FINAL COUNTRY REPORT: HAITI

October 2009

Updated in December 2011[1]

[1] The baseline survey in Haiti was not originally planned as it was for other countries due to the instability in Haiti. However, because of improving situation, the baseline survey was finally undertaken in October 2011 by a member of JICA study team

Haiti

Country Profile

Geographic coordinates	18° to 20° N, 71°30" to 74° 30" W
Total area	27,750 sq km
Land area	27,560 sq km
Water area	190 sq km
Length of Coastline	1,977 km
Shelf Area	5,857 sq km
Territorial Sea	40,142 sq km
Claimed EEZ	86,398 sq km
Highest point (m)	2,680 m (Montagne de la Selle)
Climate	tropical; semiarid where mountains in east cut off trade wind
Natural hazards	lies in the middle of the hurricane belt and subject to severe storms from June to October; occasional flooding and earthquakes; periodic drought
Population	9,035,536 (July 2009 est.)
Annual Population Growth Rate	1.838% (2009 est.)
Life Expectancy at birth	total population: 60.78 year
Languages	French (official), Creole (official
Ethnic Mix	black 95%, mulatto and white 5%
Work force	3.643 million
Unemployment	About 60%.
GDP (PPP)	$11.53 billion (2008 est.)
GDP Growth rate	1.3% (2008 est.)
GDP per Capita (PPP)	$1,300 (2008 est.)
Currency Unit	Gourdes (HTG); US$1 = HTG 39.216 (2008 est.)
Area of Mangrove Forests	22.630 ha (THORBJARNARSON (1985))
Percent of Mangrove Forests Protected	Not applicable
Per Capita Food Supply from Fish/Fishery Products (2000)	3 kg/person
Exports	$490 million (2008 est.); apparel, manufactures, oils, cocoa, mangoes, coffee.

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

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
DPAQ[2]	*Direction des Pêches et Aquaculture* (Directorate of Fisheries and Aquaculture)
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
GOH	Government of Haiti
IHHN	Hypodermal Hematopoietic Necrosis
JICA	Japan International Co-operation Agency
MARNDR	Ministry of Agriculture, Natural Resources and Rural Development
MPA	Marine Protected Area
mt	Metric Ton
OECS	Organization of Eastern Caribbean States
TIP	Trip Interview Program
TSV	Taura Syndrome Virus
UNDP	United Nations Development Program

1. Before 2011, it was "Service du pêcherie (Fisheries Service)"

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CHAPTER 1: INTRODUCTION

The Republic of **Haiti** occupies the western third of the island of Hispaniola (which it shares with the Dominican Republic), with Jamaica 180 km to the southwest and Cuba 90 km northwest across the Windward Passage. Haiti was the first modern state governed by people of African descent and the second nation in the Western Hemisphere to achieve independence. It is the poorest nation in the western hemisphere, and one of the most densely populated. Itt has an estimated unemployment rate of 60% and about 80% of the population live in abject poverty. It is a member of the Caribbean Community (CARICOM), and the standard of living of its residents – including fisherfolk – is substantially lower than in the rest of CARICOM.

The island shelf is very narrow at 5,000 sq km, and the fishing methods in use are geared towards reef demersal exploitation. Fishing activities are confined to the narrow, shallow coastal waters which exacerbates the already deteriorating condition of the resources of the near shore fishery zone impacted by coastal pollution. Deforestation in Haiti is extreme, resulting in soil erosion and the deposit of silt all along the coastal shelf.

The number of fishers, mainly small-scale and artisanal, is estimated to be more than 50,000 as shown in the table 1 in the next page. Directorate of Fisheries and Aquaculture (DPAQ) estimates that sixty percent (60%) of these are full-time, while the rest are part-time. Haiti is an open access fishery. In spite of the clear evidence of serious deteriorating condition of the fisheries resources, the number of fishers has been rising phenomenally, due to the high poverty and unemployment conditions in the country, and lack of resources to control fishing effort and enforce fisheries regulations. In consequence, pressure has increasingly been building upon the resources, particularly in the inshore areas, where the majority of the artisanal fishers operate.

TABLE 1: Summary of fisheries profile in HAITI			
Current			
Number of people engaged		more than 50,000	
Number of fishing boats		*6,500-7,000	
Fishery production	Total	16,000	MT/year
	Of which aquaculture	400	MT/year
Import of fishery products	Quantity	10,000	MT/year
	Value	10,000,000	USD
	Average price	1.00	USD/kg
Export of fishery products	Quantity	500	MT/year
	Value	5,000,000	USD
	Average price	10.00	USD/kg
Fish consumption per capita		2.5	Kg/capita-year
Development target (in 10 years)			
Production	Total	46,000	MT/year
	Fishery	21,000	MT/year
	Aquaculture	25,000	MT/year
Export		11,000	MT/y ear
Fish consumption per capita		4.6	kg/capita-year
Employment		70,000	people

Source: Plan d'investissement pour la crosssance du secteur Agricole, Annex 4 composante aquaculture et pêche, Ministry of Agriculture, Natural Resources and Rural Development (MARNDR), 2010

**** Diagnóstico del Sector de la Pesca y la Acuicultura en Haití, Xunta de Galicia***

Three different types of vessels are used by Haitian fishers: rowboats (*canots à quille*) from 3.3m to 6 m (10-18 feet) in length; flat-bottomed boats (*corallins*) from 3.3 m – 5 m (10-15 feet) in length, and dugout wooden boats (*pirogues monoxyles*) that are 3.3 m – 4 m (10-12 feet) long on average. There are between 6,500 and 7,000 (even though there is another conflicting number 26,348 based on Gilles Damais and al. , July 2007) boats used for fishing in Haiti, many of these are propelled by sails or oars. There are about thirty (30) fiberglass canoes (1,358 all type of boats) with engines. The FAO estimates that 2,382 to 2,662 commercial vessels are concentrated in the near shore waters of the West, Grand Anse and South-East departments.

The fisheries of Haiti are artisanal and target primarily demersal finfish, conch and lobster; demersal finfish account for nearly one-third of the landings.

Haitian fishers deploy about twenty (20) different fishing gear types: traps (Antillean "Z" type), nets (gill nets, trammel nets, cast nets), beach seines and hook and line gear (pelagic and demersal longlines).

Monofilament nets are increasingly in use in Haitian fisheries. These are fixed in the water column during times of high seasonal fish migration. The nets are sometimes set in a circle and have an average length of 80-275 m and a width of 4-5 m. The mesh size is typically between

50-80 mm stretched. Fixed gillnets are used during the night. It takes two to four fishermen to set a gillnet in the evening which is left in place for 12-18 hours, or longer, and is hauled in the following morning. Trawls are also commonly used and these are made of twisted nylon line.

Beach seines are typically 90-150 m in length; however, some can get up to 600 m in length. Seines are used to capture coastal pelagic species such as sardines, herrings, bonito and anchovies.

Purse seines that have very fine mesh (about 30 mm) are used. The length of these seines is between 300-700 m. The crew is made up of 6-8 fishers on a boat that is 6-8 m in length.

The Z-shaped traps that are used are made almost entirely of bamboo, and have two entry points. These can be fished either floating or on the bottom. They target demersals, coastal pelagics and lobsters (*Panulirus spp*.).

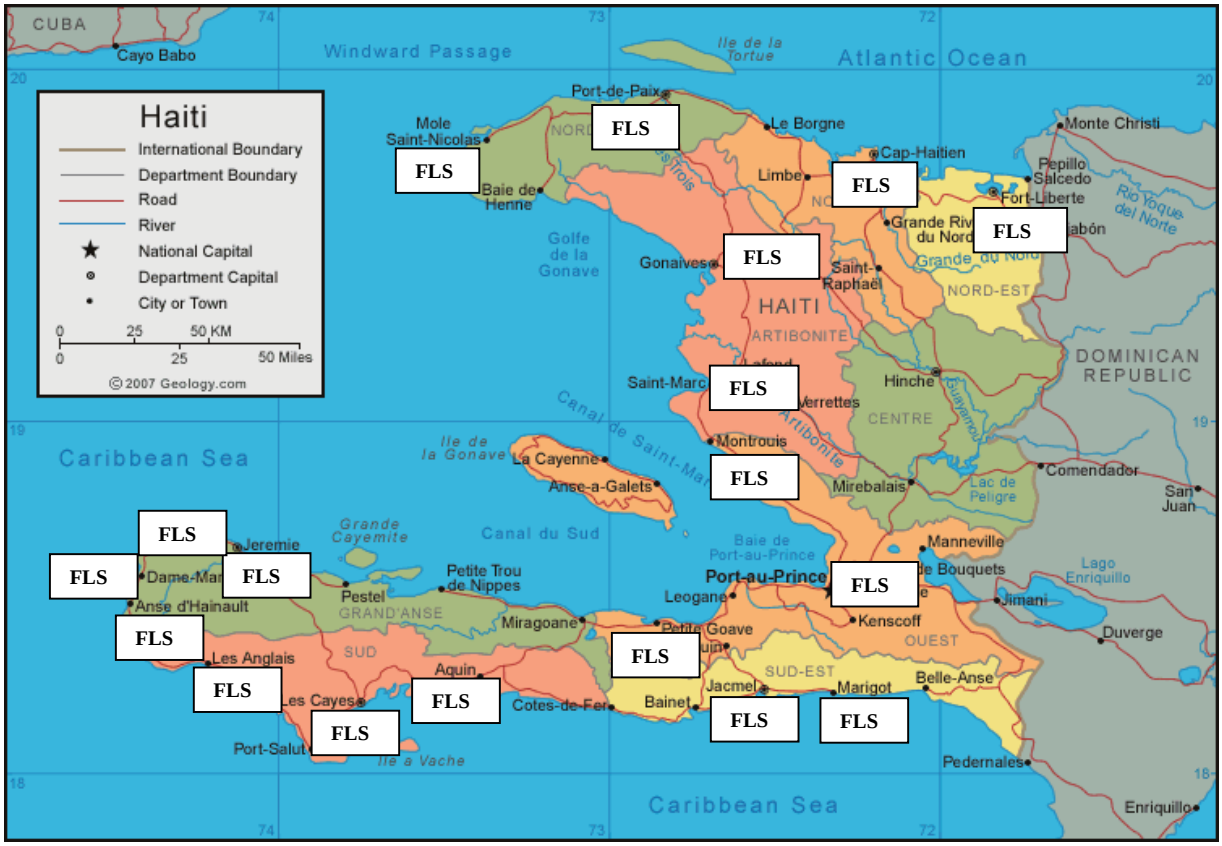
While handlines with a single hook are commonly used, artisanal fishers set pelagic longlines. These vertical lines are typically set at 20-50 m depths and each fisherman uses ten lines at a time. Longlines set on the shelf/deep slope areas have 10-18 hooks that are set one meter apart for approximately 200 m length. These lines are anchored on the sea floor by stones or allowed to drift; they are used to catch valuable coastal pelagics.

Lobsters, queen conch (*S. gigas*) and demersal fish are hand harvested by divers using spearguns. Some use hooka rigs[3] to a depth of 25 m.

Fishing is also sometimes done with lights that are used to attract the fish (when there is no moon). A bulb of 25-30 watts is immersed in the water and then hook and line fishing is carried out. Many fishers operate directly from the coast without the aid of a boat.

Fisheries and aquaculture are not considered a sector of strategic importance to the Haitian economy, but the contribution of fisheries to the livelihood of coastal communities is far from negligible. The waters off the disputed territory of Navassa Island off are the focus of expansion of Haitian fisheries.

[3] A hooka rig is a low-pressure compressor in the boat which must be constantly tended, connected by a hose to one or two second-stage regulators used by the divers at depth. The divers can stay down for several hours, but run an increased risk of decompression sickness ("the bends").



Location of the main fish landing sites (FLS) along the Haitian coastline.

Fish are landed and sold all along the coastline of Haiti, but the principal landing sites for the sale of fish to the public are: Port-au-Prince, Luly, St Marc, Gonaïves, Mole St Nicolas, Port-de-Paix, Cap-Haitien, Fort-Liberté, Petit-Goave, Roseaux, Jeremie, Dame-Marie, Ansed'Hainault, Les Cayes, Les Anglais, Aquin, Jacmel, and Marigot. Their approximate location is marked on the above map.

Poverty is endemic in Haiti, including among fishers. A vicious cycle poverty is caused by past degradation of the fisheries resources and the marine environment, and there is the real threat that the inshore fisheries will collapse. The lack of alternative sources of income or employment or income drive people into the sea to seek a livelihood, where they find persistent poverty. This has largely stifled the adoption of appropriate technologies that could support the shifting of operations away from the congested and over fished continental shelf.

The possibility of new technologies, coupled with insufficient attention to the fisheries sector by government, has triggered the mushrooming of fisherfolk organizations, determined to promote their own interests and play a serious role in the regulatory aspects of fisheries management. The emergence of fishers' cooperatives and associations in Haiti has proceeded at a rate unprecedented in the Caribbean. In the year 2000 the number of these organizations was estimated conservatively at about one hundred and forty (140). Haiti has one of the strongest fisherfolk organizational systems in the CARICOM region. Approximately 52% of the fishers are reported to be members of one or other fishers' organization.

Haitian fishers have not had the 'luxury' of operating under governments with any structured policy framework and legal and regulatory institutional arrangements that would effectively establish government legal control over marine space and create operable management and regulatory systems. The end of repressive regimes marked by the ouster of the last Duvalier dictatorship and the ushering in of a democratic regime, created the enabling environment that

paved the way for the formation of fishers associations and cooperatives. The void created by inadequate government policy and support has been effectively occupied by non-governmental organizations (NGOs) that have taken on the task of mobilizing the fishers and encouraging the formation of marketing cooperatives and associations.

Fishers have responded positively, not only because of insufficient action of their governments, but also in order to eliminate exploitation by middlemen, who purchase the catch at very low prices and made exorbitant profits. They have been more than eager to eliminate these middlemen by mobilizing resources to form marketing cooperatives and associations that would purchase their products at more reasonable prices and sell at the right time for profits that would finance the administration and management of their organizations.

