitled “**Challenges in Managing the Renewable Natural Resources**”, there is a subsection 5.1 entitled “**Marine Resources**”, which reads:

*“Marine ecosystems are under environmental threat from land-based and marine activities. Issues of concern include, over-exploitation of fish species, destruction of wetlands, degradation of marine habitats and ecosystems, and pollution from land-based sources. Moreover, the need to sustainably manage the marine ecosystems sometimes conflict with demands for recreation, tourism, food production and transportation.*

*“For purposes of management, the living marine resources are separated into the inshore coastal fisheries and the offshore fisheries. These two fisheries present different challenges in sustainable management.*

*“There are several challenges to management of the inshore coastal fisheries. Several species of fish are over-exploited. Overexploitation is a consequence of the open access nature of the inshore fisheries, weak resource management and overcapitalization. The consequences for fisherfolk have been increasing fishing effort, falling yields and declining financial returns. In addition, the coastal marine environment is being degraded as a result of land-based activities such as destruction of wetlands and pollution from agricultural, industrial and residential sources.*

*Challenges to sustainable management of the offshore fisheries include data limitations on the resource, the absence of adequate monitoring mechanisms and inadequate enforcement against illegal fishing”.*

In Section 6 entitled “**Core Strategy for Agricultural Development**”, there is a subsection 6.2 entitled “**Renewable Natural Resources**”, which reads:

*“The primary objective with respect to the renewable natural marine resources ... is sustainable management<sup>2</sup> and protection of the environment.*

*“Priorities in the marine fisheries include implementing strong management practices that take account of the many interests while ensuring sustainability of the renewable resources, and enhancing income levels and return on investment. Primary strategies include managing access to the fisheries, improving data collection for stock assessment, engaging in stock rebuilding and ecosystem enhancement activities, training of fishermen and re-equipping fleets for activities in fisheries in international waters, and introducing co-management approaches with stakeholders and other countries particularly Barbados and Venezuela. Further, aquaculture and aquaculture products will be developed as an alternative and to complement marine fisheries”.*

In Section 7 entitled “**Policy Issues**”, there is a subsection 7.5 entitled “**Stakeholder Participation**”, which reads:

*“... Agricultural production is carried on primarily by the private sector. The renewable natural resources are utilized by, and managed for, the benefit of individuals, communities and producers”*

*“The State, because it is mainly facilitator and not producer, will seek increased stakeholder participation as a means to more effectively complement the production activities of the private sector. The State will also collaborate with producers and stakeholders to sustainably manage the renewable natural resources. This will be accomplished by institutionalizing participation of the private sector in the processes of planning and implementation of policy, and management of the renewable natural marine and farm resources. From a practical standpoint, a few highlevel stakeholder committees will be established to advise on the implementation of agreed development plans for the crop, livestock and fisheries subsectors”.*

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<sup>2</sup> The term “sustainable management” is unclear, and the context of its use often reflects a lack of clarity on its meaning. “Sustainable management” could refer to the sustainability of the managing entity or the management process (i.e. funding, staffing, etc.), or it could refer to the sustainability of the resource being managed. The next paragraph reveals that the latter is meant in this case, but the term is ambiguous and should be avoided.

*“The MFPMR recognizes that increased stakeholder participation is a more time-consuming and involved management process. In consequence, efforts will be made to nurture, support and institutionally strengthen stakeholder representative groups”.*

Section 8 is entitled **“Policy Goals”** and the fifth-mentioned goal is:

***“Stakeholder Participation***

*The MFPMR will increase stakeholder participation in the process of policy formulation and the planning, implementation and monitoring of programmes”.*

The sixteenth-mentioned goal is:

***“Rural Development***

*Contribute to development efforts in rural communities”.*

The twentieth-mentioned goal is:

***“Sustainable Management of the Renewable Natural Resources***

*Sustainably manage the renewable marine resources and conserve farm land for the benefit of the present and future citizens”.*

Section 9 outlines the **“Principal Implementation Strategies”** for each Policy Goal.

- For **Stakeholder Participation** the fisheries-relevant strategy is to form a National Agricultural Development Advisory Committee with stakeholder membership, with a Fisheries Sub-Committee; and to establish a Stakeholder Focal Point in the Ministry to “nurture and support development of representative stakeholder organizations”.
- For **Rural Development** the strategy is to support community initiatives and to work with NGOs; and to establish rural development focal points in its country offices.
- For **Sustainable Management of the Renewable Natural Resources** the fisheries-related strategy is to (a) design effective strategies; (b) collaborate with the Coast Guard in enforcement; (c) to establish a stakeholder committee to facilitate sustainable management; (d) involve communities in management; (e) negotiate shared stocks; (f) increase training of fishers; (g) to increase private sector investment.

## **LEGISLATION**

The Fisheries Act currently in force in Trinidad and Tobago was first passed in 1916, and has only been amended twice: in 1966 and 1975. The consolidated act has a total of ten sections, and is the least robust of all the Fisheries Acts of CARICOM.

Section 4 of the Act allows the Minister to make regulations, which was done in 1926 and amended in 1930, 1994, 1996, 1998, 2000 and 2002. The consolidated Regulations have a total of nine sections only, the least robust of all the Fisheries Regulations in CARICOM.

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

*The Marine Areas (Preservation and Enhancement) Act 1970*, provides for the designation of restricted areas, and the *Marine Areas (Preservation and Enhancement) Regulations 1973*, require the permission of the Minister to enter and remove fauna from the restricted area. The Act is currently applied only to the management of coral reefs.

*The Archipelagic Waters and Exclusive Economic Zone Act of 1986* provides for the declaration of archipelagic waters and the establishment of a 200-mile exclusive economic zone (EEZ). The Act charges the Minister with responsibility for the conservation and management of living resources. Within this context, it provides for the determination of the allowable catch in respect of each fishery in the EEZ, and determination of the proportion to be harvested by citizens of

Trinidad and Tobago. Access of foreign fishing vessels to the archipelagic waters, territorial sea or EEZ is allowed only through licenses issued by the Minister who also provides the authority for surveillance and enforcement of regulations pertaining to foreign fishing.

A Fisheries Management Bill prepared in 1995, to be known on finalisation as the *Marine Fisheries Management Act*, will repeal the *Fisheries Act of 1916* and the relevant sections of the *Archipelagic Waters and Exclusive Economic Zone Act of 1986*. The *Marine Fisheries Management Act* will provide for the preparation of fishery management plans and will, in accordance with these plans, control and limit access to fish resources through the establishment of a licensing system for both local and foreign fishing vessels.

A copy of this draft Act was not made available to the team for our review.

At the time of writing (fourteen years after it was drafted) this act is still in draft.

## **SUPPORTING INSTITUTIONAL ARRANGEMENTS**

While the concept of participation has been embraced by the 2001 T&T **Sector Policy for Food Production and Marine Resources**, it is not been incorporated into T&T fisheries legislation, and its practice lags even further behind. None of the stakeholder committees proposed by the policy have been created.

The only fisheries-related stakeholder committee in existence is the Monitoring and Advisory Committee (MAC) comprised primarily of artisanal fishers, government agencies and research institutions. It was established in 1997 to resolve conflicts between artisanal (non-trawling) fishers and the industrial trawling fleet.

There are no staff members at the Fisheries Division trained in the formation and strengthening of fishers' organizations.

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.

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

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Although the involvement of fishers, fisher organizations, fishing communities and other stakeholders to participate in the management of fishery resources has been mentioned in the 2001 T&T **Sector Policy for Food Production and Marine Resources** it has never been translated into a national programme.

The involvement of stakeholders other than direct resource-users in fisheries management has not even been mentioned. There has been no suggestion of 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 T&T is still "top-down".

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

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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.

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

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

# CHAPTER 3: PELAGIC FISH RESOURCE MANAGEMENT AND DEVELOPMENT COMPONENT

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

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There is no current **National Fisheries Policy** for T&T; neither are there any **Fishery Development Plans** or **Fishery Management Plans** for the pelagic fisheries of T&T. Possibly through this project, T&T could develop these important management tools.

In 2001 the T&T government produced a **Sector Policy for Food Production and Marine Resources** which included several sections on fisheries. As a national policy, the T&T government puts priority on the energy and industrial sectors; the T&T government does not pay much attention to fisheries, especially the artisanal fisheries.

The “*Fisheries Act 39 of 1916*” is the major law that addresses the management of fisheries, and the regulation of fisheries and fishing related activities in Trinidad and Tobago. This Act was amended in 1966 (Fisheries Act 39 Amendment of 1966) and in 1975 (Fisheries Act 23 of 1975). This Act gives the Minister responsible for Fisheries the authority to create new regulations re:

- (1) Size limits of fishing gears and equipments;
- (2) Size limits of catches by fish species;
- (3) Preservation of fisheries resources by prohibiting the killing, harpooning, taking, removing, catching, or any other means of taking possession of fish or any variety thereof either absolutely or at such times and within such areas as may be prescribed.
- (4) Prohibition of the sale, offering, or exposing for sale or the purchase of fish or any variety of fish or any variety thereof either absolutely or at such time and within such areas as may be prescribed.

Under this framework, several regulations have been created:

- Fisheries Regulations (1926, 1930) that generally address the type and size of nets/seines that can be used to capture various fish species in T&T. These regulations also define the size limit of capture of each species that is exploited by these gears.
- Fisheries (Conservation of Marine Turtle) Regulations (LN 65, 1994).
- Fisheries (Control of Demersal Trawling) Regulations (LN 334, 2004).

The Act specifically defines penalties for breaching the fisheries regulations, and outlines legal processes to be followed in case of offences. The Minister has also authority to nominate Fisheries Officers to carry out all provisions of the Fisheries Act.

Presently, there exists a revised draft document of the Fisheries Act that was completed in 2006. After consultation with various interest groups in the country, the Fisheries Division had submitted the draft document to the Chief Parliamentary Council for final approval. The revised Act addresses issues concerning the preparation and revision of fishery management plans and the control of access to fisheries resources through the creation of licensing systems for both local and foreign fishing vessels.

Note that the government of Trinidad and Tobago also enacted in 1955, a Fishing Industry (Assistance) Act that makes provisions for providing financial assistance to the fishing industry by means of (a) fuel rebates and (b) tax waivers and subsidies on fishing equipment.

Finally, the “Fish and Fishery Products Regulations, 1998” were created under Section 25 of the Food and Drugs Act Chapter 30:01, which gives the Minister responsible for Health the authority to grant licenses for the import and export of fishery products processed in Trinidad and Tobago.

**Enforcement of Regulations:** the agencies involved are:

- The Coast Guard of Trinidad and Tobago;
- The Fisheries Monitoring Surveillance and Enforcement Unit (FMSEU): commissioned in June 2004 by the Fisheries Division. The FMSEU works in collaboration with the Coast Guard to enforce fisheries regulations; the unit also inspects processing plants, fishing vessels and export-bound shipments at the ports, including trans-shipment ports.

***Level of enforcement:*** Currently there is no enforcement of regulations for pelagic fishes.

***Level of compliance:*** Generally fair in other fisheries.

### **Fishery Management Plans (FMPs)**

There is no current management plan for any exploited fish species in Trinidad and Tobago. Note, draft FMPs were developed in the 1990s under the assistance of CRFM and FAO, however these drafts have never received any serious reviews and thus have never been implemented. Present legislation does not require any to be prepared, but the 2006 draft Fisheries Act provides for the preparation and implementation of FMPs and the control of access to fishery resources through the creation of a fishery license system.

### ***Management Policy Strategy***

Awaiting the implementation of a formal FMP, the Fisheries Division produced a Draft Policy Document in 2007 (CRFM 2008). This draft generally outlines management policies concerning different fishing fleets, as follows:

- **Artisanal multi-gear fleets:**
  - Phased introduction of an increased stretched mesh size for gillnets;
  - Promotion of line fishing as a more sustainable fishing method over gillnetting;
- **Trawl (Artisanal, semi-industrial, industrial):**
  - Alleviate the introduction of trawling through the introduction of more environmentally-friendly trawl gear;
  - Favor the introduction of BRDs that will reduce discards by up to 50%;
  - Ensure that fish trawling is conducted with an appropriate net;
- **Semi-industrial longline:**
  - Increase the availability of live bait for the line fishery;
- **Semi-industrial multi-gear fleet:**
  - Alleviate the negative impact of fish pots through the introduction of more environmentally friendly fish pots;
- **Recreational:**
  - Ensure that facilities available for commercial fishermen are not used for recreation;
  - Ensure that a regulatory framework for recreational fishing is created.

### ***Problems concerning the Implementation of FMPs***

- In general, the development and implementation of an FMP is not a priority for the Directorate;
- Past drafts/templates were too preliminary. Given financial and human resource constraints, adequate time could not be devoted to fully develop these draft beyond their preliminary contents;
- Human resource limitations: the Fisheries Division has the capability to develop a FMP for each species, but the staff has been shrinking: 3 technicians are currently employed,

whereas in the past the Division had 10 officers at this level. In this context working on the development of a plan would be at the expenses of other activities of the Division.

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

Since T&T has neither current policy goals, policy objectives nor management objectives for its pelagic fisheries, there is nothing that can be said about their “status”.

In order to sustainably use its pelagic fisheries resources for coastal community development, the Government of T&T should embark on a programme to develop these important tools. This could be a candidate for a pilot project under this JICA/CRFM project.

### 3.3 Fishery and Market Characteristics

#### FISHERIES CHARACTERISTICS

##### Exploited Species

Table 5 summarizes the exploitation and the management status of coastal pelagic fisheries in Trinidad and Tobago. The exploitation of fisheries resources is mostly done by artisanal fleets, although the semi-industrial and industrial fleets have been expanding. In 2005, 75% to 80% of the inshore catches were landed by the artisanal fleet (FAO, 2006). Also, there is a recreational fishery for the pelagic fishes, but this fishery mostly operates based on annual tournaments (CRFM 2008).

**Table 5:  
Status of Coastal Pelagic Fisheries in Trinidad and Tobago**

Species	Stock Status		Fishery Status			
	Type of exploitation	Over-exploited	Developed	Sustainable	Monitored	Managed
Wahoo ( <i>Acanthocybium solandri</i> )	Artisanal, semi- industrial, Industrial (Tobago)	Uncertain				Not
Dolphin fish ( <i>Coryphaena hippurus</i> )	Artisanal, semi- industrial, Industrial (Tobago)	Uncertain				Not
Black fin tuna ( <i>Thunnus atlanticus</i> )	Artisanal, semi- industrial, Industrial (Tobago)	Uncertain				Not
King mackerel ( <i>Scomberomus cavalla</i> )	Artisanal, semi-industrial (Trinidad)	Uncertain		Uncertain		Not
Jack Mackerel ( <i>Trachurus spp.</i> )	N	N				Not
Flying fish ( <i>Hirundichthys spp.</i> )	Artisanal, semi-industrial (Tobago)	Uncertain				Not
Sardines ( <i>Sardinella aurita</i> )	Artisanal	N		Uncertain		Not
Scaled Herring ( <i>Harengula jaguana</i> )	Artisanal	N				Not
Atlantic thread herring ( <i>Opisthonema oglinum</i> )	Artisanal	N				Not
Jack ( <i>Selar spp.</i> )	Artisanal	N				Not
Robin ( <i>Decapterus spp.</i> )	Artisanal	N				Not
Diamond back squid ( <i>Thysanoteuthis rhombus</i> )*	N	N	Potentially			Not
Conch ( <i>Eustrombus gigas</i> )*	Tobago fishery/minor fishery/ artisanal	N				Not
Caribbean spiny lobster ( <i>Panulirus argus</i> )*	Trinidad & spec/artisanal/minor	Uncertain	Potentially			Not
Spotted spiny lobster ( <i>Panulirus guttatus</i> )*	?	N				

##### Notes

\*: These species are not 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

Due to higher water salinity, pelagic species such as wahoo, dolphinfish, blackfin tuna, and flyingfish are mostly concentrated and exploited around Tobago. These species are targeted by different fleets (See effort data section below). In contrast, the king mackerel are targeted mostly by the artisanal and semi-industrial multi-gear fleets operating around Trinidad. Small pelagics such as sardines, herrings, and the scads are usually caught in mixed catches by the artisanal fishery in both Tobago and Trinidad.

Lobsters and conch are minor fisheries in Trinidad and Tobago compared to the pelagic species. The conchs are mostly concentrated around Tobago, whereas the lobsters are exploited in waters of both Tobago and Trinidad.

Diamond-back squid is not currently exploited in Trinidad and Tobago. However, experimental trials have been conducted by JICA to evaluate the feasibility of a fishery on this species.

### Stock Status

The overall status of coastal pelagic stocks in T&T is uncertain, mostly because of the regional dynamic of most species. However, it can be assumed that local exploitation of most stocks is sustainable, but more formal studies need to be conducted to better understand the dynamics of these populations and to assess their level of abundance.

Samalalsingh and Pandohee (2002) conducted a preliminary assessment on the flyingfish fishery of Tobago. They estimated that the yield in each of the 1989-90 and 1990-91 fishing seasons was on average 433 mt for a total fishing effort of 1,838 st.days. Using the Thompson and Bell model these authors predicted that a doubling of the fishing effort might increase this yield by up to 29 %. However, this assessment was based on very limited data and cannot be used to make inferences on current local and regional status of the stock.

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**

In the local market, fish landed by fishermen are generally bought by processing plants or wholesalers who typically resell these catches to supermarkets, hotels, restaurants and retailers. In the mid-2000s there were about seventy (70) of these buyers in Trinidad and ten (10) in Tobago (FAO 2006). It was also estimated that twelve (12) processing plants were operating in Trinidad and six (6) in Tobago.

Market infrastructure is not well developed in T&T. The handling and marketing of fishery products does not generally meet high quality standards. This is mainly because of an aging market infrastructure system, and serious limitations in human resources. As a result, since 1999 T&T has not been able to export fish products to the European Union (FAO 2006).

Nevertheless, T&T is major exporter of fish product to the United States, Canada, Venezuela and CARICOM countries. These countries purchase flying-fish, tuna and bonito, mackerel, herrings and lobsters. Fish products are exported either chilled or frozen, with minimum processing and little value-added (Table 6). Hence, from 1995 to 2004, the annual revenue to T&T averaged:

- TT\$2,854,487 for the export of tuna and bonito;
- TT \$ 3,082,501 for the export of flying-fish; and
- TT\$1,513,161 for the export of herrings, sardines and anchovies (Table 6).

**Table 6:  
Estimated Value (TT\$) of Exports of some Pelagic Fish Products  
from Trinidad and Tobago, 1995-2004**

Fish Products	Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Fresh, Chilled, Frozen										
Tunas and Bonito	3,977,079	3,583,764	3,007,680	5,520,924	1,020,607	730,681	926,275	150,635	3,907,095	5,720,134
Mackerels	124,899	233,312	173,614	92,577	51,604	166,051	87,666	95,052	42,580	22,047
Flyingfish	2,253,800	2,473,325	1,105,989	4,099,776	2,330,941	2,789,991	3,547,462	3,760,055	3,792,215	4,671,456
Herring, sardines, anchovies	4,538,011	6,237,765	1,018,184	365,606	286,947	638,804	568,807	920,420	233,448	323,616
Lobster*	616,924	18,449	94,862	24,003	303,298	123,569	163,476	350,212	773,000	688,189

**Source:** \* *Fisheries and Aquaculture Statistics (2008).*

Yet Trinidad and Tobago has remained a net importer of processed pelagic fish products. From 1995 to 2004 total annual imports averaged:

- TT\$11,740,342 in tuna and bonito;
- TT\$1,661,389 in mackerel; and



- TT\$16,326,057 herrings, sardines and anchovies (Table 7).

This level of imports indicates that T&T fish production is far from satisfying local demand, particularly for small pelagic fish.

Export and import licenses are usually granted by the Ministry of Trade after recommendation and approval by the Fisheries Division. Further, the “Chemistry Food and Drug Division” of the Ministry of Health is generally responsible for the control of sanitary conditions and quality of imported and exported fish products.

**Table 7:  
Estimated value (TT \$) of Imports of Processed Fish Products  
by Trinidad and Tobago, 1995-2004**

Processed Fish Products	Year									
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Fresh, Chilled, Frozen										
Tunas and Bonito	6,078,930	4,261,479	4,899,144	9,457,177	8,198,423	6,182,284	8,517,930	23,732,760	21,441,663	24,633,633
Mackerels	1,205,743	1,339,843	1,094,413	1,875,356	2,010,512	2,365,107	1,758,267	1,444,243	1,719,753	1,800,653
Flyingfish		120,916	108,980	1,798	373,739					62,980
Herring, sardines, anchovies	14,370,101	17,610,579	17,948,572	14,439,936	16,561,761	15,594,568	16,292,493	13,790,678	17,237,638	19,414,246
Lobster*	70,438	80,285	29,181	82,529	15,357	1,356	112,897	217,160	80,090	601,628

Source: \* Fisheries and Aquaculture Statistics (2008).