The following are some of the over 140 relatively vibrant and strong organizations in Haiti:

- *Association des Pêcheurs de Luly* *(APEL).*
- *Association des Pêcheurs de Léogane* *(APL).*
- *Cooperative de Pêche la Commune de Grand Goâve* *(COPECOG).*
- *Cooperative de Pêche et de Transparence de Janti* *(CPTJ).*
- *Association des Pêcheurs de Cont* *(APEC).*
- *Cooperative des Pêcheurs de Mitan* *(COPEMI).*
- *Association des Pêcheurs de Trou-A-Lèau* *(ASPET).*
- *Association Pêcheurs des Petite Goâve* *(APPG).*
- *Association des Pêcheurs des Montrouis* *(APEM).*
- *Association des Pęcheurs de Petite-Anse* *(APPA).*
- Other Associations exist in Marigot in *Sud-Est,* Dame-Marie in *Grand'Anse*; and Montrouis in *Ouest.*

Some of these primary fishers' organizations have formed second-level fishers' associations to promote their interests. For example the fishers' organizations in the west of Haiti have formed COOPECHE (*Coordination des Organizations de l'Ouest pour la Pêche*), and there are two federations with a national character: GIP (*Gwoup Insyativ Pou Yon Mouvman Nasyonal Peche Oganize*), and the "Federation of Organizations of Fishers in Haiti " founded in 1997. The goals of these organizations seem to be to promote their interest, to play the regulatory role hat that has not been effectively promoted by the government, to develop viable economic entities with access to credit facilities, to participate in community welfare activities, and to seek to reduce their dependency on government largesse. These have been supported by NGOs in Port-au-Prince such as FoProBIM (*Fondation pour la Protection de la Biodiversité Marine*, or "Foundation for the Protection of Marine Biodiversity") and FONADES (*Fondation Haitienne pour le Développement Économique et Social* (*FONHADES*) or "Haitian Foundation for Economic and Social Development") which have been pivotal in facilitating the emergence of the fisher's organizations.

THE ADMINISTRATION OF FISHERIES IN HAITI

The administration of fisheries in Haiti falls under MARNDR, and directly under DPAQ. In the year 2001 it had a staff strength of twenty-two (22), with eleven (11) of the technical staff with first degrees and six (6) with Masters' Degrees. The existing staff considers Data Collection and Management and Statistics and Stock Assessment as the priority areas of the department, and the areas where problems with recruitment are critical. Some senior fisheries officers listed the human resource needs of the department as follows: Laboratory Technicians for fisheries biological analysis, a Data Manager, Quality Control Officer and Extension Unit Head.

The department suffers from a lack of basic administrative facilities and institutional capabilities. Its technical staff compares favorably with any in the Caribbean region but there is an acute shortage of material resources for them to utilize in their operations. It lacks basic facilities that are taken for granted by the fisheries departments and divisions of other Caribbean countries. Limited governmental attention to the fisheries sector is reflected in the absence of budgetary allocations for the administration of the sector and inadequate institutional framework for fisheries resource management of both the capture (marine and inland) and the culture fisheries.

The senior staff realistically state that due to these handicaps, the functions of the DPAQ are mainly limited to providing advice to the private sector, handling of administrative files and matters, and occasionally, feeble attempts to enforce existing fisheries legislation without much success. DPAQ cannot improve the lack of funding situation from other sources of funding since donor agencies prefer working with NGOs, consulting firms and academic and research institutions, rather than directly with governmental agencies.

CHAPTER 2: COMMUNITY-BASED FISHERIES MANAGEMENT COMPONENT

2.1 Coastal Community Characteristics

Haiti is one of the most densely populated countries in the world, and much of the population lives on or near the coast. The major coastal settlements which also function as fish landing sites have the following estimated populations:

TABLE 2: POPULATIONS OF THE MAIN COASTAL SETTLEMENTS, HAITI

DEPARTMENT	SETTLEMENT	TOTAL
Ouest	Port-au-Prince	2,500,000
Ouest	Luly	2,000
Artibonite	St. Marc	66,226
Artibonite	Gonaïves	104,825
Nord-Ouest	Mole St Nicolas	4,000
Nord-Ouest	Port-de-Paix	250,000
Nord	Cap-Haitien	180,000
Nord-Est	Fort-Liberté	11,465
Ouest	Petit-Goave	12,000
Grand'Anse	Roseaux	28,811
Grand'Anse	Jeremie	31,000
Grand'Anse	Dame-Marie	27,127
Grand'Anse	Anse d'Hainault	23,185
Sud	Les Cayes	45,904
Sud	Les Anglais	25,652
Sud	Aquin	5,246
Sud-Est	Jacmel	40,000
Sud-Est	Marigot	50,734

Without the developed manufacturing and tourism sectors of other Caribbean islands, the importance of fishing to the local economy becomes apparent.

2.2 Policy, Legislation, and Supporting Institutional Arrangements

POLICY

The GOH has not chosen to prepare a **National Fisheries Policy** for Haiti. A draft **Fisheries Management Plan** (FMP) for Haiti was prepared in 1999 with the help of FAO, but it has not been introduced because of lack of funds and other resources needed for implementation. The main objectives of this FMP are:

i. Rehabilitation of degraded habitats
ii. Training of fishermen in basic literacy
iii. Introduction and use of appropriate fishing gear and equipment;
iv. Advanced training in fisheries assessment and management; and
v. Fish stock assessments.

A copy of the draft FMP was not provided, and so a detailed assessment cannot be conducted. The plan seems to suffer from two main weaknesses:

1) It does not involve fishers or fishers organizations in fisheries management or planning; and
2) It does not adequately take into account the socio-economic situation and local culture.

MARNDR has made available the investment plan for the agriculture sector development 2010-2016 which includes the fisheries and aquaculture sector. The ambitious development targets are shown in the table 1 of this report. MARNDR argues that current production level of capture fisheries, estimated at 15,000 MT/year, is not too far from the maximum sustainable yield, estimated at 20,000 MT/year. On the other hand, their strong focus is placed on the aquaculture development to increase from current production level, which is estimated to be 400 MT/year, to 25,000 MT/year.

LEGISLATION

The Act which governs fisheries in Haiti was promulgated in 1959 and is titled:

- Décret règlementant l'Exercice du droit de pêche en Haiti, et subordonnant les particuliers étrangers, sociétés et coopérative à l'autorisation d'un permis (ou licence) délivré par la Secrétairerie d'Etat de l'Agriculture des Ressources Naturelles et du Développement Rural.

"*Decree to regularize the right to fish in Haiti, and requiring all foreigners, companies and cooperatives to have a permit (or license) from the Secretary of State of Agriculture, Natural Resources and Rural Development*".

The preamble to the 1959 Act contains the following clauses reminiscent of much more recent legislation under the Law of the Sea convention:

Considérant que l'Etat Haitien exerce sa souveraineté sur les eaux nationales, sur le plateau continental, la zone contigue, la zone économique exclusive, sur les sous-sols marins et fluviaux;

Considérant qu'il lui échet l'obligation d'organiser et de réglementer l'exploitation des espèces animales et végétales qui y croissent;

Considérant que la rationalisation de l'exploitation des ressources biologiques aquatiques exige la protection de la faune et de la flore maritimes et fluviales, le contrôle des méthodes de capture et des engins utilisés; ainsi que celui de la pression de pêche face au stock disponible;

Considérant que, dans le contexte du Développement, il est du devoir de l'Etat d'assurer la promotion de la pêche maritime et fluviale, d'orienter la commercialisation des fruits de mer en vue de la croissance économique programmée par le Gouvernement de la République;

"*considering that the Haitian state exercises sovereignty over all its national waters, the continental shelf, the contiguous zone, the exclusive economic zone, and under the surface of its seas and rivers;*

And considering that it has the obligation to organize and regulate the exploitation of the species of flora and fauna which live there;

Considering that the rationalization of the exploitation of aquatic biological resources depends on the protection of the maritime and riverine flora and fauna, the control of the method of capture and the gear utilized; as well as the pressure placed on the fish based on the available stocks;

Considering that, in the context of Development, it is the duty of the State to ensure the promotion of maritime and riverine fishing, to guide the commercialization of seafood to facilitate economic growth as a programme of the Government of the Republic;"

The functions of the Secretary of State in the French tradition are similar to the functions of a Junior Minister in the English tradition.

One hundred and forty-seven (147) articles follow, the real substance of the 1959 Fisheries Act. Those articles quoted and translated below are some of those relevant to community-based fisheries management:

Article 2.-	Le fond et le sous-sol des mers intérieures, territoriales les zones économiques, les fleuves, les lacs, les lagunes les estuaires et les cours d'eau font partie du domaine public de l'Etat qui est inaliénable et imprescriptible.

Article 2: *The seafloor and water column of internal waters, territorial sea and the economic zone, the rivers, the lakes, the lagoons, the estuaries and the spring waters are in the public domain of the state which is inalienable and imprescriptible.*

Article 3.-	L'utilisation des eaux pour la pêche et pour d'autres actes similaires est soumis à l'obtention préalable d'une autorisation administrative non cessible, émanée de la Secrétairerie d'Etat de l'Agriculture, des Ressources Naturelles et du Développement Rural

Article 3: *The utilization of waters for fishing or any similar act definitely requires the obtaining of administrative authorization from the Secretary of State of Agriculture, Natural Resources and Rural Development.*

Article 5.-	Le droit de pêche appartient à l'Etat, l'exercice de ce droit est subordonné à une autorisation accordée à des particuliers des sociétés et des coopératives.

Article 5: *The right to fish belongs to the state; exercise of this right depends upon authorization given to individuals, companies and cooperatives.*

Article 10.-	Toute personne se livrant à la pêche artisanale est obligée d'acquitter annuellement une taxe de 10 gourdes aux Bureaux des Contributions de sa juridiction du 1er au 30 Octobre au plus tard, payable sur le vu du permis de pêche. Celle qui s'adonne à la pêche industrielle est assujette à une taxe annuelle de 250 gourdes.

Article 10: *All persons who are artisanal fishers are obliged to pay annually a tax of 10 gourdes to the tax office in their jurisdiction from the 1st to the 30th October, with the permit in hand.*

Those engaged in industrial fishing are subject to an annual tax of 250 gourdes.

Article 22.-	La Secrétairerie d'Etat de l'Agriculture, des Ressources Naturelles et du Développement Rural fixera le nombre, les caractéristiques des navires qui sont destinés à la pêche d'une espèce déterminée. Il en est de même des moteurs, des engins de pêche à utiliser.

Article 22: *The Secretary of State of Agriculture, Natural Resources and Rural Development fixes the number and characteristics of the fishing vessels used for fishing a particular species. Similarly the size of the engine and the types of gear to be utilized.*

Article 37.- La Secrétairerie d'Etat de l'Agriculture, des Ressources Naturelles et du Développement Rural peut, pour raison d'ordre technique ou d'intérêt général, appliquer des mesures restrictives ou limitatives dans le domaine des pêches maritimes et fluviales.

Article 37: The *Secretary of State of Agriculture, Natural Resources and Rural Development can for reasons of general welfare or scientific urgence, issue restrictions or limitations on maritime or riverine fishing areas.*

Article 72.- Sous la supervision du Service des Pêcheries, les coopératives de pêche sont tenues de donner une formation professionnelle à leurs membres.

Article 72: *Under the supervision of the Fisheries Service, fishing cooperatives have the obligation provide professional training for their members.*

Article 75.- Les coopératives de pêches adresseront au Service des Pêcheries un rapport mensuel sur les prix et un plan annuel d'opération, relativement à leurs activités de production, de commercialisation et de gestion.

Article 75: *The fisheries cooperatives will send a monthly report to the Fisheries Service detailing prices and an annual operations plan, relating their production and commercial activities and management.*

The 1959 Fisheries Act of Haiti contains – in general and specifically – many useful provisions for fisheries management; in 1959 it might have been considered rather *avant garde*. However it contains no provisions for fishers, fisher organizations, fishing communities and other stakeholders to participate in the management of fishery resources. There is no provision for any sort of fisheries Advisory Council, or any requirement for consultation with fishers or their representatives. It is a consummate top-down "command and control" fisheries act[4], where the Secretary of State of Agriculture, Natural Resources and Rural Development and the Fisheries Service are assumed to know what is best, and the fishers should just follow along.

With Haiti's membership in CARICOM, the CRFM has undertaken to provide technical assistance to the Fisheries Service "*to improve the institutional capability of the department, strengthen the planning and policy framework and improve the system of governance*".

The CRFM intends to collaborate with the Fisheries Service in a Project which "*will:*

i. Assist with the preparation of a comprehensive national fisheries policy, fisheries management plan, and work plan …

ii. Assist with preparation and establishment of a mechanism for providing policy advice and enhancement of participatory approaches to decision-making regarding the fisheries sector,

iii. Support a review and preparation of recommendations for strengthening of the legal framework, organizational structure and operational arrangements of the fisheries

[4] The 1959 Fisheries Act appears under the signature of Dr. Francois "Papa Doc" Duvalier (1907-1971), "President for Life" of Haiti from 1957-1971. He ruled Haiti as a dictator. One is not sure if some of that sentiment is present in the 1959 Act or whether it was simply that stakeholder participation was not yet fashionable.

department, and provide resources to assist with the implementation of the recommendations agreed upon.

SUPPORTING INSTITUTIONAL ARRANGEMENTS

DPAQ is responsible for the administration and enforcement of the Fisheries Act and associated regulations. Monitoring, surveillance and enforcement of fisheries regulations are among the specific functions of the DPAQ, but generally there is no monitoring, surveillance or enforcement of fisheries regulations due to lack of resources and equipment, limited organizational capacity, lack of personnel, poverty and political instability. Normally no action is taken when violations of regulations are discovered.

Even though the promotion of fishers' organizations is directly part of the mandate of the DPAQ, little is actually done because of the lack of presence of the DPAQ outside of Port-au-Prince[5]. The absence of government has expanded the role NGOs in Haiti may play, which has led to the explosion in fisheries organizations in recent years.

In addition to providing support to the government of Haiti, any fisheries development project should consider providing some funding and other support for NGOs which are doing useful work on the ground, for they could be powerful allies in the task of assisting 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

MARNDR's agriculture sector development plans [6] recognize the importance of fishers' participation in various aspects of the fisheries resource management, such as information collection, monitoring and enforcement of regulation, and consider these measures could be successfully introduced only when there is active involvement of fishers.

[5] This was expressed to the team leader during a meeting with representatives from COOPECHE at Luly in 1998.
[6] Plan d'investissement pour la crosssance du secteur Agricole, Annex 4 composante aquaculture et pêche, MARNDR, 2010
Programme National pour le Développement de la Pêche Maritime en Haïti 2010-2014, 2010, MARNDR

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

As for the application of participatory approach, limited scale of trails can be seen on project basis where the budget is available (for example in South-east department, there is fisheries community development project with Spanish cooperation). However, implementation at national level seems unfeasible unless further assistance is provided to complement very limited resource and capacity of Haitian government.

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

Baseline workshops were held with government staff and the community. The results are presented in the Chapter 6 of this report. Below the review of a multidisciplinary survey of the fisheries of Haiti, published by CRFM in 2009 is given.

Attitudes to Participatory Approaches to Fisheries Management

The CRFM team administered 120 questionnaires to fishing communities in the departments of *Grand' Anse, Sud-Est, Ouest, Artibonite* and *Nord*, in and around *Jeremie* and *Dame Marie* in *Grand Anse, Marigot* in *Sud Est* and *Port-au-Prince, Léogane, Grande Gonave* and *Saint-Marc* in the *Ouest* and *Antbonite* Departments, and *Cap-Haitien* in the *Nord* Department. Although the sample at each landing site was small, the results may be taken as indicative.