The overall contribution of fisheries to total GDP of Trinidad and Tobago is relatively small and was estimated to be 0.09% in 2005 (FAO 2006). However, the contribution of Fisheries to the GDP of Agriculture, Forestry, and Fishing was estimated to be 10% in 2005 (FAO 2006). Present contribution of fisheries to total GDP of Trinidad and Tobago may be as low as 0.03%.

### **3.4 Current Levels of Catch and Effort by Species**

#### **Effort Data**

Several fishing fleets operate in the marine waters of T&T. These fleets are commonly identified by location of operation and type of fishing gear (CRFM 2008). The main characteristics of each fleet in term of fishing location, gears, methods and vessels can be summarized as follow:

- **Trinidad Artisanal Multi-gear Fleet:**

- **Location:** Trinidad;
- **Vessel number and type:** 1107 Pirogues (7-12m);
- **Engine:** 1 or 2 outboard engines, usually 45-75 Hp each;
- **Gear:** gillnet (monofilament and multifilament); pelagic lines (*a-la-vie*, trolling, towing, switchering); fishpot; seines (beach, bait, Italian tuck); diving, spearfishing;
- **Pelagic species targeted:** King mackerel and Spanish mackerel.
- **Unit of effort:** Number of trips;
- **Sampling:** Catch and effort data started in the 1950s. In the early years two fish markets were sampled: Port-of-Spain and San Fernando. Presently data are collected in 20 landings sites in Trinidad; and 20 randomly selected days are sampled each month. When possible a complete census of landings is taken on the selected days;

- **Trinidad Semi-industrial Longline Fleet:**
  - *Vessel number and type:* 20 Longliners (14-23 m) in 2007;
  - *Engines:* 160-400 Hp inboard diesel engine;
  - *Equipments:* electronic fish finding aids, navigation and communication equipment, fish/ice hold (4-9ft);
  - *Gears:* pelagic longline;
  - *Pelagic species targeted:* tunas and tuna-like species;
  - *Unit of effort:* No. of hooks, no. of sets;
  - *Sampling:* Trip reporting system provide data coverage of ~80%
- **Trinidad Semi-industrial Multi-gear Fleet:**
  - *Vessel number and type:* ~23 fishing boats (14-23m) ;
  - *Engines:* single inboard diesel engine. 165 Hp;
  - *Equipments:* fish finding aids, navigation and communication equipment;
  - *Gears:* Palangue, fishpot, demersal longline, a-la-vie;
  - *Pelagic species targeted:* King mackerel;
  - *Fleet operation:* T&T EEZ (north and east coasts); average trip length: 8 days.
  - *Sampling:* no systematic sampling of this fleet.
- **Trinidad Recreational Fleet:**
  - *Vessel type and number:* Power boats (6-8m), pirogues (9-11m), cabine cruisers (10-11m); 307 vessels were operating in 1993, with a large number of them registered as commercial vessels.
  - *Gears:* A-la-vie, trolling, banking, rod and reel, spear fishing; fishpot, gillnet, palangue;
  - *Fleet operations:* some manual som mechanized; year round : T&T EEZ year round; some part time commercial (i.e. catch is sold) some fishing for leisure (catch not sold), at least 5 tournaments
  - *Pelagic species targeted:* pelagic finfishes;
  - *Sampling:* Catch and effort data collected at tournaments;
- **Tobago Artisanal multi-gear Fleet:**
  - *Vessel type and number:* 297 pirogues (7-10 m); note that bumboat is also used for beach seine;
  - *Gears:* Gillnet, driftline, trolling, a-la-vive, beach/land seine, banking, bottom longline, divine, spearfishing;
  - *Fleet operation:* Manual; year round; day fishing, territorial waters of Trinidad and Tobago.
  - *Pelagic species targeted:* wahoo, dolphin, tunas, and flyingfish;
  - *Sampling:* Ad-hoc collection started in the 1970s. In 1988 sampling design was better planned, but targeted mostly the flyingfish fishery at three landing sites. In 1995, sampling scheme was modified again to include all components of the coastal fisheries, and involved random sampling of eight landing sites on the island. However, the collection of data is highly limited by human and financial resources.
- **Tobago Semi-industrial Multi-Gear Fleet**
  - *Vessel type and number:* 9 fishing vessels (8-14 m);
  - *Engine:* inboard diesel engine 75-335 Hp;
  - *Equipment:* ice hold;
  - *Fleet operation:* mechanized; year round in western and northwestern coasts of Tobago; average trip length: 5 days;
  - *Pelagic species targeted:* wahoo, dolphin, tunas, and flyingfish;

- **Sampling:** Ad-hoc collection started in the 1970s. In 1988 sampling design was better planned, but targeted mostly the flyingfish fishery at three landing sites. In 1995, sampling scheme was modified again to include all components of the coastal fisheries, and involved random sampling of eight landing sites on the island. However, the collection of data is highly limited by human and financial resources.
- **Tobago Recreational Fleet**
  - **Fleet operations:** at least 2 tournaments per year;
  - **Pelagic species targeted:** coastal and migratory pelagic ;
  - **Sampling:** catch and effort data collected at tournaments.

Catch and effort data have been collected from the different fleets since the 1970s. However, detailed information on these data was not provided by the FD, particularly for the most recent years. Nevertheless, the number of vessels per primary gear type reported by CRFM (2008) is summarized in Table 8 for the years 1991, 1998, and 2003. Finally Table 1 above shows the total number of registered fishers working in Trinidad and Tobago waters from 2001 to 2007.

<b>Table 8: Primary Gear Type by Vessel, Trinidad Fishing Vessel Censuses, 1991, 1998, and 2003*</b>			
Primary Gear Type	Number of Vessel per year		
	1991	1998	2003
Multifilament gillnet	216	195	174
Monofilament gillnet	163	133	172
Multi/monofilament		2	
A-la-vive		44	114
Trawl	186	114	98
Banking		156	80
Trolling/Towing		47	53
Palangue		40	46
Fishpot		63	38
Switchering		17	21
Beach/Land Seine	25	18	12
Bait seine		5	
Italian Seine	20	12	7
Longline		4	11
Spearfishing		1	
Other			11
		399	
<b>Total</b>	<b>610</b>	<b>1250</b>	<b>837</b>

Source: CRFM (2008)

### **Catch Data**

Although fishery landings have been sampled in T&T since the 1970s, detailed information on catch statistics were not provided by the Fisheries Division. Thus, the trends in landings of pelagic species surveyed in this study cannot be evaluated, except for king mackerel. Landings of king mackerel have fluctuated little, averaging 615.14 mt from 1998 to 2004 (Table 9).

**Table 9:  
Estimates of Annual Landings (mt) for some Pelagic Species  
Trinidad and Tobago, 1998-2004.**

Species	Year						
	1998	1999	2000	2001	2002	2003	2004
King mackerel	788	485	433	472	963	588	577
Tunas and Bonito	489	524	619	722	1965	958	961
Herring and Jashua	722	943	82	178	47	22	12
Cavalli and other Jacks	330	156	365	546	637	402	482

Source: \* *Fisheries and Aquaculture Statistics (2008)*.

Further, Table 9 shows estimates of annual landing for Bonito (including blackfin tunas), the herring and jacks captured in mixed catches with other species from 1998 to 2004.

Finally, Table 10 presents total annual landings by the commercial and recreational fishing fleets, operating in Trinidad and Tobago.

**Table 10:  
Estimates of Annual Landings\* (mt) by Pelagic Fishing Fleets,  
Trinidad and Tobago, 1996-2004**

Fishing fleet	Gear	Year								
		1996	1997	1998	1999	2000	2001	2002	2003	2004
<b>Commercial Trinidad</b>		9,901	10,962	15,014	13,335	11,633	13,482	15,487	11,058	11,204
Artisanal	Multigear	6,867	7,972	11,804	9,893	8,523	10,439	12,221	8,109	8,412
Semi-industrial	Longline	402	461	417	390	171	306	351	365	380
Semi-industrial	Fish pot line	970	970	970	970	970	970	970	970	970
Industrial										
<b>Commercial Tobago</b>		2,479	2,479	2,479	2,479	2,479	2,479	2,479	2,479	2,479
Recreational (T&T)										
Recreational part time		1,233	1,233	1,233	1,233	1,233	1,233	1,233	1,233	1,233
Game fish tournaments		3	3	3	3	3	3	3	3	3

Source: \* *Fisheries and Aquaculture Statistics (2008)*.

### **Technical Assurances and Funding**

#### ***Needs in technology development:***

In T&T, the coastal inshore areas are presently near saturation level in term of fishing effort. Thus, the focus should not be on the development of fishing, but on the general improvement of the efficiency (e.g. in term of reducing by-catch) of fishing methods and technologies used. Nevertheless, studies on developing technology to explore offshore areas should be conducted in the future.

#### ***Needs in institutional assistance toward:***

- Developing the capability of the Division in Information Technology;
- Developing socio-economic studies to better understand present market conditions and identify areas that need to be developed or improved;
- Improving efficiency of fishing methods, gears and equipments;

*Needs in funding toward:*

- **Improving the enforcement capability of the Division:**
  - **Rationale:** There is only one small boat available to enforce fisheries regulations, with limited staff and equipment. An efficient enforcement program will require an increase in the number and quality of boats, equipments and staff.
- **Improving the Research Capability of the Division:**
  - **Rationale:** Only one pirogue is available for research, and in the last 10 years only fishery-dependent data collection has been conducted. Conducting sound assessment of fish stocks in the future will require the collection of fishery independent data, along with an increase in the number and quality of research vessels, data collectors and supporting staff in general.
- **Maintaining and upgrading the current Information Management System;**
  - **Rationale:** the Fisheries Management Information System (FMIS) is not currently very functional. The system needs to be upgraded so that it can play its role as the central facility that manages electronic and digital database for the region. Further, there is a requirement in the new draft legislation to:
    - Computerize historical records;
    - Consolidate fishermen and vessel registration system;
    - Enhance the management of catch and effort data.

### **Technical and Research Capabilities**

The “Marine Fisheries Analysis Unit” is the main research facility of the T&T Fisheries Division. This facility is located in Chaguramas and comprises 30 officers and 20 field collectors. The facility generally conduct scientific studies on:

- *Shark biology and fishery;*
- *Quantification of catch and effort data in the recreational and commercial fisheries;*
- *Identification of fish species and evaluation of fish stocks;*
- *Identification and classification of fisheries methods and gears;*
- *Socio-economic studies.*

In addition, the Fisheries Division has both wet and dry laboratories to conduct basic biological research. In general these facilities are under-utilized. The main problem in developing a good fishery research program is the limitation in financial and human resources.

# CHAPTER 4: AQUACULTURE DEVELOPMENT COMPONENT

## 4.1 Policy, Supporting Legislation, Development Plans

### Policy and Supporting Legislation

There is at present no formally recognized policy statement in T&T that addresses aquaculture development. The responsibility for the sector falls within the preview of the Fisheries Division, which has in place a draft policy which is currently subject to refinement through stakeholder review and consultation. Because of this, the document was not provided; however key elements of same were discussed with the CFO.

The stated vision for aquaculture is “*to promote the development of an Aquaculture Industry that is sustainable and market driven in support of food and nutrition security, employment generation and rural development, creation of investment opportunities and foreign exchange.*”

With increased pressure being placed on marine fish stocks due to the international demand for fish and fish products, and its attractive foreign exchange earning capability, a renewed focus on Aquaculture as a potentially viable economic activity is being pursued in Trinidad. The renewed focus on aquaculture development comes against the background that the coastal marine resources of T&T are considered to be either heavily exploited or even over-exploited, and the high levels of pollution associated with the hydrocarbon industry.

Within the national context, the Ministry of Agriculture, Land and Marine Resources intends to actively pursue the formalizing of aquaculture activity within a policy and legal framework in order to provide the necessary support to facilitate further development of the industry. The core elements of the strategy encompass the following:

- Identification of all organizations, both public and private sectors involved in Aquaculture and defining the roles and responsibilities of those organizations;
- Establishment of an Aquaculture Management Authority (AMA);
- Research agencies to be positioned to impart technologies and training at various levels;
- Definition and categorization of producers
- Identification of species to be cultured and production technologies;
- Horizontal integration to capitalize on and ensure investment security with in-built risk reduction through group activity
- Training towards evolving a cooperative effort and the eventual reduction of dependence on Government by encouraging private responsibility for inputs;
- For ornamentals, guidance and training programs and access to finance and markets;
- Government is to ensure that the environmental, sociological, economic, legal and technological implications for the development of the industry are effectively addressed.

Interview with Fisheries Division personnel indicated that there are two sets of regulations/Laws addressing aquaculture and these are presented as follows:

1. Those immediately referring to or alluding to the aquaculture production process:
  - a. The Draft Fisheries Act 2007 not yet in force; please note that the relevant sections of the draft act were not made available, so no further comments can be made.
2. Those affecting aquaculture development, but not directly connected to production:
  - a. The Environment Management Authority (EMA) requires a permit to develop greater than 2 Hectares; larger projects may require an EIA.
  - b. Trade effluent arising from the aquaculture facility will also require a permit.
  - c. The Water and Sewerage Authority requires a permit for all water extraction.

## **4.2 Aquaculture Development Status regarding Stated Policy Goals and Development Objectives**

Statistics of Current levels of aquaculture production by species in Trinidad and Tobago are not available. At present the sector appears to be beset by earlier problems and is currently in decline, and most efforts focus on Subsistence and Research and Development activity. Over the past 30 years aquaculture has met varying levels of success; however there have been a string of failed attempts, which to date still hover over the sector as a cloud of uncertainty, hence the reluctance for investment.

As stated earlier, in existence there is only draft Policy, and draft Legislation still to be submitted before Parliament; hence there are no real measures against which to assess development status.

The designation of the Seafood Industry Development Company (SIDC) by the Fisheries Division as the steering/coordinating agency (as per the role of the proposed AMA) for the sector is a step in the right direction; in the past stakeholder interest groups were each addressing their own blinkered agendas. The current decision of the SIDC through the Institute of Marine Affairs (IMA), to investigate the financial viability of small scale commercial re-circulating tilapia production systems, is in keeping with the stated vision of the Draft Aquaculture Policy.

SIDC is also looking at commissioning a detailed market survey of all aquaculture products for which exist production technologies.

Additionally, financial development incentives are provided in the form of Government subsidies on pond construction, and equipment and machinery relevant to the sector. The Agricultural Development Bank provides concessionary financing to the sector on advice/recommendation of the government coupled with project feasibility. Interest rates are in the range of approximately 3-5%.

## **4.3 Aquaculture and Market Characteristics**

Despite several demonstrations of the technical feasibility of tilapia farming, there is still some reluctance to invest, and this has been attributed in part to the unavailability of market information, and to possible high costs of production.

As early as 1993 a preliminary market survey conducted by the IMA indicated that red hybrid tilapia had high market acceptance. Currently tilapia is sold as whole gutted fish at TT\$10/lb after a production cost of TT\$7/lb; the gross margins are very slim.

Cascadura on the other hand, fetches a very high price and at present the demand far outstrips supply. To satisfy demand, the product is imported from Guyana, Venezuela and Brazil and currently retails for TT\$25-35/lb according to seasonal availability. Reports on production technologies do not give costs of production; certainly this is an area that should be pursued.

The mangrove oyster receives high market acceptance, and is sold raw on the half shell on the side walks within most townships. At present, the market is satisfied by the wild catch; however increasing degradation of the coastal zone may threaten natural recruitment and settlement, and hence threaten supply. The technology for the culture of the mangrove oyster is in use elsewhere in CARICOM<sup>3</sup>, and should not be difficult to transfer to T&T.

I was not able to obtain local prices for this product.

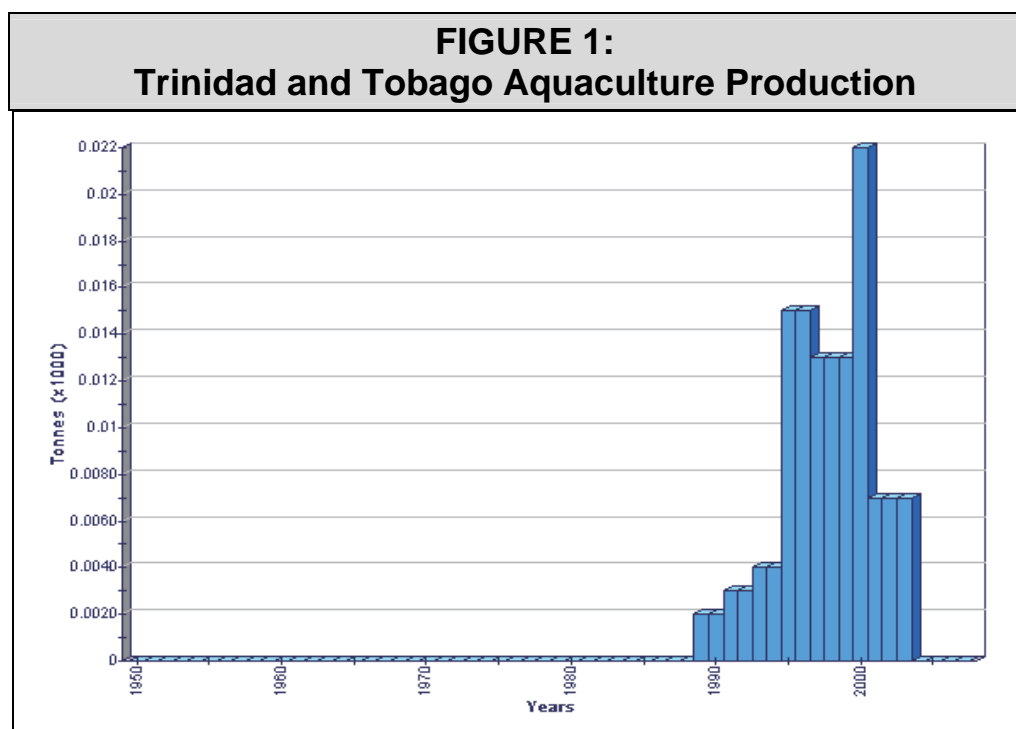
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<sup>3</sup> In Jamaica, which has been culturing *Crassostrea rhizophorae* for the last twenty years beginning with technical and financial assistance from IDRC.

#### 4.4 Current Levels of Aquaculture Production by Species

To understand where T&T is at now, a review of past interventions and productivity levels is provided in Annex 1 attached.

What is evident is that aquaculture production peaked in the mid late 1990s (Figure 1), and for some unstated reason declined dramatically since then. The main species produced were tilapia, Macrobrachium and Haplosternum. Historic production and earnings data are provided in Table 11 below.



Source: FAO Fisheries Statistics.

**TABLE 11: ESTIMATED PRODUCTION OF FRESHWATER FOOD FISH  
IN TRINIDAD AND TOBAGO, 1990 -1996**

YEAR	TILAPIA		CASCADURA		PRAWN	
	Quantity (kg)	Value (TT\$)	Quantity (kg)	Value (TT\$)	Quantity (kg)	Value (TT\$)
1990	1,000	8,000	1,680	43,680	100	2,000
1991	1,000	8,000	1,000	26,000	6,127	122,540
1992	1,000	8,000	4,087	106,262	1,300	26,000
1993	2,530	22,264	2,641	68,666	2,687	53,740
1994	16,000	140,800	1,000	26,000	2,369	59,225
1995	16,016	145,746	1,000	26,000	2,786	78,008
1996	18,590	190,584	1,000	26,000	200	5,600

Source: Ramnarine (1998) based on extrapolation of Caroni (1975) Limited; data collected by the Central Statistical Office.

#### Inland aquaculture

At present, the red hybrid tilapia and the armored catfish, Hoplosternum littorale, are the only freshwater fish species cultured throughout T&T on a small-scale. The Asian freshwater prawn (Macrobrachium rosenbergii) is the only other freshwater species attracting considerable



attention and interest. At present the Caroni and Bamboo Grove facilities are functioning below productive capacity.

During the country visit, the IMA was the only facility up and running; at present they are engaged in tilapia and *Macrobrachium* seed supply to farmers, along with ongoing research and development activities (currently focused on intensive freshwater re-circulating systems for tilapia production).