When asked their preferred role in fisheries management, the respondents "*left no doubt that they wish to play an active role in the resource management process, as shown in the ensuing table:*

TABLE 14:
PREFERRED ROLE IN FISHERIES MANAGEMENT

ROLES	Frequencies
Fishermen to be involved	**100**
Fishermen to play the leading role	94
Fishermen to unite for playing that role	91
Authorized to turn in unlicensed fishers	19
Authorized to turn in no fishing areas violators	19
Authorized to turn in users of nets/ traps with small meshes	12
Authorized to turn in dynamiters	9

"*Respondents are not only prepared to play a role but to play a leading role and to organize for that purpose, as they are currently doing. These healthy positions are however not consistent with their stand on turning in violators of regulations backed by legal instruments when they are given positions of authority. The preparedness of the fishers to be watchdogs over the violation of regulations would be a strong indicator of their readiness to assume leadership positions as*

co-managers of the fisheries resources. The next table shows a strong desire, among the Respondents, to be involved in the co-management of the fisheries resources:

TABLE 15: ***CO-MANAGEMENT OF THE FISHERIES RESOURCES***		
Form of Management	**Frequencies**	**Percentage**
Government Alone	7	**6.1**
Fishers Alone	4	**3.5**
Fishers & Government	104	**90.4**

"The table shows an overwhelming majority of Respondents prefer the co-management of the fisheries resources, involving collaboration between fishers' organizations and the institutions of government. However, fishers' unwillingness to bring violators to justice, irrespective of their relationship with the culprits, contradicts their desire to play the leadership role in the co-management of the fisheries resources. The elements of equity, fairness and justice without discrimination are critical requirements for leadership positions in any co-management arrangement. These are lessons that should be inculcated in the Resource User Organizations and their leaders through training and education and public awareness building programs."

Attitudes to the Introduction of Alternative Livelihoods

The CRFM community survey in Haiti did not ask any specific questions on the introduction of altenative livelihoods, but they did ask questions on the education and literacy levels of the fishers in their sample.

"*The next Table (2) shows the levels of formal education attained by the respondents of the Community Baseline Survey:*

TABLE 2: ***LEVELS OF EDUCATIONAL ATTAINMENT***		
LEVELS	**NUMBER**	**PERCENTAGE**
No formal education	42 (35%)	94.2 %
Primary School (not completed)	36	
Primary School (completed)	18	
Secondary School (not completed)	17	
Secondary School (completed)	4	5.8%
Tertiary/ Vocational (not completed)	2	
Tertiary/Vocational (completed)	1	
University (not completed)	0	
University (completed)	0	

N = 120

"The data presented in the table mirror the situation in the entire country. Illiteracy and semi-literacy is a common problem. In this case, whilst about 35% of the respondents have not set foot in an educational classroom, about 92.2% on the whole have not obtained a high school diploma.

A similar picture is reflected in the ability of these respondents to read, and presumably, to write as depicted in the following table:

TABLE 3: ***READING ABILITY***		
ABILITY LEVELS	**NUMBER**	**PERCENTAGE**
Read Well	12	**11.76**
Can Manage	18	**17.65**
Read a Little	46	**45.10**
Can't Manage	26	**25.49**

N = 102

"The table shows that about 12% of the fishers claim that they could read well, whilst 18% could just manage to read. We should however take into account that generally rural folks, including those in the fishing communities, who can read actually are literate only in the Creole or Patois, spoken by the 95% Blacks and which is also an official language. This puts them at a disadvantage in deciphering technological and scientific literature. Additionally, over 70% of the respondents admit that they could read only a little or not at all.

"In terms of access to information, it is heartening that an encouraging 56 or almost 50% of 113 respondents claim that they have radio in their homes, although only 5 (4.1%) out of 113 respondents claim to own Television sets in their homes, a far cry from the situation in other Caribbean countries. It would seem that poverty might have a part to play in this situation. In any case, whether those who own radios might use them regularly to access information and not use them just for entertainment must for the mean time remain a moot question, awaiting answers from further research. Generally however, difficulty in accessing information via the mass media might make a Herculean undertaking of the building of awareness of environmental and conservation issues among the fishing population. Yet the most effective means of reaching about 30,000 fishers with persuasive messages on conservation of resources is through the mass media. An issue worthy of inclusion in the agenda of the National Fisheries Workshop is how to develop and popularize a national Fisheries Radio Program that targets and involves the small-scale fishers of Haiti.

"The use of the print media for building community awareness of critical environmental and conservation issues also meets an almost insurmountable impediment by way of the widespread illiteracy rates among the target population. The next table shows the section of the respondent group that avails itself to newspapers.

TABLE 4: *ACCESS TO, AND READING OF NEWSPAPERS*		
Frequency	**Number**	**Percentage**
Daily (6 - 7 days per week)	1	0.91
3 - 5 days a week	1	0.91
1 - 2 days a week	4	3.63
Rarely	24	**21.81**
Never	80	**72.72**

N = 110

"The vast majority of the respondents in the fishing communities (94.53%) either rarely or never access or read newspapers; a function of poverty and illiteracy. On the one hand, access to newspapers is curtailed by illiteracy that inhibits them from making any sense of the information contained in newspapers. On the other hand, poverty and limited technology drives many of the small-scale fishers to struggle for survival by going to fish in the crowded and over-fished inshore waters almost year-round, in order to eke out a meager living for themselves and their households. That leaves little or no time for reading newspapers. Additionally, the small incomes derived form fishing would not be used for purchasing newspapers since it is barely sufficient for the household's survival.

"Difficulty in accessing information could translate into low levels of awareness of the principles and methods of modern sustainable fishing practices and environmental protection ideals. The task of externally induced interventions to effect changes to negative attitudes towards the adoption of positive conservation ethics becomes even more arduous."

CHAPTER 3: PELAGIC FISH RESOURCE MANAGEMENT AND DEVELOPMENT COMPONENT

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

There is no **National Fisheries Policy** for Haiti. There is a draft 1999 Fisheries Management Plan for Haiti, but it was not provided.

Fishery Management Plan (FMP)

Although there is an existing law regarding the regulation of fisheries in Haiti, a fishery management plan (FMP) has not been implemented on exploited-fish populations. However, in 1999 a draft FMP was prepared with the assistance of FAO, but this draft has not been implemented due to lack of funds and other resources needed for implementation (Mateo and Haughton 2003). The main objectives of this FMP were:

- Rehabilitation of degraded habitats;
- Training of fishermen in basic literacy and more advance fisheries training in fisheries assessment and management;
- Fish stock assessment;
- Introduction and use of appropriate fishing gears and equipment.

Mateo and Haughton (2003) pointed out two major problems of the draft FMP:

- It does not involve fishers' organizations;
- It does not take into account the socio-economic situation and local culture.
-

MARNDR's sector development plan published in 2010 point out both potential and necessity of diversification of fisheries through the development of pelagic fisheries. As in many other countries, coastal fisheries resource in Haiti is under heavy overfishing pressure due to the fact that it is easy to access for boats even without engine, and that there is no effective enforcement and monitoring on the fishing activities. On the other hand, offshore resource is practically unexploited. Some FADs have been introduced and proved as effective measure for the promotion of pelagic fisheries in Haiti.

Current Management Policy Strategy

Although regulatory measures, such as closed season for the lobster and conch fisheries, were prescribed in the Fishing Law of 1977 they were never implemented or enforced in practice. Fishers usually do not respect the fisheries laws, or simply do not know of their existence.

As for the pelagic species, it is yet to be developed. It is expected that management policy and strategy are formulated along with the process of the development.

Legislation

The *"Haiti Fishing Law of 1977"* is the major legislation that addresses the development and management of fisheries, and the regulation of fisheries and fishing related activities in Haiti. This Law provides for:

(1) Registering and licensing of fishermen;
(2) Registering and licensing of fishing vessels;
(3) Protecting and preserving marine resources;
(4) Regulating the lobster and conch fisheries by imposing closed seasons;
(5) Restricting the mesh size of fishing nets.

Under this law the Ministry of Agriculture, Natural Resources and Rural Development (MARNDR), is responsible for developing and managing Fisheries. Presently the MARNDR has established a Directorate called "*Direction des Pêches et Aquaculture*" (DPAQ) to administer all fisheries and fishing related activities (CRFM 2009).

Enforcement of Regulations

The government agency charged with the responsibility of enforcing fisheries regulations in Haiti is the DPAQ: this Directorate of the MARNDR is responsible for monitoring, surveillance and enforcement of fisheries regulations.

Level of enforcement

- Regulations exist on paper, but have never been enforced.
- *Problems*:
  - *Limited human and financial resources;*
  - Lack of infrastructure: legal and institutional;
  - Generally enforcement of regulations has not been a priority for any government, compared to other socio-economic issues.

Level of compliance

The level of compliance with fisheries regulations is generally poor.

- Illegal fishing is wide spread in all fisheries;
- Poaching by foreign vessels is very common;
- Fishermen do not typically carry a license; and they usually have poor knowledge on existing regulations.

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

2010 MARNDR sector development plans include development target (shown in table 1), action plan, and rough cost estimation. However, the most of necessary finance seems unclear if it could be secured. The aftermath of earthquake in January 2010 is considered to be affecting fisheries development from the budgetary point of view. The feasibility of the fisheries development will depend heavily on the availability of external finance.

3.3 Fishery and Market Characteristics

FISHERIES CHARACTERISTICS

Exploited Species

Table 3 summarizes the exploitation and the management status of coastal pelagic fisheries in Haiti. Fishing is completely a small-scale artisanal economic activity, in the country. Large pelagics such as wahoo, dolphin, and blackfin tunas are used to be occasionally caught by artisanal fishermen that use fishing lines. King mackerel are commonly caught in the gillnet fishery operating in coastal waters. The introduction of FAD could convert these species into main target species.

The DPAQ typically operates some large vessels that target offshore pelagics for experimental trials and training of fishers and staff. In the 2000s five such vessels were operating in Haiti waters under a Cuban technical assistance project (Mateo and Haughton 2003). There is also a small sport/recreational fishery that target large offshore pelagic, but few people are involved in this fishery. Small coastal pelagic fishes are typically not targeted but are harvested in mixed catches in gillnets or beach seine nets.

Table 3:
Status of Coastal Pelagic Fisheries in Haiti

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

Stock Status

The overall status of large pelagic stocks is uncertain because of their regional dynamics. Further, there are no directed fisheries on these populations, although a few large vessels have been conducting experiment trials toward developing an offshore pelagic fishery. However, results of these trials were not provided for this Baseline Survey. Nevertheless, catches 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 stocks in the eastern Caribbean. This evaluation of the stock assumed wahoo catches to be sustainable in the region (CRFM, 2005). Note that no data were provided by the DFAQ to determine the occurrence of large pelagic species in catches landed in Haiti over the last decade.

MARKET CHARACTERISTICS

Most of the artisanal fishery production is consumed on the local market. Traditionally, a fraction of the catch may be sold directly from the beach, but typically the fishers' wives carry the catches to a local market and sell to consumers. However, high value fishery products such as lobsters, snappers, groupers and tuna-like fish are sold to middlemen that retail them to fish markets, supermarkets and hotels in the major cities. An increasing number of fishers are now selling their catches via cooperatives. From a sub-sample of 2006 fishermen surveyed by a CRFM (2009) multidisciplinary group it was found that nearly 48% of fishers sold their fish to local cooperatives (Table 4). However, it is important to note that this percentage may highly vary as most fishing sites in Haiti do not have a cooperative in place.

In Haiti, as in other countries in general, fish is a protein source less affordable compared with some of poultry products. Moreover, cheap imported seafood, which competes with domestic

fisheries product, is available in Haiti. On the other hand, upper class household should be able to afford the domestic fisheries product and the scale of the market is significant in Haiti, considering its population reaches 10 million. Except high value fisheries products, distribution channel needs a lot of improvement, as current system cannot assure the quality and hygienic safety. For this reason, distribution and marketing would be an important part of fisheries development in Haiti, and the cost benefit analysis of the development should be carefully examined to ensure the economical viability.

The average per capita fish consumption in Haiti is only 2.5 kg (shown in table 1) indicates that fish consumption is not so common and needs promotion and awareness rising. In fact, it is reported in Marigot[7] that large pelagic species have begun to be caught after FADs were introduced, but it has difficulty in marketing because people is not used to them.

Conch and lobsters are among the top species exported by Haiti to foreign markets. However, only a small fraction of the total conch landings is actually exported. Indeed, during the fishing season of 2003-2004 Haiti exported only 21.9 mt of conch (CRFM 2005). In contrast, a sizable fraction of the lobster production is annually exported to foreign markets, mostly to its neighbor the Dominican Republic. From 1997 to 2007 the country exported an average of 111.21 mt of lobster per year. Hence, the annual contribution of lobster exports to the economy of Haiti ranged from $168,000 to $4,254,000 over the last decade (Table 5).

Table 4:
Target Markets of Fish Production in Haiti

Customers	Place	Frequencies
Vendors	Beach / Dock	93
Associations / Cooperatives	At the main office	48
The General Public	Public Market Place / Roadside	39
Private Marketing Companies	At the main office	15
Hotels & Restaurants	At the establishment	11
Total fishermen surveyd		206

Source: Table reproduced from CRFM (2009).

The export of fish products by Haiti so far has been very limited, partly because no regulations have been put in place to control the quality of these products. In the early 2000s, close to eight (8) private processing plants were operating in the country, but with no control from the DFAQ. As a results Haiti was temporarily banned from exporting fish products to the EU and North American Markets until better quality standards were set by government agencies (CRFM 2009).

Table 5:
Level (MT) and value (US$'000) of lobster exported by Haiti, 1997-2007

Fish Product	Year										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Lobster (nei ,Frozen)(MT	144	156	20	12	62	106	130	125	150	140	179
Value (US x $ 1000)	1,194	900	176	168	840	1,645	2,202	2,492	3,543	3,372	4,254

Source: FAO FishSat

[7] Field survey conducted by JICA study team in October 2011. Marigot is one of main landing site in the South-east department

Nevertheless, Haiti remains a major importer of fishery products. The herrings (nei, smoked) and frozen jack and horse mackerel are among the top products imported on the local market. The value of annual imports of herrings (nei, smoked) averaged US$1,521,000 from 1997 to 2007; whereas importation of frozen jack and horse mackerel averaged US$2,586,000 over the same period of time (Table 6). Fishery products from other pelagic species such as sardines and tunas are also imported by Haiti and annual values of their imports are shown in Table 5.