In August 2003, the Ministry of Agriculture, Land and Marine Resources conducted a frame survey of one hundred and forty-nine (149) potential farmers (Planning Division 2003). It was determined that only fifty-five (55) were active. The data showed that just over 76% of these active farmers (i.e. 42 farmers) had less than one (1) acre (0.4 hectares) in aquaculture production. Generally, it was discovered that tilapia production was not being practiced on a wide commercial scale.

In 2000 and 2001 respectively, 0.5 t and 2 t of red hybrid tilapia were produced. Two community projects established by the Fisheries Division produced approximately 3.6 t of silver tilapia in 2001, and in 2002 the two projects yielded almost 2.4 t (Personal Communication).

### **Coastal Aquaculture**

Coastal aquaculture operations do not exist in T&T. Attempts have been made to culture various species of penaeid shrimps (*Penaeus monodon* and *Penaeus vannamei*); however to date, none of the farms and pilot projects are in operation.

General interest in coastal aquaculture activities is growing, particularly as a result of the substantial catch reduction in the marine capture fisheries, large imported quantities of marine fish, and a strong local demand and preference for marine products.

The potential for coastal aquaculture development is clearly shown by the strong market demand for the mangrove oyster (*Crassostrea rhizophorae*) due to its alleged aphrodisiac properties. The abovementioned oyster was once very abundant in the Caroni and Nariva Swamps, however, due to over-harvesting, the numbers are much reduced, and are now collected mainly from the Claxton Bay region.

## **4.5 Knowledge on Aquaculture Issues by Category**

In Trinidad and Tobago total annual domestic marine landings have fluctuated around 14,000 mt annually. Recent research findings indicate declining stocks of the major commercial marine fish species. Exports of fish have altogether shown dramatic increases over the last five (5) years. In 1996 approximately 2,000 mt of fish were exported valued at TT\$15.8 million. In 1998 the figure dramatically increased to approximately 8,633 mt valued at TT\$92.4 million.

Tilapia also suffered from low consumer acceptance due to its dark coloration and muddy taste and consumer preference for marine species.

Resources to explore more commercial projects in aquaculture were not available since the development thrust focused on the more traditional artisanal and offshore fisheries, resulting in inadequate funding, inadequate staffing and a general disinterest in fresh water fisheries.

At the operational level some of the elements that constrain the success of aquaculture projects are:

- The high cost of inputs and high risks (high capital injection, credit access/finance, feed, fingerlings, water)
- Availability of suitable and adequate land and adequate and reliable water supply
- Pollution and poor water quality
- Inadequate security
- Lack of extension support from the Fisheries Division
- Use of small production units
- Use of extensive culture systems
- Poor management of the ponds
- Inappropriate species selection
- Poor market acceptance of product
- Poor marketing strategies
- Failure in the use of sex-reversal technology

<b>INPUT</b>	<b>COST (US\$)</b>
Electricity (/KwH)	0.05
Gas (/litre)	0.70
Diesel (/litre)	
Wild-caught fish (/Kg)	8.77
Wild-caught shrimp (/Kg)	
Farmed fish (/Kg)	16
Farmed shrimp (/Kg)	?
Fish food (/Kg)	0.75
Farmed prawns (/Kg)	
Beef (/Kg)	4.62
Chicken (/Kg)	4.15
Pork (/Kg)	5.60
Rice (/Kg)	1.45
Pond Construction (/Ha)	?
Land costs (Lease/Ha)	?
Labour/week (unskilled)	150-200

The following points may be noted from the above cost structure:

- The cost of production of Tilapia is higher than the cost of wild-caught fish
- The cost of electricity is low (Trinidad is an oil-producer)
- Although land costs were not ascertained, it was indicated that cost are high.

Research aimed at increasing yields and profit margins must be available and accessible, and training must be on-going to ensure that a critical mass of expertise is locally available to support investments. The opportunities in aquaculture must be categorized according to levels of production, and constraints specific to these producers as well as measures to address these constraints must be identified.

Guidance must be provided in species selection and appropriate production technologies for profit maximization. Producers must be guided in terms of value-added activities, in particular,

horizontal integration of aquaculture activities such as production of vacuum-sealed products, and secondary processing, convenience foods (fish fingers, patties etc.) smoked and salted.

Cooperative development to achieve greater economies of scale for the export market must be encouraged, as well as to reduce costs of supplying inputs to commercial projects such as seed stock and feed.

There is the need for greater cohesion in the industry and collaboration among agencies for information sharing, avoidance of effort duplication and for maximizing the use of scarce resources. There must be a shared vision for aquaculture and a clear definition of the roles and responsibilities of all relevant organizations and other stakeholders that are impacted by aquaculture activities.

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

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There is a shift in focus from small-scale aquaculture production at a subsistence level to small scale commercial production systems. Varying factors are cited as contributing to a failure in small-scale subsistence farming primarily:

- The oil-rich nature of the country
- The low price and high availability of marine catch
- High land costs
- High labour costs
- An aging farmer class and techno-savvy young farmers
- Theft.

To this end the SIDC, the Ministry of Agriculture, Land and Marine Resources and the IMA are engaged in production trials to determine the appropriate production methodologies and economic viability of modular re-circulating fresh water tilapia production systems. Preliminary results are encouraging, indicating current fortnightly harvest yields of 500 Kg of fish; however detailed technical analysis will not be available until late 2010.

Where rural subsistence small farming are still practiced, the main areas of concern are with seed stock availability, feed availability and feed management issues.

There are no attempts to use aquaculture directly for stock enhancement purposes; however the technology for hatchery-reared *Haplosternum* and *Pomacea urceus* (River conch) exists, and should wild stocks become threatened, then stock enhancement programs utilizing hatchery-reared juveniles is possible.

*Crassostrea rhizophorae* is favoured with high market demand, and is subject to considerable fishing effort; this coupled with deteriorating coastal water quality could pose a possible threat to the species; hence an appropriate management plan and stock enhancement program should be considered before a crisis situation develops.

#### ***4.7 Technical and Research Capabilities of Fisheries***

Please note that at present there is no dedicated Aquaculture Unit in the Fisheries Division, and that the staff member who has responsibility for same also has other areas of responsibility within the Fisheries Division.

Technical assistance and extension services to the small-scale fish farmers was in the past provided by the Sugarcane Feeds Centre (Caroni) and the Bamboo Grove facility. The above centers usually provide free-of-charge the following assistance:

- (i) assessment of the land and water resources of an applicant,
- (ii) preparation of feasibility studies,
- (iii) advice on the biological aspects of the species being considered and/or cultured,
- (iv) advice on pond design and construction, and
- (v) advice on farm management practices.

The objectives then of the Aquaculture Extension Program of the Aquaculture Unit are therefore:

- (i) to demonstrate certain fish culture practices so that the farmers can be acquainted with the scientific method of fish farming;
- (ii) to act as liaison between the research units and the farmers, so as to ensure that new and improved techniques are transferred to the farmers in a language readily understood; and
- (iii) to support farmers in all aspects of their aquaculture project.

The IMA, in addition to supplying seed stock to farmers, also provides technical assistance and extension services to fish farmers in the form of hands-on technical workshops, seminars and technical manuals.

In addition, existing research and development areas are:

- enhancement of tilapia broodstock by selective breeding;
- improved technology for hormonal sex reversal;
- improved nutrition and feed management;
- improved production technology including water quality management; and
- use of locally available raw materials and by-products of agro-industries in the formulation of practical tilapia diets

The University of the West Indies, through the staff members of the Department of Zoology at its Aquaculture and Fisheries Research Laboratory, conducts post-graduate research programs and also provides technical assistance; however usually at a higher technology level than at the level of small-scale farmers. Current aquaculture research thrusts are summarized in ANNEX 3.

The Fisheries Society of Trinidad and Tobago is an organization of aquaculturists of both food fish and ornamental fish which was incorporated in September 1991. It seeks after the interest of aquaculturists in Trinidad and Tobago, and makes representations to Government on their behalf. The Society has thus far hosted one technical seminar and has produced one technical bulletin, and is attempting to assist farmers in the development of business plans for fish farm projects to be funded by the Agricultural Development Bank.

The situation in Trinidad is a truly complex one and would require more time in the country to fully understand the issues.

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, research, technology transfer, fiscal incentives, environmental protection, marketing, etc.

## ANNEX 1: Review of Past Aquaculture Interventions.

- 1930s when eggs of the rainbow trout *Oncorhynchus mykiss* were introduced from the United Kingdom and were hatched and released into the Guanapo River. This attempt was unsuccessful because of the high river water temperatures.
- 1940s another attempt was made with the importation of the common carp *Cyprinus carpio* which was stocked into a pond in Arouca, but this too was unsuccessful.
- 1950s Bamboo Grove Fish Farm was established as a research and demonstration station, to promote the cultivation of the Java tilapia *Oreochromis mossambicus*. This species was imported into Trinidad from St. Lucia and was perceived as the answer to the protein deficiency problem facing the colonies of the British Empire, hence providing a cheap food source for low-income groups.
- 1952-1954. Research efforts on Tilapia were initiated by J.S. Kenny; a mono-sex extensive culture system was described. The paper concluded that rearing this species under this system was suitable in any area in Trinidad, in particular Central Trinidad.
- 1960s this species reportedly escaped in flood waters from the Demonstration Station and a population of tilapia was established in the Caroni Swamp, which today, serves both as a source of food and income to lower income groups in Central Trinidad.
- 1970s, the focus of the Government of T&T was to promote small-scale and subsistence farming using small family ponds in rural communities. Farmers were encouraged to rear tilapia and the indigenous Cascadura (*Hoplosternum Littorale*), and to integrate same with other types of farming activity such as animal husbandry, rice farming and other crop farming in order to maximize total food production within the farmer's holding. Most of these systems failed because they were inherently inadequate for fish culture, and production was hampered by repetitious failure resulting from insufficient security, invasion of predators, low productivity, pollution and poor water quality.