Table 6:
Level (MT) and value (US$'1000) of some fishery products imported by Haiti, 1998-2007

Fish Products		Year									
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Herrings (nei, smoked)	1,192	648	711	314	479	393	504	975	1,841	4,418	5,254
Jack and horse mackerel prepared or preserved, not minced	.	477	-	963	1,206	-	1,115	2,365	2,607	2,509	1,315
Jack and horse mackerel, frozen	3,225	4,891	3,591	2,589	3,015	1,754	1,703	1,956	1,380	1,691	2,653
Mackerel prepared or preserved, not minced, nei	629	1	973	1,014	-	504	1,752	351	612	20	197
Sardines, sardinellas, brisling or sprats, prep. or pres., not minced, nei	87	488	196	88	20	92	8	214	840	56	543
Marine fish nei, prepared or preserved, not minced	-	-	16	134	146	11	251	446	93	4,322	2,516
Marine fish, frozen, nei	-	21	169	153	147	74	86	135	73	187	366
Tunas prepared or preserved, not minced, nei	7	30	71	117	19	58	43	59	54	72	7

Source: FAO FishStat

The Contribution of Fisheries to the Haitian Economy

The fisheries sector makes significant contribution to the economy of Haiti. In 2004 the value of total landings was estimated to be US$30 million, which represented 2.5% of the GDP of the country. Further, any artisanal activity fishing is a subsistence activity, and accounts for a substantial fraction of protein intake by members of the fisher family. Hence, fishing does guarantee some level of food security to this social fraction of the Haitian nation.

3.4 Catch and Effort

Fish catches are mostly landed on beaches around the island. However, fish are sold mostly in open markets located in major cities or towns such as: Port-au-Prince, Luly, St Marc, Gonaives, Mole St Nicolas, Port-de-Paix, Cape-Haitian, Fort-Liberte, Petit-Goave, Roseaux, Dame Marie, Anse-d'Hainault, Les Cayes, Les Anglais, Aquin, Jacmel and Marigot.

Effort Data

According to the MARNDR's sector development plan, more than 50,000 fishermen are involved in the artisanal fisheries, operating in Haiti coastal waters. It was estimated that 80% of these fishermen use fishing as a full time economic activity (CRFM 2005). The number of boats operating in the coastal waters is approximately 6,500 to 7,000. Fishing vessels are usually small wooden boats, which are propelled by oars or by sails. Note that more than 62% (2,152) of these fishing boats operate from beaches on the west and southeastern parts of the island (Mateo and Haughton 2003, CRFM 2005). These non-mechanized fishing vessels may represent 85 to 94% of fishing boats used in Haiti (CRFM 2005), and are mostly confined to fishing in near-shore coastal waters. Indeed, a survey of Haitian boat owners (N=101) showed that 77% of these fishing vessels were below 15 feet (Table 6, CRFM 2009).

Table 6: Size distribution of Canoes owned by Fishermen in Haiti		
Canoe Length	**Frequency**	**Percentage**
Up to 8ft.	7	6.4
8ft. to 15 ft.	79	71.8
15ft. to 20ft.	16	14.5
> 20ft.	8	7.3
# of surveyed fishermen	110	

Source: CRFM (2009)

The following fishing gears are primarily used in the coastal pelagic fisheries:

- The Antillean Z-traps;
- Nets: gillnets, trammel net, cast net, bottom net, beach seine;
- Fishing lines: hook and lines, surface lines, longline, bottom vertical lines, trawling;

The line is one of most common gears used by fishermen in Haiti, because the continental shelf is very narrow and hence these gears are the most suitable for fishing on the deep continental slope (CRFM 2009).

A typical fishing unit may operate from 125-150 hrs per year. The average catch per fishing unit may fluctuate between 3 to 5 kg (Ehrlich et al. 1985 cited by Mateo and Haughton 2003).

Free diving and hookah diving are also commonly used in the lobster and conch fisheries. Further many fishermen use hand lines to fish from the coast without the need of a boat.

Catch Data

Table 7 shows the temporal trends in total landings of marine fish, conch and lobster in Haiti from 1997 to 2007. Average annual landing of marine fish was estimated to be 5,409 mt during this period of time; however no information is available regarding species composition of these catches.

Table 7: Estimated landings (mt)* of marine fish, conch and lobsters, Haiti, 1998-2007

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Marine fish (nei)	4,000	4,000	4,450	4,750	5,100	5,350	5,650	5,700	6,300	7,100	7,100
Conch (nei)	380	350	300	300	300	350	300	300	300	300	300
Lobster	200	200	270	360	480	630	800	950	950	1,000	1,000

Source: *Compiled from FAO FishStat

Estimated landings of conch varied little, ranging from 300-380 mt during the 1997-2007 time period. This is mainly because these numbers are rough estimates, as sampling of the catches is not usually conducted. In this context the DPAQ tends to report the same values from year to year with basically no adjustments in some years. In contrast, landings of lobsters have steadily increased, ranging from 200 mt in 1997 to 1000 mt in 2006 and 2007. Detail breakdown of the catch, such as by species or locality, is not yet available in Haiti due to the insufficient resource and capacity of the DPAQ. This hinders analysis of resource, and decision-making for the resource management measures.

Technology Improvement & Extension Programs

In recent years the DPAQ has been trying to develop fisheries research projects, aiming to improve fishing technology and production, particularly by developing methods to exploit the large pelagic species in the offshore waters of Haiti. The DPAQ seeks generally to continue or develop projects research such as:

- **Data Collection Program from FADs**
  - **Goal:**
    - Build a strong and reliable program of fishery and biological data collection and analysis for long term monitoring and management of fishing exploitation around FADs moored in offshore waters of Haiti.
  - **Immediate Objectives**
    - Collect fishery data, i.e. catch and effort data around two FADs moored offshore in each of these four fishing sites:
      - Fort-liberty;
      - Grand-Goave;
      - Anse d'Hainault;
      - Bell-Anse.
  - **Short term Objectives**
    - Expand data collection to target FADs located in other parts of the country, after one year of experimental trials.
  - **Long term Objectives**
    - Establish a permanent system of data collection, processing and dissemination for the sustainable management and development of pelagic fisheries in Haiti.
  - **Rationale:**
    - In 2005-2006 the Fund for Social and Economic Assistance (FSEA) and the International Bank of Development (IBD) provided substantial financial support to the MARNDR for the development of several FADs offshore Fort-Liberty, Grand-Goave, Anse d'Hainault, and Belle-Anse. There is presently anecdotal evidence that productivity of fishing activity has tremendously increased around the FADs. However, due to lack of funds and limited human resources the MARNDR has not been able to monitor and evaluate fishing productivity around the FADs, and the overall impact of these devices on the economy of these fishing locations. Hence, it important to establish a well-designed sampling program to study fishing exploitation around the FADs, while determining to what extent FADs should be developed in other fishing locations of the country.
  - **Funding:** The DFAQ is still seeking funds to realize this program. As Haiti is perhaps one of the rare countries where the off shore pelagic resources are still practically untapped, this "FAD Data Collection and Monitoring Program" would be a good candidate pilot studies to be supported and financed in the context of this Baseline Survey.

Extension Programs

The DFAQ has also a long tradition of reaching out to small-scale fishermen via extension programs, dating back to the mid 1980s. However, little government financial support has generally reduced the effectiveness of these programs. According to the CRFM multi-disciplinary survey (CRFM 2009) the main areas of intervention of these programs have been:

- Monitoring of adherence to regulations e.g. habitat protection, mesh sizes for nets and traps and closed seasons for lobsters and conch.
- Training and Education of fishers for institutional strengthening and capacity building.
- Functioning as intermediaries between government and fishers associations.
- Information dissemination and public awareness building.
- Cultivating appropriate social and working relations with the fishers.

However, in recent years the role of the DPAQ is being progressively reduced as various NGOs are now involved in developing independent extension programs toward strengthening fishermen organizations and cooperatives. Through the field survey and discussion with DPAQ, it was learned that NGOs tend to focus on short-term incentives with which fishers and fish farmers can continue their activity, but not on long-term incentives. As a result, they tend to provide all or part of the cost in-kind such as boats, nets, fingerlings, feed, marketing of the products etc, but not establishing economic viability, which is essential for long term and sustainable development. DPAQ is aware of this problem but limited resource and capacity make them impotent for the action. External assistance should incorporate organizational strengthening component for DPAQ, so that DPAQ become capable of formulating extension policy and guideline, and coordinating the extension among different stakeholders.

Technical and Research Capabilities

The DFAQ has a team of qualified and experienced staff. In 2001 there were 22 individuals, with 11 having an undergraduate degree and 6 a master's degree (CRFM 2009). The staff occasionally conducts applied research toward the development of fishing technology and production in Haiti, with the assistance of various international organizations, such as FAO, BID, USAID, JICA etc. Over the past decade the Fisheries Division has received solid aid in applied-research from Cuba. Indeed, in 2003, five large vessels were involved in offshore fishing trials under a Cuban assistance project. However, the functions of the DFAQ are generally geared toward providing advice to the private sector, handling of administrative files and matters, and occasionally, feeble attempts to enforce existing fisheries legislation without much success (CRFM 2009).

The Fisheries Division does not have any facilities to conduct basic biological and fisheries research. However, most of the staff of the Department has received their Bachelor degree from the Faculty of Agronomy and Veterinary Medicine (FAVM), an undergraduate-level institution and thus has several laboratories to conduct basic biological research. Further, as the FAVM operates under both the jurisdiction of the State University of Haiti and the MARNDR. It is usually seen as the academic branch of the MARNDR and therefore the Fisheries Division.

Nevertheless several problems limit technical and research capabilities of the DFAQ:

- Fisheries research is not a top priority of the government of Haiti. The government often tends to focus more on fish production rather than on the understanding of the dynamics of exploited- fish populations so that they can be better managed;
- Operation of the MARNDR is project-oriented and thus it is not conducive to long term applied research in fisheries stock assessment and management;
- The Fisheries Division has limited financial and material resources. Note that in the past two decades many international agencies have progressively shifted their aid from government agencies to non-governmental organizations, consulting firms, and academic and research institutions (CRFM 2009);
- The absence of a national policy framework and management strategy to guide the overall operation of the DFAQ. A multi-disciplinary survey conducted by CRFM (2009)

found that there was lack of consensus among the top staff on capacity building priorities, with the greatest tension four subject areas: Stock Assessment, Data Management, Community Participation and Education and Fisheries (Co-) Management.

Nevertheless any serious plan to develop and manage off shore pelagic fisheries in Haiti will need:

- More sustainable financing; in particular the DFAQ should seek 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 will be warranted;
- Funds for improving data collection and analysis of biological and fishery data ;
- Develop stronger research collaboration with CARICOM States and other countries toward the assessment of regional pelagic stocks;
- Funds to conduct a study on cost and productivity of fishing production;
- Funds to conduct socio-economic surveys.

CHAPTER 4: AQUACULTURE DEVELOPMENT COMPONENT

4.1 Policy, Supporting Legislation, Development Plans

Policy and Supporting Legislation

MARNDR sector development plans see that in view of the unsustainable condition of the fish stocks in the near-shore marine fisheries, there is need to focus more on the development of aquaculture. There also is an expectation that fishers can be introduced to small scale aquaculture activity as a means of diversification of lively hoods and reduction of pressure on already threatened fish stocks.

The development target is set at ambitious 25,000 MT/year of national aquaculture production in 10 years, compared with 400 MT/year of estimated current production level (shown in table 1).

The development plans sets out number of government interventions for the aquaculture development with estimated cost necessary for the implementation.

Food security

In Haiti a survey of household consumption patterns suggests that some 3.8 million (58%) Haitians fall below the recommended minimum daily food intake of 2,240 Kcal/day indicating that this sector of the population is below the poverty line and face grave threats to continued food security.

The malnutrition is one of the most serious consequences of this food insecurity. The contribution of animal protein and fish to the food security is at present very weak with the average annual per capita consumption estimated at 4.2 Kg/person/yr.

In this regard and despite an ineffective regulatory framework and investment climate in Haiti the DPAQ in the past and certainly at present would welcome and encourage all projects inclusive of aquaculture which will contribute positively to the reduction in poverty, increased food security and increase dietary protein and food intake.

To this end there have been various interventions in the past however the sustainability of same has been thwarted by the political instability and civil unrest.

4.2 Aquaculture Development Status regarding Stated Policy Goals and Development Objectives

The development target is quite ambitious and will need significant amount of both economical and technical input. However, considering the DPAQ and Haitian government is not capable of securing enough resource without external assistance, the necessary cost is most likely not to be financed hence development target cannot met. Currently DPAQ, the department in charge of aquaculture development within MARDNR, suffers from a lack of basic administrative facilities and institutional capabilities. Its technical staff compares favorably with any in the Caribbean region but there is an acute shortage of material resources for them to utilize in their operations. Therefore support for the sector is primarily provided by NGOs and church /humanitarian efforts

at the community level but their activities are not necessarily coherent with government policy[8]. To achieve the development objective, DPAQ has to be strengthened but also DPAQ's capability of coordinating with donors and NGOs so that their better contribute better for the development objectives of the government.

4.3 Aquaculture and Market Characteristics

Current level of production estimated as 400 MT/year is quite small compared with the Haitian population. Hence farmed fish is normally consumed within or near the community and practically unknown among the general consumer. On the other hand, cheap imported tilapia and seafood is available on the market in Haiti. The aquaculture production cost depends heavily on the feed cost, which is not cheap in Haiti[9]. Utilization of locally available feed could reduce the feed cost to some extent but careful examination of production cost, marketing strategy, and consumer awareness rising for domestic aquaculture product should be undertaken if its production is to be expanded as in the development target and marketed among general public.

4.4 Current Levels of Aquaculture Production by Species

Several attempts over the past 4 decades to culture various species to include the following

- Tilapia
- Carps Common
- *Pangasius Spp*
- *Cassostrea Spp*
- Spirulina
- *Gracilaria*
- Eels
- *Macrobrachium Spp*.

After many failed attempts the main species current been produced are tilapia with carps and catfish being cultivated to a lesser extent.

There is a small-scale research trial into spirulina and eel production. To date tilapia still offers the most promise and efforts are centered on Tilapia culture in above ground recirculation tanks, earthen ponds, natural lakes and cages in lakes.

The recent introduction of *pangasius* species and the development of seed production technology through induced spawning offer opportunities to increased diversification. Demonstrated grow-out methods, market acceptance and environment issues are yet to be addressed. At present the DPAQ is reluctant to allow the free distribution of *pangasius* given environment concerns. The belief of the government that the fish is a predator and the possible impact it will wave on the current productivity of natural water bodies and water ways is the source of discontent.

MARNDR estimates put current aquaculture production at approximately 400MT per annum, of which further break downs as to species contribution, production methodologies and area of production are nonexistent. Several reports point to activities, initiatives pre date 2006 and simply report on past attempts however no actual field survey is done to determine what exists today. What is also lacking in the various reports is financial sensitivity analysis that seeks to

[8] Refer to "Extension Program" in sub-chapter 3.4 - Chapter 3

[9] The imported pellet is used in Haiti. Field survey revealed that feed cost to raise 1pound of tilapia is approximately 0.9 USD.

make an assessment on the profitability of tilapia aquaculture utilizing differing production technologies.

4.5 Knowledge on Aquaculture Issues by Category

Fresh water – Extensive

· Extensive Stocking of Natural and manmade Lakes and Pond

The total area of inland waters is estimated at about 22,700 ha 69% of which consists of three major lakes include:

- Lake Azuei 11,300 ha

-Lake Peligre 2,750 ha

-Lake Miragoane 1,130 ha

-31 rivers more or less permanent representative about 6.820 ha

-Small water bodies 2.770 ha. To this we must add the

-Hill side lakes Artibonite, Central Plateau and the North East 90 ha

Lake stocking / extensive aquaculture was done to improve the yield from the lakes and efforts date back to the early 1950's where lakes were stocked with tilapia and carp fingerlings. In subsequent years stocking were not systematic and there was no orderly management or development of the resource, However through the cooperation with the Cuban Government this program of lake stocking has resumed and since 2010 there has been a systematic approach to the stocking of lakes.

The increased productivity of the lake benefitting from restocking has been demonstrated ; For example between April 30, 1997 to November 30, 1999, Lake Azuei received eight stocking (total number of fry introduced: 418.256), while from 2000 to 2008, it received only three stocking with a total number stocked less than 200,000. Meanwhile, in 1999, Lake Azuei produced an average of 140 tons of fish while in 2006 it produced less than 45 tonnes.

Further analysis of carrying capacities, productivity and sustainable yields need to be determined to optimize this approach whilst preserving the environment integrity. Lake stocking need to be subject to greater control as information gathered is that fingerlings are subject to fishing pressure immediately after the lakes are stocked. To determine the effectiveness and full potential of lake stocking program a proper demonstration needs to be conducted.

Fresh water – Semi intensive

Several projects utilizing the semi intensive method of production are reported to exist across the country, however only one such project was observed and the farmed appeared to be underutilized. Some of the reported projects are:

(2005-2007) Integrated fish farming project of the Canadian Cooperation in the Central Department

-This project is an integrated farming project incorporating fruit, vegetable and poultry crops. 28 family units are utilizing 4 ponds. It benefited from the demonstration of tilapia and carp production, yields as high as 4 t / ha / year were realized. The main problems identified development of this type of actions have been

- the difficulties to identify the beneficiaries,
- the quality of soil for water retention,
- difficult access and communication
- Poor supply of fingerlings in the project cycle.

The above mentioned problems seem to symptomatic of inadequate project development.

(2002-2004)FAO project to promote small-scale aquaculture Departments in the South and Artibonite utilizing an integrated approach

-This project has been developed within the activities of the Programme of FAO's Food Security (Special Programme for Food Security, SPFS) and has two components, aquaculture and production poultry. Measurable outputs of the project are the construction of 63, 150 m2 earthen ponds. Ponds are gravity filled from the adjacent irrigation. Nile tilapia and common carp stocked at 2- 4 fingerlings /m2 and fed on a diet of locally produced rice bran and generated yields of 70-80 Kg/pond/year.

-This project generated great enthusiasm among the beneficiaries and the good results obtained have led to the launching of new initiatives.

(Phase I, 2005-2006) FAO project funded by the Organization of Petroleum Exporting Countries (OPEC) in the South and Artibonite Department

-This project was an extension of the previous project and also had two components, aquaculture and poultry production. 56 ponds 150 m2 ponds were constructed. Nile tilapia and common carp stocked at a density of 1-2 fingerlings/m2, crop cycle of 6-8 months, fed locally available farm by products (rice bran, corn, sorghum and cattle blood) in processing units installed in each area.

-To ensure the supply of fingerlings hatchery in Les Cayes was rehabilitated and fingerlings sold to .0085 $ US / unit. As in previous project, the benefits of this culture system have shown very clearly the potential success and profitability of aquaculture integrated farming systems to this end another project was proposed with the following objectives

- Reconstruction of production units established
- Strengthening capacities for construction of ponds for local farmers, extension workers and technicians
- Conduct a thorough analysis of production data

- Establishment of a National Plan for sustainable development of aquaculture and poultry production

Fresh water – Intensive

Tanks/Cages

In Haiti, intensive aquaculture is developed within the scope of some projects primarily funded by NGO's and international donor agencies. The high capital cost and the high cost of inputs feed and energy puts these projects raise questions as to the sustainability of these ventures.

Reported intensive tilapia farming projects are as follows.

(2006-2010) French cooperation: "Project economic and social development of the lake Azuey (PRODESELA)"

-This project represents a strange marriage between the Government private sector and a NGO. This project is developed by a partnership between the (MARNDR), the private company Caribbean Harvest and the NGO Groupe pour l'Assitance aux Et pour la Petite Potiers Hydraulique (GATAPHY).

-This project has two components namely, aquaculture production and social integration of 248 inhabitants representative of (42 improvrished families) around lAke Azuei .

-Tilapia fingerlings are produced at the Caribbean harvest hatchery located at Croix-des-Bouquets. The hatchery is designed to produce (2.5 million fry / year). However at the time of field visit the facility appeared to be grossly underutilized with the operators pointing to the lack and high cost of electricity as a major obstacle.

-Fingerlings produced at the facility are stocked in cages, the fish produced is sold and a target of 50% of these benefits from this sale is slated to go to the purchase of feed and maintenance of facilities. The other 50% is reinvested in the population through purchase of potable water, medical care, schooling and social assistance. At the time of our visit we did see a clinic under a tent however the level of cage activity is not sufficient to alter the livelihoods of the people living there. Interestingly there more cages on land that were in disrepair than that in production indicating that there are some obstacles in the way of the development plan.

-Current status and projected expansion targets of the cage culture component of this project were not forth coming however anecdotal information suggests there have been some setbacks primarily due to

- Poor cage construction
- Fish kill in the lake
- Logistical issues surrounding issue of feed management.

(2006-2010) Project to install raceways and drinking water conveyance Boix Petit

This project, funded by the French cooperation consists of two components namely growing fish in aqueducts to supply water to 3 nearby villages.

(2009 – Present) Food for the Poor ICDF Project

This project is twofold it seeks to improve livelihoods in poor rural area through he introduction of aquaculture technology. At the time of this survey two activities were observed

1) Cage culture of tilapia in Lake Miragone, where 15 floating cages 4 m3 stocked at 1600 fish per cage were deployed. Technical feasibility was demonstrated as farmers have been able to harvest marketable fish from cages. More work need to be done to determine the following

- Seasonal effects on optimal stocking densities and profitability
- Determination of carrying capacity of the lake.
- Develop a model for lake management and rules governing cage culture in same.
- Demonstrate profitability to participants and introduce and create an investment scheme that will allow for the financial sustainability of the project.
- Market development
- Improved cage design

2) Development of a *pangasius* hatchery and grow out system.

The technical feasibility has been realized however much more work is required to establish a sustainable farming approach for the species given its recent introduction to the system

This survey did not allow for a quantitative analysis of the number, distribution and categorization of farms however MARNDR sources suggest that the total installed capacity at the end of the 1990's stood at 642 Ha with only 469 hectares being in production at the time. This installed productive capacity was rapidly eroded with the political instability of the early 2000s, and by 2006, the area in production did not exceed 20 ha. In 2008 after the passage of tropical storms and hurricanes, harvested areas were further reduced.

It would be worthwhile to catalog all the current aquaculture sites and to develop a geo spatial map of all the existing facilities along with a determination of areas suitable for future development. Care must be taken in generating the spatial mapping or zoning plan as in the past several projects have failed due to poor site selection. An integrated planning approach here is critical as in addition to soil type, access to irrigation water disaster risk management, proximity to market, environment sustainability and infrastructure are all issues that must be factored in determining the cost benefits to convert lands to aquaculture development. Such a zoning plan would be a valuable tool to guide the proposed aquaculture development plans in Haiti.

Marine and coastal aquaculture

Haiti's coastal region has numerous protected embayments which would offer a protected environment for cage culture. In a "1987Caribbean Marine Research Centre (CMRC)" study to assess the social, economic, and cultural considerations for saltwater cage culture of Florida Red tilapia in North Western Haiti by (Brass et al.) it was determined that several differences between the work styles and economic structure of capture fishing and mariculture were identified and that same would make the transition from fisher to farmer a challenging one. The lack of differed gratification and related spending pattern are seen as the key socio economic factor that would inhibit the transition and that other occupational groups (FARMERS) would be more suitable in this regard, however other issues would surface.

Rust et all 1991 through the CMRC attempted to assess the Environmental Potential for Saltwater cage Culture of Florida Red Tilapia along the Northeast Coast of Haiti found that all sites investigated then were suitable(environmental parameters and shelter) for tilapia culture, however cage trials being conducted were required to before firm conclusions could be drawn.

There are reports of marine tilapia cage culture activity in the North in Fort Libertie however the team was not able to substantiate this information

There are reports of marine shrimp *Litopenaeus vannamaei* farming in the north central region of the Southern peninsula; however in the absence of a site visit or any mention in the literature team were unable to determine the exact scale of operations. Attempts to farm shrimp in the north east in the early 1980's proved unsuccessful due to poor site selection.

The possibilities for sea moss culture, oyster culture integrated into a mangrove replanting program within designated sanctuaries offers exciting prospects for creation of alternative lively hood and habitat replenishment. Such efforts however will require the market intelligence and an appropriate legislative framework.

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

One of the main threats to the development of small-scale aquaculture is due to the low profitability, limited productive capacity (small size of ponds) which by extension lends itself to low profitability/ low motivation. In addition the lack of formal land holdings excludes the small farmer from meeting the collateral requirements of financial institutions.

Aquaculture is considered a high risk area. Faced with the socio-political instability, investors tend to move to other areas with less risk notably the distributive trade, where the return on investment is much faster. It must be mentioned that several stakeholders cite the disregard for or lack of legislation and inadequate security as deterrents to investment in the sector. The effects of the absence of any regulatory framework are further compounded by infrastructure constraints i.e. poor roads unreliable to no electricity supply.

In recognition of the fact that coastal resources are fully exploited then additional fish protein intake can only be met through imports, inland fisheries and aquaculture. Within the context of the Haitian economy the existent natural resource base the development of aquaculture is seen as an investment area that would serve to boost local agricultural production, create jobs and contribute positively to food security

With all this said the real opportunity depends heavily on the production of fish that is competitively priced with other meat and fish protein sources which are produced locally or imported. Information from Food for the Poor and Caribbean Harvest put the cost of production of tilapia at around US$0.90/Lb. On the other hand, there is information that the average price of imported fish is USD1.0/kg (shown in the table 1). Considerable effort should be done to reduce the cost of domestic aquaculture production or to promote it as better product over cheap imported products.

There are at least two feed mills within the Port Au Prince area that currently produce animal feeds utilizing imported ingredients. The feed is a sinking pelletized ration, and is not considered to be nutritionally complete given the low levels of fish meal and oils within the ingredients. The locally produced feed is at present only suitable for extensive production in ponds. Feed requirement for cage and tank culture systems are more intensive and require nutritionally complete diets. The majority of the feed that is used is imported from the USA and represents excellent formulations. The available crude protein content of these diets, range from 45% to 30%, with the available cost to farmers being in the range of US$ 45/ 50lb bag to US$22/40Lb respectively.

Seed production in Haiti's aquaculture sector can be characterized as experimental, even though there has been demonstrated technical capacity to produce seed stock from the main fresh water cultured species. Any direction to increase production whether through lake stocking, pond or cage culture will require considerably investment in expansion of hatchery facilities. As an example of appropriate lake stocking, production and management program in Lake Miragoane (4800Ha) would require a hatchery with a capacity to produce 4 million 15g mono-sex tilapia fingerlings per annum. However, there is no facility equipped to do so.

Given the poor road infrastructure and the geographic distance between the different proposed centers of productions (South, central Region and North) single large scale hatchery should not be attempted and may be 3 centers of seed production and demonstration would be more appropriate. Such a demonstration facilities unlike in the past should focus on the transfer of technology and the demonstration of profitability to the private sector so that they can accelerate the aquaculture development with the investment.
Hatchery design should be multipurpose, utilizing appropriate technologies, given the existing limitations with the local electricity supply and capacity of the workforce.

4.7 Technical and Research Capabilities of Fisheries

There are two main academic centers which offer theoretical courses on aquaculture. The University Our Lady of Haiti and The Episcopal University of Haiti. Though both have expertise in oceanography and in aquaculture, none possess suitable infrastructure for research.

There are 8 officers assigned to the aquaculture unit and plans exist to expand the staffing position in the near future. However limited governmental attention to the fisheries sector is reflected in the absence of budgetary allocations for the administration of the sector, inadequate institutional framework and management of aquaculture activity.

CHAPTER 5: REGIONAL FISHERIES DATABASE DEVELOPMENT COMPONENT

5.1 Policy and Data Management Documents

The articles 8-39 of the decree published in 1978 define fishers' provision of data as necessary obligation for governmental institution to take fisheries management measures[10]. Considering the limited resource and capacity of the government, utilizing fishers as information source seems practical option.

5.2 Data Collection – Current Situation

In a 2003 FAO Report of the CFU/FAO Fisheries Statistics and Data Management Workshop, it was stated that:

> "*There is no regular data collection programme in place. Data are only collected from the registration of the amount of marine products to be exported. In order to improve on this situation, a data collection program is now being developed with assistance from the CARICOM Fisheries Unit (CFU). The aim of this programme is to undertake a census of the marine fishery to assist in the design of a comprehensive sampling programme for Haiti, in order to facilitate decisions regarding fisheries management and development. The improvement of the system will require substantial efforts from the Government, with support from regional and international organizations."*

In southeast coast, there is a data collection system in plance wih financial support from Spanish government. However at national level, not much progress seems to have been made on the data collection issues and regular data collection is not undertaken except exportation. Many data is taken from the results of surveys and studies sporadically done by donors or NGOs.

5.3 Data Management – Current Situation

Since data is not sufficiently collected, data management is done with limited scale.

5.4 Information Dissemination

.Since data is not sufficiently collected, data dissemination is done with limited scale.

5.5 Gaps in the Capacity for Management of Fisheries Information Systems

Limited resource and capacity of government authority make the data collection and management very challenging task in Haiti. It would be quite difficult to establish its own system to collect, stock, and analyze data for fisheries management in the near future. For this reasons, it seems important in the short term to promote cooperation with other stakeholders such as NGO, donors, and private sectors to obtain the necessary data while strengthening the DPAQ at the same time.