The 1980's saw a resurgence of interest and is outlined as follows:

- Red and silver tilapia hybrids, silver and grass carp, to stimulate greater consumer demand.
- Two research projects were also established at other Government institution; the Sugarcane Feed Centre for red and silver tilapia, and the Institute of Marine Affairs conducted propagation trials with Cascadura and the river conch *Pomacea urceus*. Efforts were redirected towards Aquaculture extension using farmer's ponds to demonstrate Aquaculture practices and supporting these systems with seed stocks at subsidized rates.
- Attempt at large scale red tilapia cultivation in the Caroni Swamp were made, but due to environmental concerns this project was aborted.
- A pilot project for shrimp was also attempted at Brickfield but never came to fruition.
- 1990-1995 Caroni entered into commercial Aquaculture production with the assistance of the UWI. The pilot phase consisted of a multi-purpose hatchery and 9.5 ha of earthen ponds. The company initially produced Malaysian prawns, and then focus was shifted to the production of red hybrid Tilapia.
- 1992-1993 Cascadura was produced. Caroni marketed its fish products via its Aquaculture Project at Orange Grove and through its Diversification Office at Brechin Castle. Cascadura and Malaysian prawns both enjoyed good consumer acceptance on the local market, and the acceptance of the red hybrid tilapia had the potential to rapidly increase. Small quantities of food fish, namely tilapia, were exported mainly to North America and the United Kingdom. These exports were done on a trial basis by individuals who purchased fish from Caroni Ltd.

- 2007- Present: The Seafood Industry Development Company (SIDC) subject to the direction of the Ministry of Agriculture and Fisheries will play a coordinating/ oversight role with all stake holders in support of the revitalization of the aquaculture sector in Trinidad. To this end SIDC has been engaged in market survey activity, production modeling, review of past initiatives to ascertain reasons for prior failures and avoidance of duplication of effort.

## **ANNEX 2: Technical Bulletins**

1. Cascadura Farming “From Hatchery to Production” 1990
2. Fish Farm Ponds “A Manual for the Design Construction and Maintenance” 1990
3. Marketing the Red Hybrid Tilapia “ A Pilot Survey of Retail Fish Markets in Trinidad” 1993
4. Poly Culture of Giant Freshwater Prawn (*Macrobrachium rosenbergii*) and Cascadura (*Haplosternum littorale*) in Earthen ponds in Trinidad. 1995
5. Tilapia Farming “ A Manual for Commercial Tilapia Production In Trinidad and Tobago” 1998

## **ANNEX 3: Current Graduate Research Programs**

Anuradha Singh (M.Phil) Comparative larval development in *Macrobrachium* spp.(with Dr J. Agard)

Aweeda Newaj-Fyzul (M.Phil) Bacterial diseases of ornamental fish in Trinidad and Tobago (with Prof A.A. Adesiyun)

Suresh Benny (M.Phil) Development of a production system for the river conch *Pomacea urceus*

Ryhanna Sedarnee (M.Phil) Intensive culture of the armoured catfish *Hoplosternum littorale*

Zaheer Hosein (M.Phil) The trawl fishery of Trinidad and Tobago

Areas of Research Focus: Embryology, larval development, larviculture, nutritional requirements, and production technology of indigenous species of fish and shellfish with aquacultural potential. Intensification of the culture of tilapia and cascade.

# CHAPTER 5: REGIONAL FISHERIES DATABASE DEVELOPMENT COMPONENT

## ***5.1 Policy and Data Management Documents***

There is no current **National Fisheries Policy** for T&T. The Fisheries Division has in place a draft policy which is currently subject to refinement through stakeholder review and consultation. The Government of Trinidad and Tobago's management objectives and main policy directions as outlined in the draft Marine Fisheries Policy Document (1994) and the goals outlined in the draft Strategic Plan (2002) are given below. The draft objectives for management are to:

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

Though not explicitly stated, the value of the Fisheries Information System (FIS) is viewed as the component that will contribute significantly to meeting the objectives.

A document (textbook) was prepared by the Fisheries Division staff and JICA in 2006 under the Regional Technical Cooperation Promotion Programme as a component of the Project for the Promotion of Sustainable Marine Fisheries Resource Utilization (Yanagawa et al. 2006). This document outlines details on the types of data to be collected, the collection of data, the storage and the assimilation of the data. This document is presently being used as a guide to ensure quality and integrity of the FIS in Trinidad and Tobago. The protocols established are adequate to meet the objectives and goals of the management of fisheries in Trinidad and Tobago.

## ***5.2 Data Collection – Current Situation<sup>4</sup>***

### ***Trinidad:***

The FD of T&T employs a total of twenty-four (24) data collectors who are stationed at the twenty-four (24) enumerated sites around Trinidad. These enumerated sites are a subset of the total of sixty-seven (67) landing sites around Trinidad (there are 43 non-enumerated sites). All sites are spread across nine (9) sampling zones. At the enumerated sites, data are collected for at least 20 random days per month. Data collected for Catch and Effort are based on three established forms:

- Return of Fish Landed form;
- Boat Activity Sheet; and
- Questionnaire on Fishing Days.

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<sup>4</sup> *The current situation described below refers only to Trinidad. There was much difficulty in communication with Tobago, and meetings were cancelled by Tobago on more than one occasion. Tobago was supplied with the Information Request Sheet and has yet to date returned same, though numerous emails have been sent. The Tobago situation will be described using recent reports found if the information is not supplied in time.*

The first two forms are administered by the data collectors on their sample days while the questionnaire is administered by staff of the FD Statistical Unit on a monthly basis. These forms are enclosed in the aforementioned 2006 Textbook. The data collection system targets the artisanal inshore fleet such that each enumerated site is assumed to be representative of artisanal fishing activity within the zone. A census of fishing vessels is conducted every few years to determine the number of boats at each landing site.

*“This system also covers the semi-industrial and industrial trawl fleet but not the semi-industrial/industrial longline and multi-gear fleets. Within recent years, a trip reporting system was implemented for the longline fleet whereby Trip Report Forms are filled out by the vessel captain/owner and submitted to the Fisheries Division”* (Yanagawa et al. 2006).

Other data collected are listed below, as well as the format for storage (Yanagawa et al. 2006):

- Fisher, vessel, engine, gear
  - Registration Forms (LRS – Licensing and Registration System)
  - Census (MS Access)
- Landings and Effort
  - Data Collectors, Forms and Interviews (Oracle)
  - Trip report Forms (MS Excel)
- Biological Data
  - Field Sampling (MS Access)
- Fish Exports, imports
  - Applications for licences, Return Forms (MS Access)
- Economic Data
  - Costs and Earnings surveys (MS Excel)
- Social Data
  - Surveys, Questionnaires and Interviews (dBase)
- Fisheries Incentives
  - Application forms (not computerized)

According to (Yanagawa et al. 2006), the collection of biological data was initiated in 1991 and was limited to shore-based sampling for the following species:

- Artisanal, semi-industrial, industrial trawl fleet
  - Species: Shrimp (*Farfantepenaeus subtilis*, *F. notialis*, *Litopenaeus schmitti*, *F. brasiliensis*, *Xiphopenaeus kroyeri*)
  - Parameters measured: length
- Artisanal gillnets and pelagic hand lines
  - Species: Serra Spanish Mackerel (*Scomberomorus brasiliensis*), King Mackerel (*S. cavalla*), Shark (*Carcharinus porosus*, *C. limbatus*, *Rhizoprionodon lalandii*, *Sphyrna lewini*, *S. tudes*)
  - Parameters measured: length, maturity, age and growth

A sea sampling programme was also implemented in 1999 for the trawl fleets in order to capture information on the species composition in the discards of bycatch. The biological sampling programmes for five targeted species of penaeid shrimp and two species of groundfish (*L. synargis* and *M. furnieri*) landed as bycatch in the trawl fishery, and for the pelagic species *S. brasiliensis*, *S. cavalla* and *C. hippos*, were suspended in early 2008 due to a critical shortage of staff (including supervisory staff (Ferreira 2008)).

Data collected on gear types, social and economic status have been linked to specific projects over the years, and hence the absence of continuity. This however, does not mean that the data is not important and useful.

Recreational data is limited to catch and effort data collected at fishing tournaments.



The system implemented to collect data, especially for catch and effort, appears to be working. A system of periodically training the data collectors, as well as regular review of their methodology and reporting, has proven useful in quality control.

Financial and human resources are the main limiting factors cited in the collection of the suite of data. However, the use of the current resources appears to be efficiently managed, and only an increase in resources would yield an increase in data coverage in Trinidad.

#### **Tobago:**

Tobago has shown a less effective data collection and management system. According to Ferreira (2008), *ad hoc* collection of data on landings with the artisanal multi-gear fishing fleet and the semi-industrial multi-gear fishing fleet began in the early 1970s in Tobago. In 1988 the system was regularized, but focused only on the component of the fleet that targeted flying-fish at three landing sites. The system was modified in 1995 to include all components of the coastal fisheries through monthly random sampling at eight (8) of the forty-five (45) landing sites around the island. The system is hampered by human and financial limitations. Recreational data in Tobago is limited to catch and effort data collected at tournaments.

### **5.3 Data Management – Current Situation<sup>5</sup>**

The following is an excerpt from Yanagawa et al. 2006 and is representative of the current situation:

*“The commercial landings data collected on the Return of Fish Landed Forms are computerized from 1995 to the present (data from trawling trips are computerized from 1991 to the present). They comprise the Harvest Module of FISMIS (Fisheries Management Information System). The development of FISMIS began with the Harvest Module component. A technical co-operation project with the International Development Research Centre (IDRC) of Canada which began in 1991 led to the system being conceptually re-designed, with its incorporation within a general fisheries management information system. The Harvest Module will also comprise components for the Recreational Landings, and Observer/Logbook Records. The other two modules of FISMIS are: Socio-Economic Module comprising Fishermen Registrations, Vessel Registrations, Beach Facility Profiles, Imports/Exports, and Financial Incentives; and Stock Assessment Module comprising Ageing Data, Resource Survey Data, Catch Sampling Data, Oceanographic Data, and Remote Sensing Data. The system uses MS Windows version of Oracle Recreational Database Management System and is a multi-user operating system comprising an Intranet connecting 14 PCs and one domain server.”*

A private company, Illuminat®, was commissioned by the Fisheries Department to design and implement the Oracle Platform. This was implemented and is currently in use. However, the Data Manager raised relevant concerns that maintenance of the system had to be done by the private company which may not be financially sustainable. Considerations to either changing the platform or training in-house IT officers in Oracle are being explored.

Data collected in the field are validated prior to data entry, and more rigorous validation is done by the Fisheries Officers upon entry. Data normally takes approximately 9 months to be entered, validated and deemed suitable for use in analyses. The shortage in the number of data input personnel was cited as the main limiting factor for the time span.

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<sup>5</sup> The current situation described below refers only to Trinidad. There was much difficulty in communication with Tobago, and meetings were cancelled by Tobago on more than one occasion. Tobago was supplied with the Information Request Sheet and has yet to date returned same, though numerous emails have been sent. The Tobago situation will be done using recent reports found if the information is not supplied in time.

The analysis of the data is clearly articulated in the guiding textbook, (Yanagawa et al. 2006). The following is an excerpt and is representative of the current situation:

*“The nominal landings and effort statistics collected on major (enumerated) beaches are used to generate data for the secondary (non-enumerated) beaches, where it is assumed similar fishing occurs, at the same intensity. The nominal catch landings and fishing effort data are raised by two factors (MIS 1996). The First Raising Factor (1<sup>st</sup> RF) adjusts the nominal statistics to account for the non-enumerated fishing days at each enumerated beach, that is, fishing days on which the Field Data Collector did not collect information. This factor is determined as the ratio of the Total Number of Fishing Days to Total Number of Enumerated Fishing Days. This is a monthly ratio obtained for each of the 19 enumerated beaches. The Second Raising Factor (2<sup>nd</sup> RF) adjusts the first raised statistics to account for the non-enumerated vessels, that is, vessels which fished but for which no data were recorded. This factor is determined as the ratio of the Total Number of Boats to Total Number of Enumerated Boats and is applicable to a zone. The totals are obtained from an annual fishing vessel census. The totals obtained from the 1991 census were used to estimate total landings for 1992 to 1997, and the totals obtained from the 1998 census for 1998 to 2000.”*

Summary Statistics are compiled periodically and sent to the Statistics Office in Trinidad. Stock assessments are carried out at the Annual CRFM Scientific Meetings on shrimp, and pelagic finfish as well as groundfish. Periodic stock assessment on certain target species are done on an *ad hoc* basis through collaborations with various governmental and research agencies. These reports are available for use in the management of the fisheries.

The Marine Fishery Analysis Unit, Fisheries Division, Ministry of Agriculture, Land and Marine Resources, is the entity responsible for the FIS. The data is stored on hard-drives and servers in the Unit, and there is a system of regular weekly back-ups. Duplicates of the data are sent to the Fisheries Headquarters as well as the Statistical Unit on a periodic basis, therefore off-site storage of data is available.

CARIFIS has been used by Trinidad in a very limited manner, as only vessel and fishermen information is stored using this system. There is not much confidence shown for CARIFIS in Trinidad, and there is not currently any desire to adopt CARIFIS as the platform for the FIS. The Data Manager cited “software problems” and “querying issues” as the main limiting factors of CARIFIS. Trinidad is quite comfortable using Oracle at their database programme.

#### **5.4 Information Dissemination**

The Central Statistics Office in Trinidad produces an Annual Report based on the Fisheries Statistics supplied by the Marine Fishery Analysis Unit. This is widely available for use. The CRFM Annual Publication of the Scientific Meetings also contains T&T’s profile and information. Numerous publications using information from T&T’s FIS are produced by the FAO and ICCAT.

There is the need for improved stakeholder involvement in information dissemination, and it was appreciated that this would assist the data collection programme, as the fishers would see the direct benefits of providing data to the collectors.

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

### **1. Human Resources**

The number of staff members in the T&T FD is close to adequate to support data collection. However, human resources for the input and analysis of the data is seriously lacking in numbers. 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*	24	24	0	Yes
Data Input Clerks	11	14	3	Yes
Fisheries Statistician	1	2	1	Yes
Fisheries Officers	5	10	5	Yes
<b>Total</b>	<b>42</b>	<b>51</b>	<b>9</b>	

*\* 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 the data as well as conduct analyses. The current system requires the following additional equipment:

- Five (5) Desktop Workstations for data input
- Three (3) Desktop Workstations for validation of data, summary statistics, and data assimilation
- One (1) field-hardy laptop
- One (1) UPS dedicated for the FIS

### **3. Other Resources**

One of the major factors cited for inconsistent collection of high quality data is the lack of the resources listed below:

- Field vehicles dedicated to meet the needs of the data collection; this data collection system requires on-going and intensive field visits.
- Consistent funding for field trip expenses.

## **6. RESULT OF THE BASELINE WORKSHOP**

### **6.1. Output from ID/OS Workshop with the Staff of the Fishery Division**

#### ***Brief Overview of the Workshop in Trinidad***

The workshop was held in the conference room of the Fisheries Division on the 8<sup>th</sup> of September 2009, in which ten staff participated. The basic question (theme) was discussed among the participants and decided as follows: "How can the Fisheries Division improve the sustainable management and development of the fisheries sector?"

Three tools, Environmental Scan, IOM (Integrated Organization Model) and SOR (Strategic Orientation) were used for the analysis.

#### ***Problem Analysis in Trinidad***

The negative spiral was identified regarding the decreasing fish stock and was analyzed. In order to reduce this spiral or even reverse it, the negative impact from trawl fishing and/or the improvement of the income of fishers needs to be addressed.

The following measures would be effective to improve the income (or net profit) of fisher folks:

- Improvement of fishing condition using FADs
- Improvement of the supply of live bait to extend the line fishing, thus reducing gill net fishing
- Development of under-utilized marine species
- Development of an alternative income source

#### ***ID/OS analysis***

The ID/OS method was applied in the workshop of the Fisheries Division. The workshop analyzed external and internal factors (problems, conditions, potential and so on) regarding the basic question, "how fisheries division can improve sustainable management and development of fisheries sector" for the Fisheries Division. Eleven opportunities and fourteen threats were identified whereupon the following five external factors were selected as the key factors by the participants:.

- Great diversity of marine species
- High demand for Fish
- Two stakeholders committees to promote inter-agency collaboration
- Conflict between multiple users of the marine environment
- Low level of organization within the fishing community

In the same way, nine strengths and fifteen weaknesses were identified, whereupon the following four strengths and four weaknesses were selected as the key internal factors by the participants:

#### **(Strengths)**

- Efficient, experienced, and committed staff
- Large number of services offered to meet the needs of fisher folk
- Ongoing fisheries catch & effort statistical data collection program in place (since the late 1950s)
- Library and information center provides services nationally, regionally and internationally

#### **(Weaknesses)**

- Outdated fisheries legislation
- Lack of an adequate training program for fisheries staff
- Inadequate staffing/ and remuneration
- Weak computerized system and technology

Two of the external factors which indicate strategic options were highlighted as strong internal potentials for the Fisheries Division.

- High demand of fish → To increase fish supply
- Great diversity of marine species → To develop under-utilized marine species

“To increase fish supply” could be a strategic option of the Fishery Division, which includes the development of aquaculture. IMA has been developing the technology as well as that for the development of under-utilized marine species, for which CFTDI has been developing fishing methods.

### ***Brief Overview of the Workshop in Tobago***

The workshop was held in the conference room of the Department of Marine Resource and Fisheries (DMRF) on the 14<sup>th</sup> of September 2009, in which the DMRF manager and fifteen staff participated. The basic question (theme) was discussed among the participants and decided as follows: “How can DMRF improve the sustainable management and development of the fisheries sector?”

### ***ID/OS analysis***

The ID/OS method was applied in the workshop of the DMRF. The workshop analyzed external and internal factors (problems, conditions, potential and so on) regarding the basic question. Twelve opportunities and fourteen threats were identified, whereupon the following five external factors were selected as the key factors by the participants:

- Strong tourism linkage
- Underutilized pelagic - flying fish
- Availability of funding
- Fisheries resources provide food and jobs
- Poor resource management

In the same way, seven strengths and thirteen weaknesses were identified, whereupon the following four strengths and four weaknesses were selected as the key internal factors by the participants:

(Strengths)

- Experienced staff
- Good extension services
- Good potential to serve fishers
- Education of public about the purpose of fisheries

(Weaknesses)

- Lack of a clear strategy
- Lack of proper staff structure
- Limited research activities
- Lack of sufficient staff numbers to implement programs

Two external factors indicating strategic options were highlighted as utilizable in order to capitalize the internal potential of DMRF.

The first strategic option is the establishment of value-added fisheries through a linkage with tourism, which emerged from an external factor “Strong tourism linkage”. It includes the adjustment of fishing activities and the improvement of the supply chain of good quality fish and seafood based on tourism needs, as well as the enhancement of tourism related income generating activities by fishers and/or fishing communities.

The second strategic option is the maintenance of fisheries resources which occurs as an external factor “Fisheries resources provide food and jobs”. It includes the enhancement of the departmental research activities.

## 6.2. Output from Workshops and/or Interviews with Local Fishers

### *Brief Overview of Interviews in Trinidad*

The interview was held at two fishing communities as shown in Table 13 and the summary of communities was shown in Table 14.

**Table 13: Fishing communities where interviews were held at**

Name of Fishing community	Date of Workshop
Claxton Bay	8 <sup>th</sup> September 2009
Las Cuevas	9 <sup>th</sup> September 2009

**Table 14: Summary of Communities in Trinidad**

Name of Fishing Community	Location of the Community	Number of Fishing Boats
Claxton Bay	W. of Trinidad	20 boats
Las Cuevas	N. of Trinidad	N/A

### *Present Status of Local Fishery in Trinidad*

The economic status of the fishery is relatively stable. The major target species are kingfish and carite by gillnet, which fishers catch year round. Additionally, mallet in Claxton Bay and dolphin fish in Las Cuevas are important species for the fishers. However, there is a fishing community in Claxton Bay that is in conflict with the National Energy Corporation concerning the industrial development of the coastal area.

### *Brief Overview of workshops in Tobago*

Workshops were held in two fishing communities as shown in Table 15 and the summary of communities was shown in Table 16.

**Table 15: Fishing communities where interviews were held at**

Name of Fishing community	Date of Workshop	Number of Participants
Belle Garden	15 <sup>th</sup> September 2009	15
Castara	15 <sup>th</sup> September 2009	7

**Table 16: Summary of the Community in Tobago**

Name of Fishing community	Location of the Community	Number of Fishing Boats
Belle Garden	Atlantic Ocean side	Not available
Castara	Caribbean sea side	55 boats

### *Present Status of Local Fishery in Tobago*

FADs are already popular among fishers, who deploy the FADs single-handedly in the shallow water. However, FADs have not yet been deployed in deep water. The major target species who would utilize these would be dolphin fish, wahoo, and kingfish. Since the fishing season of dolphin fish defers from that of the kingfish, local fishers would be able to utilize the FADs throughout the year. Fishers living along the Atlantic Ocean rely on demersal fish more than those on the Caribbean side.