[10] 83p, Diagnóstico del Sector de la Pesca y la Acuicultura en Haití – 2008, Xunta de Galicia

6. RESULT OF THE BASELINE WORKSHOP

6.1. Output from workshop with the staff of DPAQ

PCM and ID/OS workshop were held on 12th and 13th of October 2011, in a conference room of the DPAQ. PCM workshop was held separately for marine fisheries and aquaculture.

Problem Analysis

The problem analysis was done to understand major issues for the sustainable development of marine fisheries. Low income was pointed out as core problem, and further analysis revealed that

- Government is incapable of taking appropriate resource management measures such as monitoring and enforcement of the regulation, data collection
- Fishing gears and equipment is not readily available and its price is high
- Destruction of the ecosystem is undermining the fisheries resource
- Competition with cheap imported seafood
- Lack of proper distribution and marketing system (reduced quality and spoilage as a result)
- Coastal fisheries resource is overexploited

Same as marine fisheries, low income was pointed out as the core problem for the sustainable aquaculture development. Further analysis revealed the causes of core problem including the followings

- Poor infrastructure and electricity problem (high cost and frequent power cut)
- Poor availability of credit
- Poor availability of fingerlings
- High cost of production
- Underdeveloped marketing and distribution system
- Political instability

ID/OS Analysis

The ID/OS method was applied for the analysis of DPAQ with basic question "how DPAQ can improve the sustainable management and development of the fisheries sector in Haiti?".

External Factors to Fisheries Department	
Opportunities	Threats
• Market for the fish exists • There is technical and financial support of NGO • There is financial assistance from donor • Foreign expert come for the mission • Fishers association is strengthening	• Influence from politician • Staff leave job for low salary, and find other job in oversea or NGO • Better intervention of state for the fishers is necessary • Foreign donors assistance is utilized according to their own interest • Foreign expert is not always capable
Internal Factors of Fisheries Department	
Strengths	Weaknesses
• Staff capable of multi-disciplinary task • Stable employment • On-going training opportunity	• The budget is not enough (60% depends on donors) • Insufficient material and equipment • Absence of carrier development plan • Administrative procedure takes long time

6.2. Output from workshop with local fishers

The workshop with local fishers was held at Jackmel on 19th October and Cayes Jackmel on 20th October.

Summary of the Community

Typically individual fishers do not have engine and their fishing activities are limited within near shore, using simple fishing gears such as hand line, trap, beach seine etc. Fish is landed locally or to Marigot, the main landing site in the Southeast department. The landing is sold and consumed in the local market except high value fish, which traders buy and distribute to high-end market in Port-au-Prince such as hotels and restaurants.

There is fishers association in each community, and each fishers association has one boat and engine donated by Spanish cooperation. There are 2 DPAQ officers in charge of the Spanish cooperation project and working with the community.

Present Status of the Local Fishery

Small boat without engine has confined and concentrated fishing effort on near shore. However, due to the increasing number of fishers, lack of enforcement and monitoring on the fishing activity, and also possibly pollutions stemmed from sediment runoff from deforested land, coastal fisheries resource is overexploited.

Spanish cooperation has installed FAD around 5-10 miles from the community in an effort to divert some of fishing effort onto the offshore large pelagic, which has been practically untapped. The fishing around the FAD is making good yield of large pelagic species such as dorado, tuna, wahoo etc. However, these newly introduced large pelagic species has low acceptance in the local market. Coupled with the poor storage and distribution system and insufficient facility and demand for the processing product, it has problem in marketing and some sold at very low price or discarded because of spoilage.

Conch and lobster has closed season according to the law, but it is not respected or some fishers even do not know the existence of such regulation.

Needs of Local Fishers

Facility and equipment

- Number of boats and engines is not enough
- Number of FAD is not enough
- There is no fishing gear shop in the community
- Landing facility is necessary

Skills and training

- Training on post-harvest treatment and marketing of fish is necessary
- Training on fish conservation and processing is necessary
- Training on marketing of large pelagic caught on FAD is necessary

Law and enforcement

- Regulation should be placed to prohibit the small fish catch
- Conflict between Haitian and Dominican Republic fishers has to be resolved.
- Fishers need to be registered
- Statistical data should be collected

Others

- Access to credit needs to be improved for fishers and fish traders
- Alphabetization for fishers and traders is necessary

Insurance for fishers is necessary

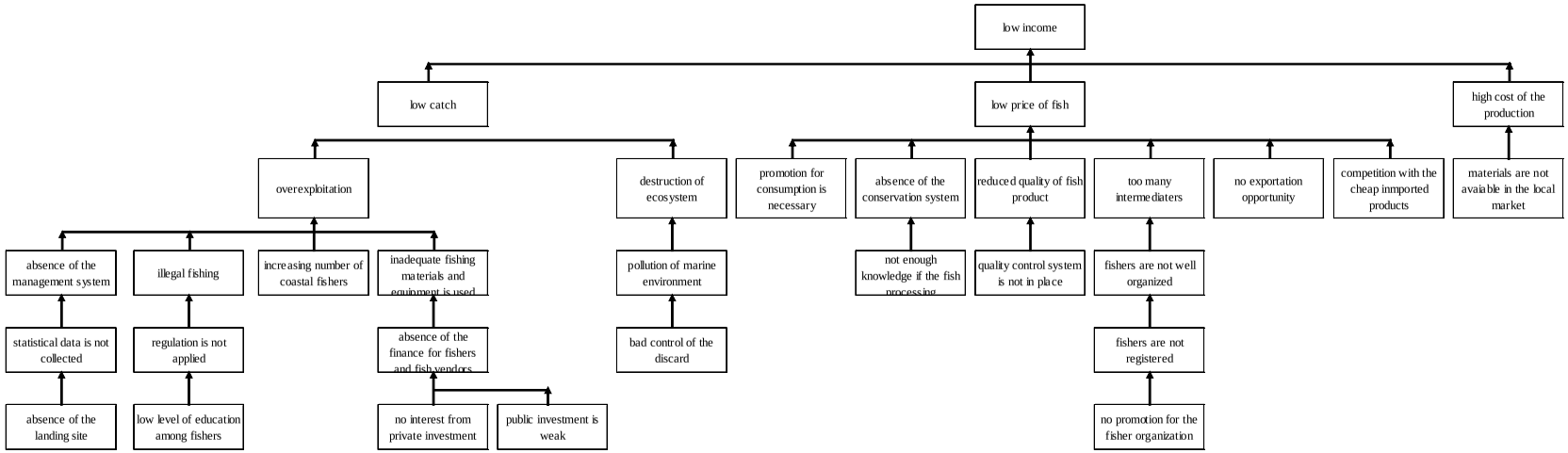
6.3. Key issues identified for the coastal resources management in the workshop

The coastal resource is not properly managed and depleted. With limited resource and capacity, DPAQ is incapable of not only taking effective measures to mitigate the situation but also providing basic services such as statistical data collection and management, enforcement and monitoring of fisheries regulation.

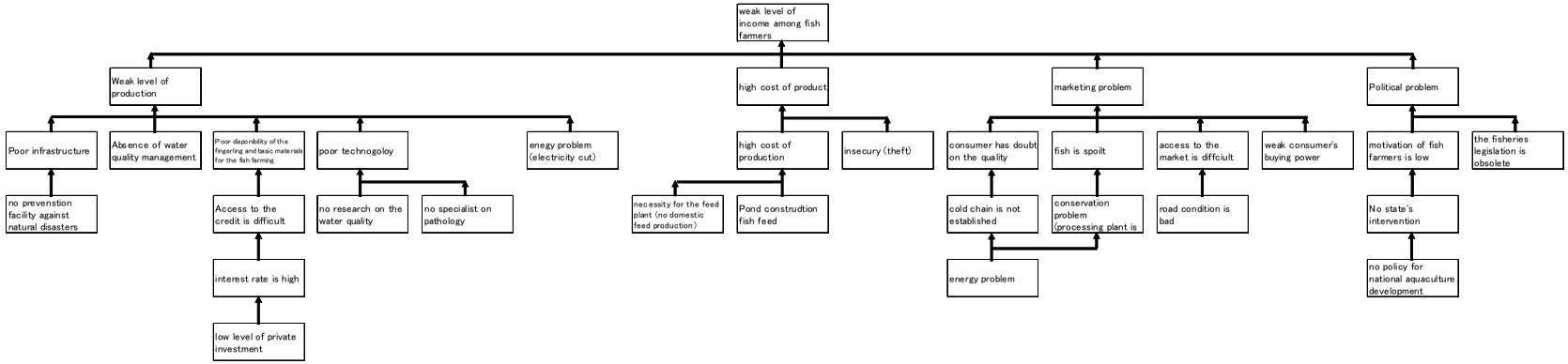
Haiti has large water body suitable for the aquaculture development. Small scale aquaculture development could bring an alternative income for them. For this to happen, the profitability of each process of aquaculture, namely the production including fingerlings and grow-out, processing, marketing and distribution has to be demonstrated so that potential stakeholders get interested in working or investing in the sector.

As for the capture fisheries, offshore pelagic fisheries development is under way. If proper fishing boat, engine, and gears are provided, and processing, distribution and marketing for the product is developed, offshore pelagic fisheries development has potential to generate an alternative income for the fishers thereby mitigate the overexploitation of coastal resource.

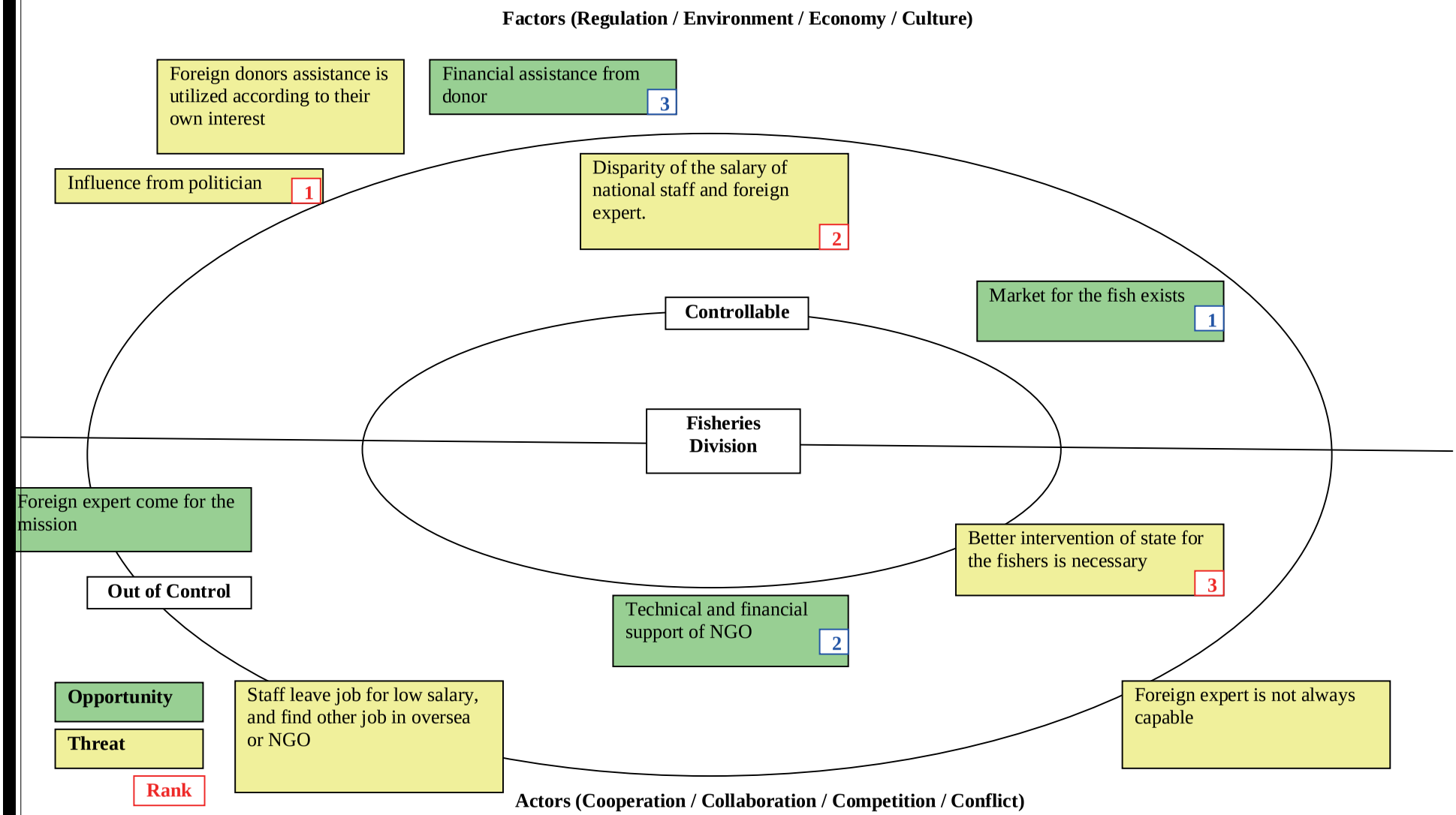
RESULT OF THE PCM WORKSHOP (Fishery)



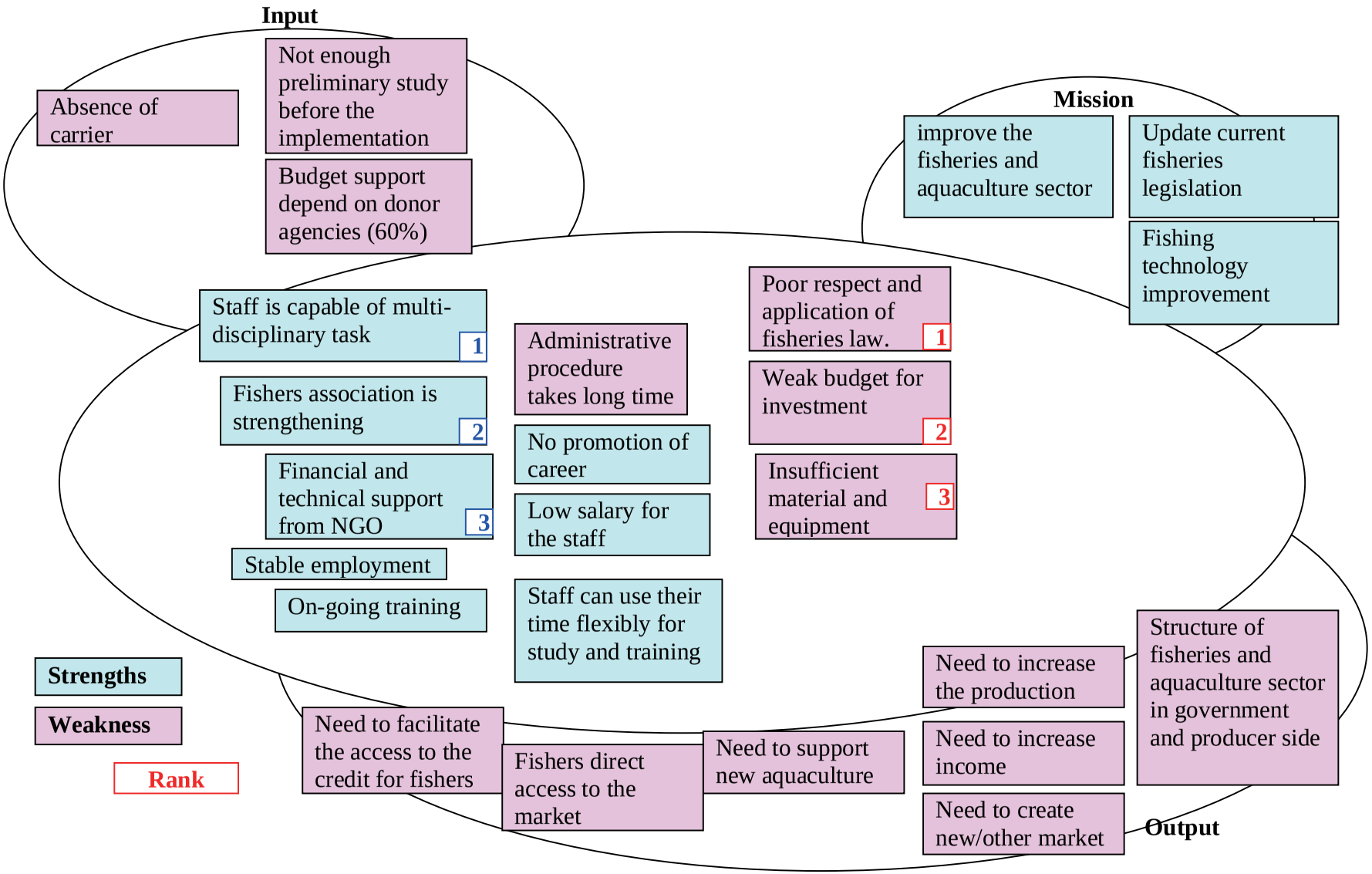
RESULT OF THE PCM WORKSHOP (Aquaculture)



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: JAMAICA

October 2009

Jamaica

Country Profile

Geographic coordinates	18^o 15' N, 77^o 30' W
Total area	10,991 sq km
Land area	10,831 sq km
Water area	160 sq km
Length of Coastline	895 km
Shelf Area	5,609 sq km
Territorial Sea	15,973 sq km
Claimed EEZ	234,780 sq km
Highest point (m)	2,256 m (Blue Mountain Peak)
Climate	tropical; hot, humid; temperate interior
Natural hazards	hurricanes (especially July to November)
Population	2,825,928 (July 2009 est.)
Annual Population Growth Rate	0.755% (2009 est.)
Life Expectancy at birth	total population: 73.53 years
Languages	English, English patois
Ethnic Mix	black 91.2%, mixed 6.2%, other or unknown 2.6% (2001 census)
Work force	1.304 million (2008 est.)
Unemployment	11% (2008 est.)
GDP (PPP)	$24.04 billion (2008 est.)
GDP Growth rate	-0.6% (2008 est.)
GDP per Capita (PPP)	$8,600 (2008 est.)
Currency Unit	Jamaican dollars (JMD); US$1 = J$90
Area of Mangrove Forests	86 sq km
Percent of Mangrove Forests Protected	11%
Per Capita Food Supply from Fish/Fishery Products (2000)	28 kg/person
Exports	$2.602 billion (2008 est.); alumina, bauxite, sugar, rum, coffee, yams, beverages, chemicals, wearing apparel, mineral fuels

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

Abbreviations and Acronyms

CARICOM	Caribbean Community
CARIFIS	Caribbean Fisheries Information System
C-CAM	Caribbean Coastal Area Management Foundation
CFO	Chief Fisheries Officer
CFRAMP	CARICOM Fisheries Resource Assessment and Management Programme
CRFM	CARICOM Regional Fisheries Mechanism
EU	European Union
FAO	Food & Agriculture Organization of the United Nations
FAC	Fisheries Advisory Board
FD	Fisheries Division
FIS	Fisheries Information System
FMP	Fisheries Management Plan
GEF	Global Environmental Facility
GOJ	Government of Jamaica
IHHN	Hypodermal Hematopoietic Necrosis
JFCU	Jamaica Fishermen's Co-operative Union
JICA	Japan International Co-operation Agency
JNFP	Jamaica Draft National Fisheries Policy
MAFF	Ministry of Agriculture, and Fisheries
MPA	Marine Protected Area
mt	Metric Ton
nei	Not elsewhere included
nm	Nautical Mile
NRCA	Natural Resources Conservation Authority
OECS	Organization of Eastern Caribbean States
PBFMC	Portland Bight Fisheries Management Council
PBPA	Portland Bight Protected Area
TIP	Trip Interview Program
TSV	Taura Syndrome Virus
UNDP	United Nations Development Program
UWI	The University of the West Indies

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CHAPTER 1: INTRODUCTION

Jamaica is an archipelagic state consisting of over sixty (60) islands and cays, of which five (5) are inhabited and serve as important bases for fishing. Jamaica's territorial fishing grounds may be considered under four headings (see Figure 1 overleaf): The **North Shelf** of the main island (an intensely fished strip never wider than 1 km), the **South Shelf** of the main island (at its widest 11 km from Portland Point), the **Inshore Banks** (, including Albatross, Blossom, California, Dingle, Formigas, Grappler, Henry Holmes, Kingston, Lamotte's, Mackerel, New, Norseman's, Sunbury and Walton Banks) and the **Offshore Banks** (the Pedro Bank and the Morant Bank, each with two coral cays inhabited by fishers). Jamaican fishers also have access to the Jamaica-Columbia Joint Regime Area which includes the **Alice Shoal** and some portions of Baja Nueva, and Seranilla Banks.

Jamaica's coastal waters are the most overfished in the English-speaking Caribbean, and probably rank among the most overfished in the world. Over the last half-century Jamaica's fisheries have increasingly displayed the classical symptoms of overfishing: decline in total catch weight, decline in fish size, and decrease in quality fish species and increase in trash fish species.

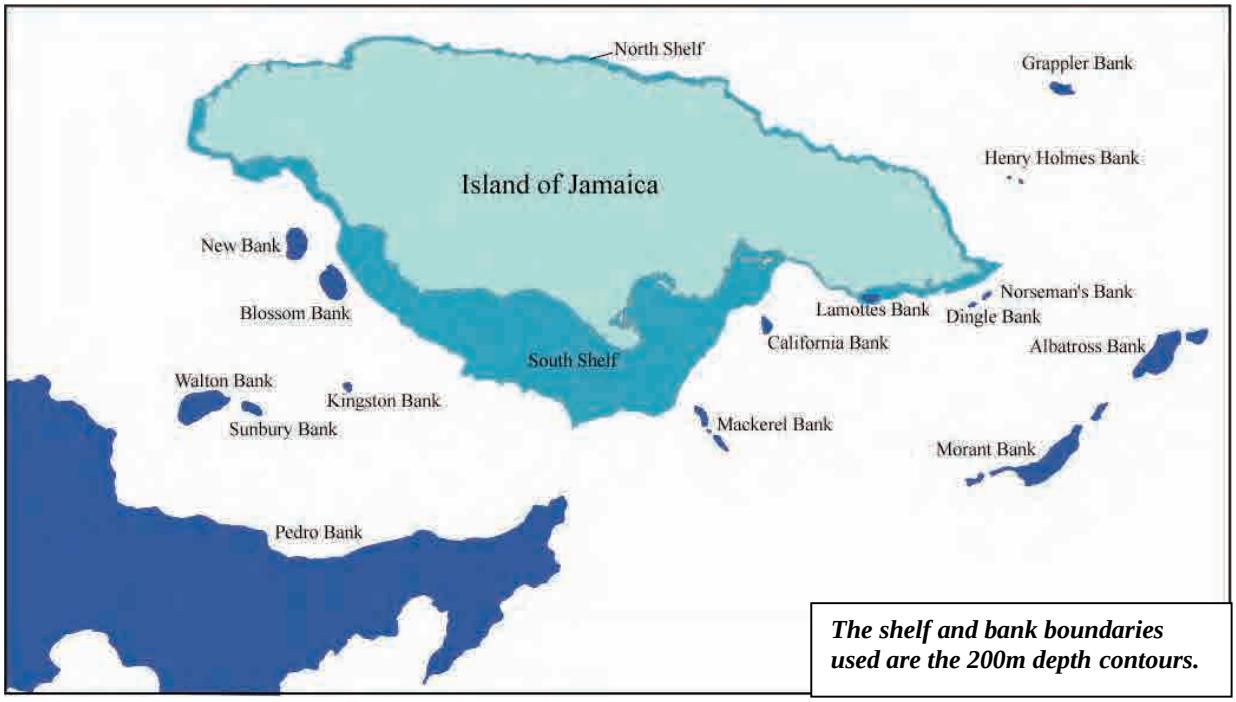


Figure 1: The Fishery Areas of Jamaica

Over the same period fishing effort has substantially increased; various "loan schemes" operated by the government in the 1950s and 1960s assisted many fishers to upgrade their oar-powered dugout canoes and sail boats to motorized fiberglass boats allowing greater range and versatility. It was during this period that permanent fishing camps were established at the Pedro and Morant Cays. The Beach Control Act (1956) offered some security of tenure to fishers for the landing sites at which they sell their fish and beach their boats. Lump-sum severance payments to laid-off public sector workers in the 1970s and 1980s further capitalized the industry and remittances from overseas family members in the 1980s and 1990s performed the same function.

At the same time, improvements in fishing technology increased the efficiency of the capital invested.

With more and more players coming into the fishing industry with new (and sometimes destructive) gear, government regulating and monitoring at fish landing sites and at sea became even more important. The Fishing Industry Act was passed in 1976 requiring all fishers and their boats to be registered and licensed, and accompanying fishing regulations were passed in 1977. Enforcement of the Act and its Regulations has been minimal;. Jamaica's Marine Police and Coast Guard are understaffed, underequipped and underfunded, and are preoccupied with drug interdiction. Although many fishing beaches across Jamaica have police stations in the vicinity, no members of the Marine Police are associated with any of them. The Marine Police however, have stations in Kingston, Montego Bay, Portland and Black River.

The commercial finfish catch may be broadly classified into four general groups:

- **Coral Reef Demersals**: caught on or around coral reefs (e.g. parrot fish, doctor fish).
- **Coastal Pelagics**: caught in shallow coastal waters (e.g. herring, sprat)
- **Deep-Slope Demersals:** caught at the bottom of deep slopes (e.g. snappers)
- **Deep-Water Pelagics**: caught in deep water while free-swimming (e.g. jacks)

The commercial shellfish catch may be broadly classified into five general groups:

- **Lobsters**: mostly *Panulirus argus*.
- **Conch**: mostly *Strombus gigas*.
- **Shrimps**: mostly *Penaeus* spp.
- **Oysters** – C. R.
- **Crabs**: calinectes spp

The gear used to catch each type of fish is specialized, but fall into four general categories: traps, nets, lines and by diving. There is some variety within each of the gear types, several of which should be counted as different methods[1]. In reality, a list of effectively different gear types would be much more complex, having to take into account different mesh sizes in nets and traps, different sizes and baiting regimes for pots, different heights and lengths (surface area) of nets, and differing hook assemblies and numbers of hooks for lines. Further complicating the issue is a consideration of whether the fisher uses a boat, and whether or not it is motorized or powered by oars.

Each of these gear types are utilized in particular segments in the coastal zone. Figure 6 is a description of the spatial context of the fishing gear and the species targeted:

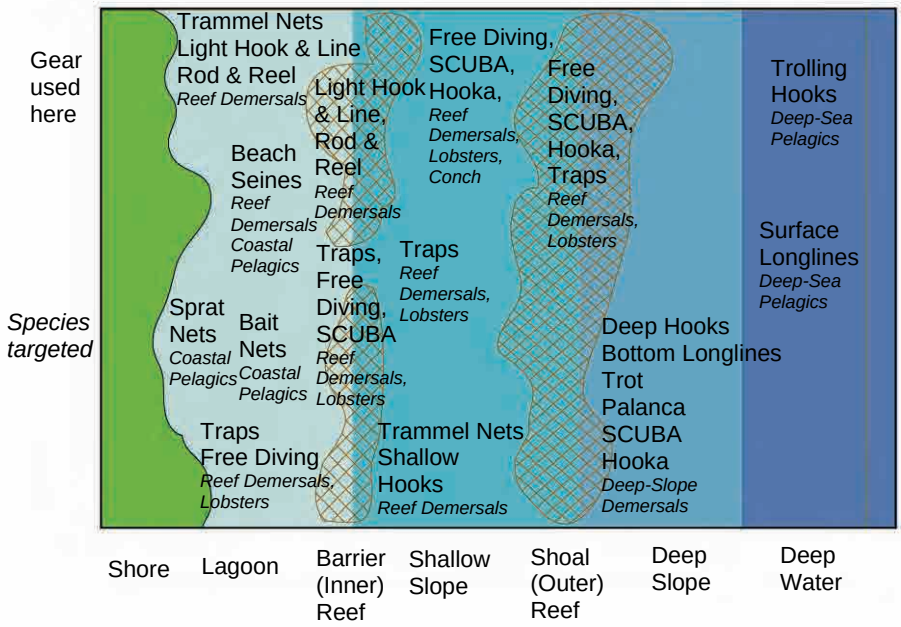


Figure 3: Spatial deployment of fishing gear in the Coastal Zone and the species targeted.

Coral Reef Demersals are targeted by all four general fishing methods, which suggest why they are the most heavily overexploited. Adult **Coastal Pelagics** are caught predominately with specialized nets, and juveniles are caught for bait. **Deep-Slope Demersals** and **Deep-Water Pelagics** are accessed with hand-lines and long lines with varying numbers of hooks. Among the shellfish, the high-value **Lobsters** are heavily exploited in nets, traps and by divers. **They also use either SCUBA or Hooka to heavily exploit conch (for export)**. **Marine Shrimp** stocks are small and targeted by special nets. Not included in this listing is the hand-harvesting of the Mangrove Oyster or Cup Oyster (*Crassostrea rhizophorae*) and the Flat Oyster (*Isogamon*

[1] See Espeut (2004) for a fuller treatment of the variety of fishing gear used in Jamaica.

alatus) from the rhizophores of Red Mangroves (*Rhizophora mangal*) using small rowboats. The gathering of a seaweed (an agarophyte) locally called Irish Moss (*Grassilaria* spp.) on the seashore or by shallow diving is used to make a viscous milk-based drink. The extent of the stocks of these species and the numbers of harvesters are small.