### **6.3. Key issues identified for coastal resource management in the workshops**

In discussions with staff of fishery department and with local fishers, four items were identified as key issues; namely "Sustainable aquaculture development in Trinidad"; "Pelagic fish resource management and sustainable development in Trinidad"; "Pelagic fish resource management and sustainable development component in Tobago"; and "Community-based resource management component in Tobago".

In Trinidad, Aquaculture development is the first priority of the Fisheries Division and IMA has been developing suitable techniques. However, potential farmers' groups who will engage in aquaculture using the IMA developed techniques must be identified.

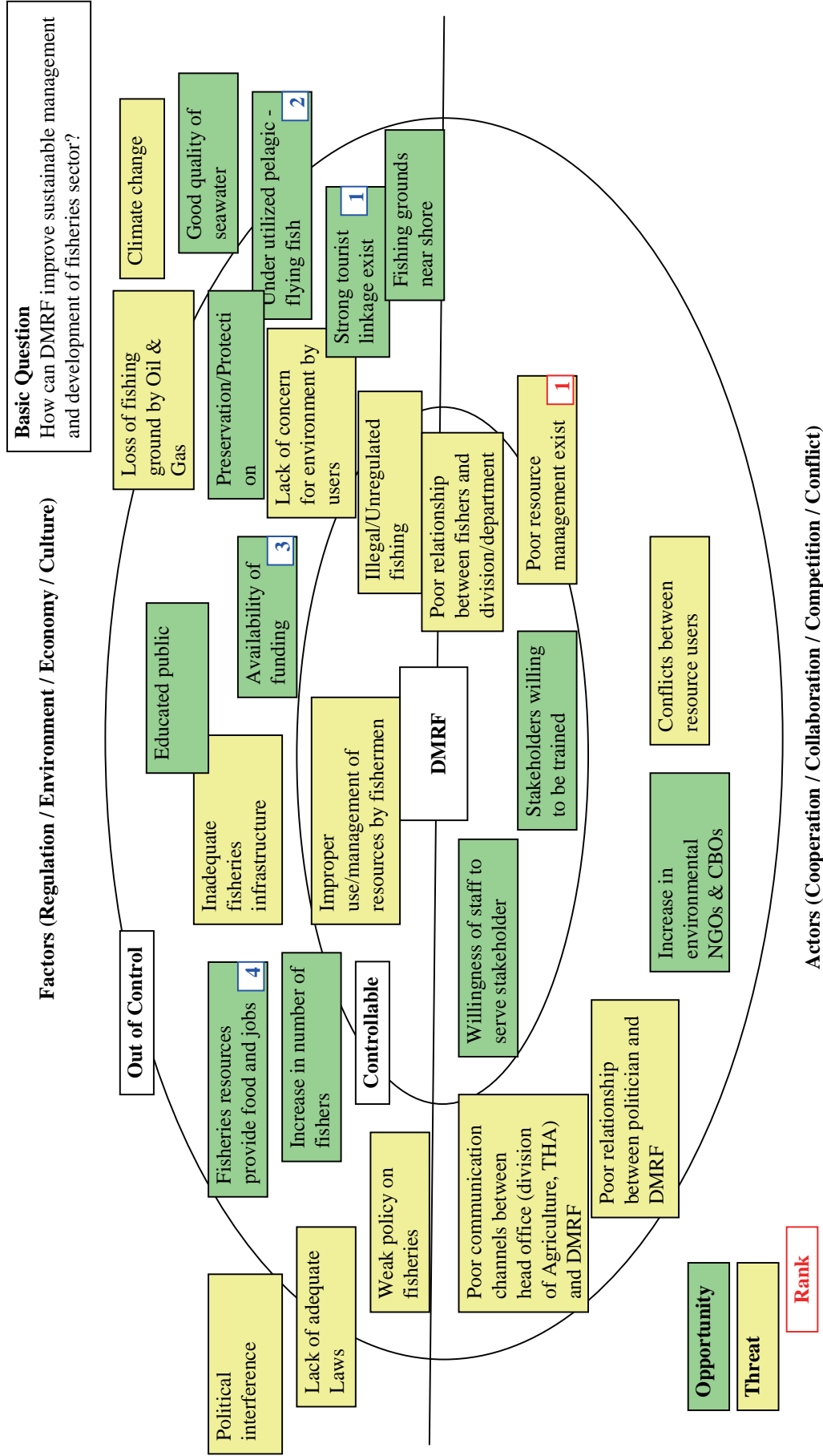
Needs for pelagic fish resource management and a sustainable development component in Trinidad were identified through the workshop in the Fisheries Division. Small pelagic fish are an under-utilized marine species. Developing the small pelagic fish resource will improve the supply of live bait, thus extending the period of line fishing and reducing gill net fishing. Small scale purse seine using lights for luring fish and/or small-scale nets are applicable for this purpose. However, both methods should be examined and compared.

In Tobago, three species (dolphin fish, wahoo and kingfish) were identified as important resources to be maintained. It is thus significantly important to enhance departmental research activities. DMRF should be the leading agency for this research, collaborating with CRFM and thus regionally linking research activities. Tobago is important as a nursery area of the species

Ensuring a constant supply of coastal species like lobster, conch, and reef fish is important to attract tourists. Thus establishing value-added fisheries by linkage with tourism is related to community-based resource management. Community-based resource management activities must be introduced for this purpose, because the creation of an eco-friendly image among tourists can be one of the value-added activities conducted by fishers.

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

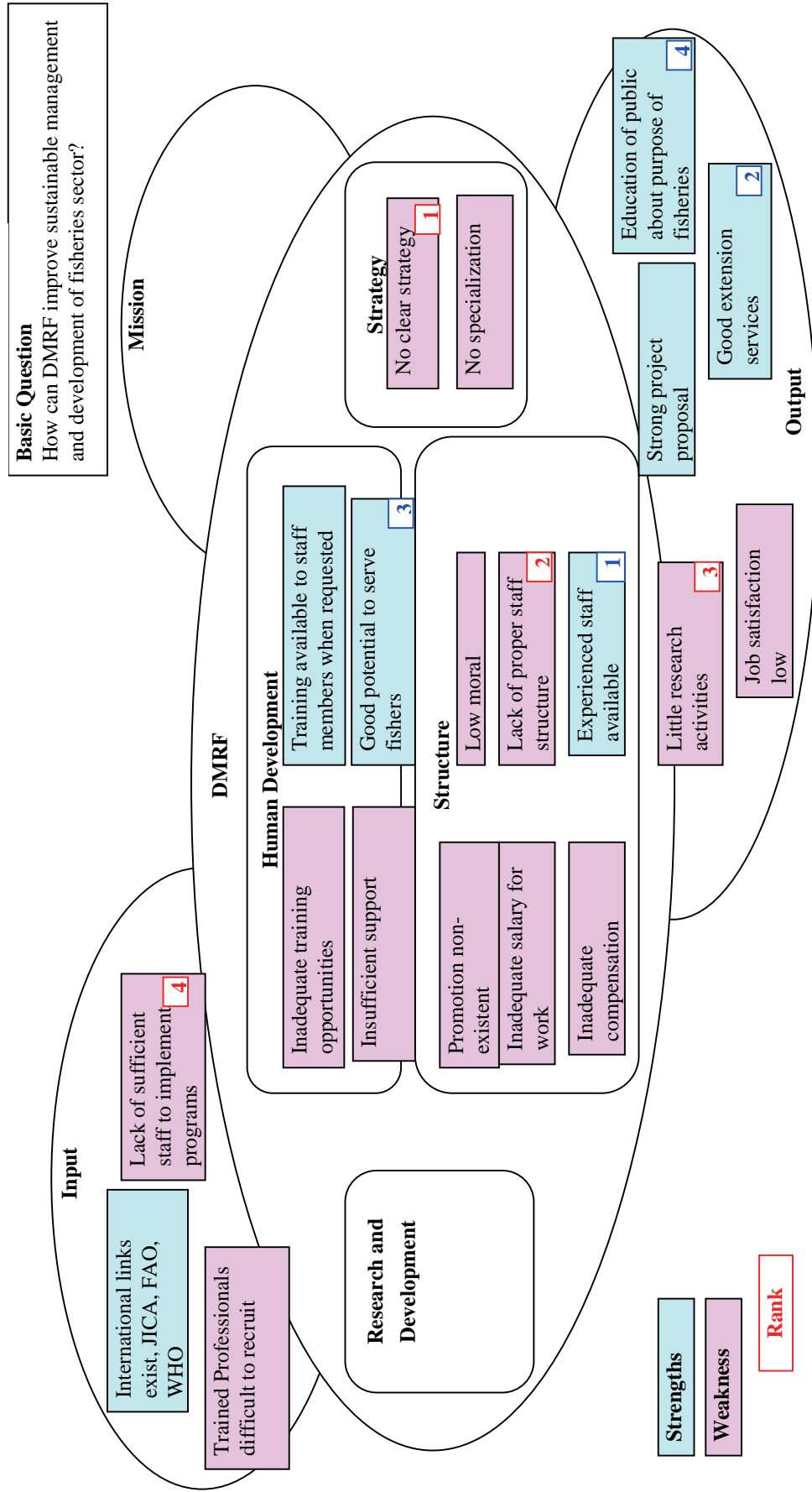
## External Factor Analysis Department of Marine Resources & Fisheries (DMRF) in Tobago (Sep. 14, 2009)





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

## Internal Factor Analysis in Department of Marine Resources & Fisheries (DMRF) in Tobago (Sep. 14, 2009)



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## IMA PUBLICATIONS

- *IMA Aquaculture Workshop*
- *Inland Fish Farming for Profit*
- *“Financing Opportunities”*
- Policy and Regulatory issues in Aquaculture
- “Water pollution Rules”
- Tilapia Industry Development Plan
- Cascaudura Farming “From Hatchery to Production” 1990
- Fish Farm Ponds “A Manual for the Design Construction and Maintenance” 1990
- Marketing the Red Hybrid Tilapia “ A Pilot Survey of Retail Fish Markets in Trinidad” 1993
- Poly Culture of Giant Freshwater Prawn (*Macrobrachium rosenbergii*) and Cascaudura (*Haplosternum littorale*) in Earthen ponds in Trinidad. 1995
- Tilapia Farming “A Manual for Commercial Tilapia Production In Trinidad and Tobago” 1998