The Fishing Industry Regulation, 1976 designates 142 Official Fishing Ports on Mainland Jamaica and the Morant and Pedro Cays which are two important off-shore fishing beaches. There are however, numerous sites where fish can be landed. A census conducted by the author has found that the list requires updating. Several listed landing sites have no discernable fishing activity and a few active beaches found were not on the list. Several listed beaches have been converted for other uses (like industry or tourism),and several beaches listed could not be located..

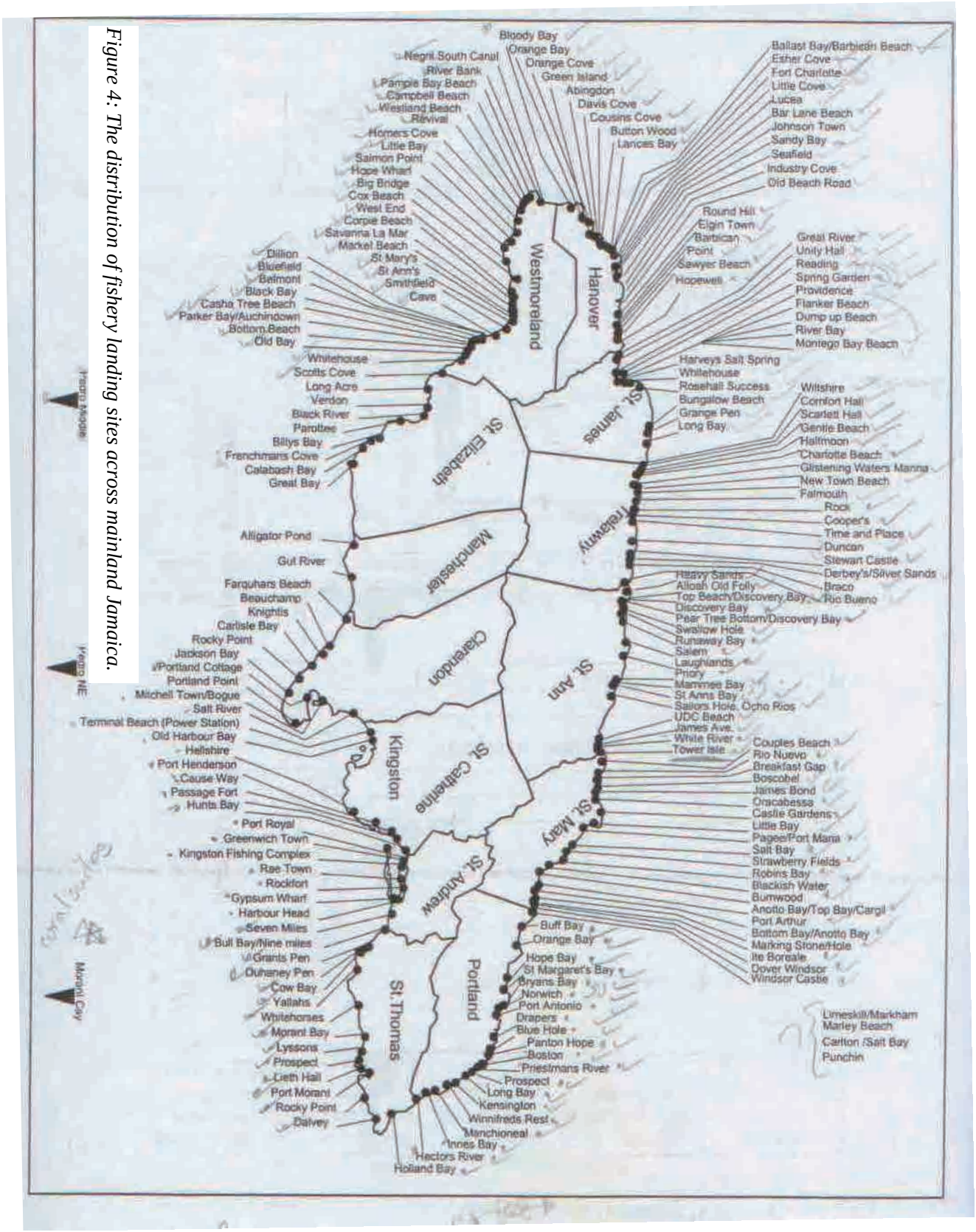


Figure 4: The distribution of fishery landing sites across mainland Jamaica.

Figure 4 above is a diagram of the known fish landing sites in Jamaica. Although the distribution of landing sites is relatively similar on Jamaica's north and south coasts, the south has many more fishers and boats. On the average, boats on the south coast contain more fishers, and its beaches are a base for almost three times more fishermen, than on the north. Considering its narrowness, the north shelf has a higher density of fishing activity than the south (See Table 1 taken from Espeut and Grant, 1990). Table 1 though dated illustrates this point which still holds true today.

TABLE 1:
THE NORTH & SOUTH COASTS OF JAMAICA COMPARED: FISHERMEN, BOATS AND LANDING SITES, 1990

INDICATOR	TOTAL/AVERAGE	SOUTH COAST	NORTH COAST
Fishers	18,739	13,585	5,154
Boats	9,539	6,169	3,370
Landing Sites	212	103	109
Shelf Area (Hectares)[3]	284,500	258,590	25,910
Fishers/Boat	1.96	2.20	1.53
Fishers/Landing Site	88.39	131.89	47.28
Boats/'Landing Site	45.00	59.89	30.92
Men/Hectare	0.066	0.053	0.199
Boats/Hectare	0.034	0.024	0.130

Source: Espeut and Grant (1990)

There are fifteen (15) fishermen's co-operatives in Jamaica, and a fair number of informal fishers' organizations that have no legal status. Table 2 below is a list of the co-operatives:

TABLE 2:FISHERS' CO-OPERATIVES, LOCATIONS AND MEMBERS

	Name of Organization	Location	Approx. Members
1	Alloa Fishermen Co-operative	Discovery Bay	35
2	Calabash Bay Fishermen Co-operative	Calabash Bay	21
3	Gillings Gully Fishermen Co-operative	Whitehouse (Westm.)	81
4	Negril Fishermen Co-operative	Negril	37
5	Old Harbour Bay Fishermen Co-operative	Old Harbour Bay	77
6	Rae Town Fishermen Co-operative	Rae Town, Kingston	62
7	North Eastern Fishermen Co-operative	Hope Bay, Portland	6
8	Whitehouse Whitesands Fishermen	Montego Bay (east)	83
9	Annotto Bay Fishermen Co-operative	Annotto Bay	12
10	Half Moon Bay Fishermen Co-operative	Hellshire	56
11	Port Royal Fishermen Co-operative	Port Royal	9
12	Rocky Point Fishermen Co-operative	Rocky Point	108
13	Corporate Area Fisher-folk Co-operative	Kingston	
14	St. Mary Fishermen Co-operative	Oracabessa	16
15	River Bay Fishermen Co-operative[4]	Montego Bay (west)	72
		TOTAL MEMBERS	**Pl add**

Source: Jamaica Fishermen's Co-operative Union (personal communication)

[3] Not all of the shelf area is productive.
[4] Not a member of the JFCU

The fishers' organizations are located in communities where there are relatively large numbers of fishers and boats. [However, only a tiny fraction of the fishing community joins up. For example, in Old Harbour Bay of the 1,400 fishers which operate from there only 80 are members of the co-operative.

The Jamaica Fishermen Co-operative Union (JFCU) – then the Jamaica Co-operative Union (JCU) – began in 1942 as an umbrella organization for all co-operatives in Jamaica. Jamaica Welfare Limited, a social services organization started by Jamaican National Hero, Norman Manley, decided to set up the JCU to promote the development of co-operatives across Jamaica and to co-ordinate the activities of co-operatives. The organization grew during the years of World War II to become a vibrant consumer co-operative, purchasing scarce food items such as flour, sugar and milk in bulk for member co-operatives that operated as buying clubs. The JCU began supplying fishing equipment to the fishing industry in the 1950's. This aspect of its business grew when the newly formed primary fishing co-operatives joined the JCU, and the JCU obtained £3,000 sterling to buy stock.

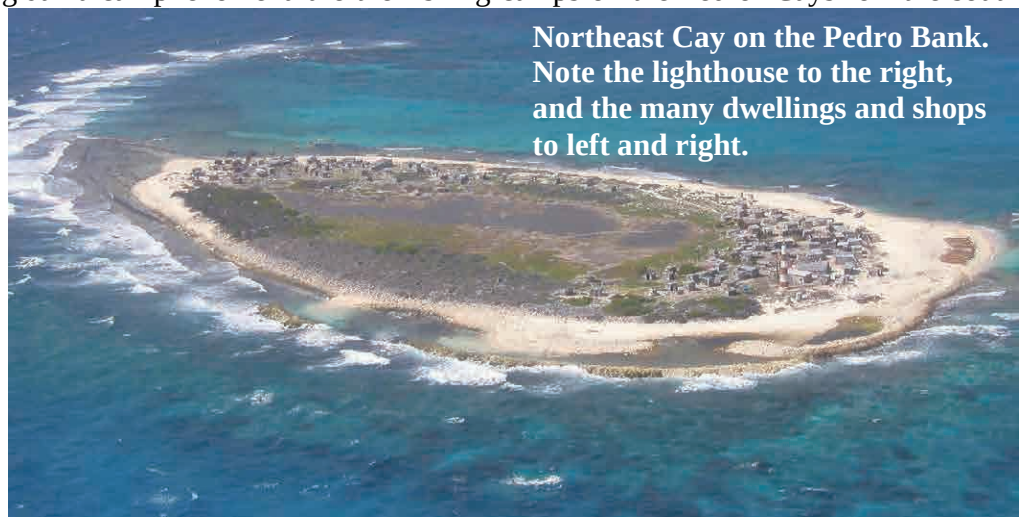
Today the JFCU is a secondary co-operative society with membership expanded to include several hundred individual fishermen. Combined membership in the JFCU from these two sources is about 4,000. The JFCU now provides a range of services to its members and other licensed fishermen. It is a major supplier of a wide range of commercial fishing equipment to fishermen in the island and is managed by a nine-man board representing member societies. It also manufactures fiberglass canoes.

Below is a list of some other fishers' organizations:

TABLE3:
INFORMAL FISHERS' ORGANIZATIONS AND LOCATIONS

	Name of Organization	Community Base	Parish
1	Bluefields Bay Fishermens' Group	Bluefields	Westmoreland
2	Old Harbour Bay Fishers' Association	Old Harbour Bay	St. Catherine
3	Rocky Point Fishers' Association	Rocky Point	Clarendon
4	Mitchell Town Fishers' Association	Mitchell Town	Clarendon
5	Welcome Beach Fishers' Association	Welcome Beach	Clarendon
6	Barmouth Fishers' Association	Portland Cottage	Clarendon

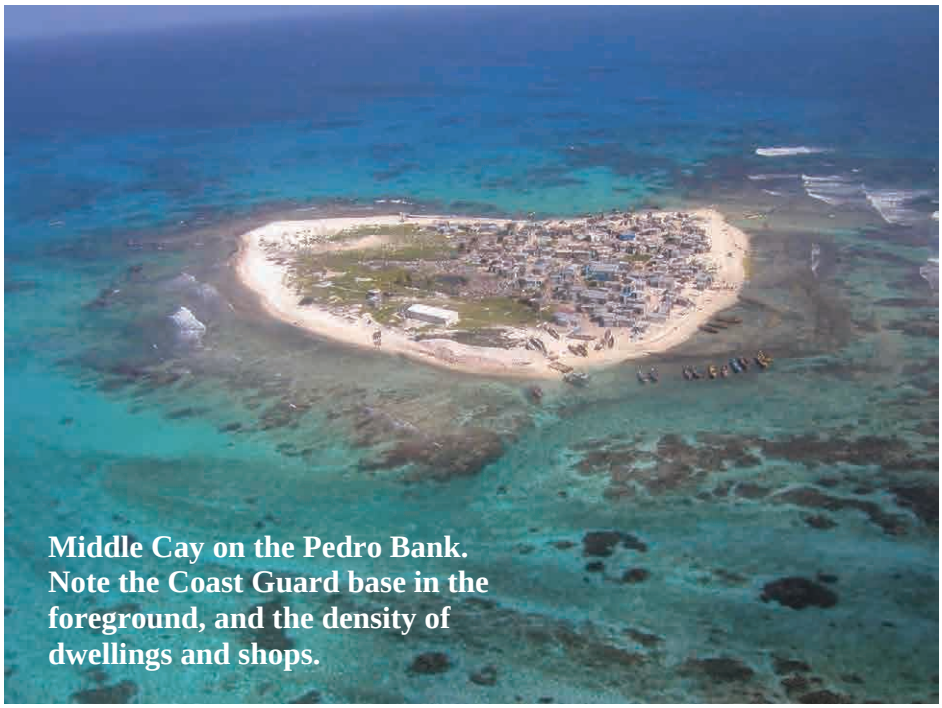
Some interesting Jamaican phenomena are the fishing camps on the Pedro Cays off the south coast of Jamaica (90 miles SW of Kingston).



Northeast Cay on the Pedro Bank. Note the lighthouse to the right, and the many dwellings and shops to left and right.

The Pedro Bank is a submarine plateau rising abruptly from about 500 m and extending more than 161 km east to west falling within the Archipelagic waters, territorial sea and Exclusive Economic Zone (EEZ) of Jamaica.

With an area of 8,040 km^2 it is one of the largest offshore banks in the Caribbean Basin. The submarine plateau breaks the sea surface in eight places, four of these are craggy rocks inhabited only by seabirds; the other four are the Pedro Cays, two of which (Middle Cay and Northeast Cay) are inhabited by Jamaicans, mostly engaged in the fishing industry. Living conditions on the Cays are marginal at best, with insufficient operational sanitary facilities, no piped water supplies and no social services. However there are some commercial services (e.g. shops, entertainment) and the Jamaica Defense Force Coast Guard maintains a permanent base there. It is a tough, frontier existence with primitive living conditions[5]. Espeut's 2006 survey at the height of the most active hurricane season in recorded history, found 140 residents on Northeast Cay and 348 residents on Middle Cay, for a total of 488 persons. Anecdotal evidence is that at one time the Cays were home to 1,000-2,000 residents. The Pedro Bank is Jamaica's most productive fishing ground.



Middle Cay on the Pedro Bank. Note the Coast Guard base in the foreground, and the density of dwellings and shops.

THE ADMINISTRATION OF FISHERIES IN JAMAICA

The Jamaica Fisheries Division falls under the Ministry of Agriculture and Fisheries (MAF). Under the present Minister the name of the Ministry of Agriculture was changed to include the portfolio of fisheries, as a statement of the new government's commitment to the improvement of the fisheries sector.

As part of the modernization of the public sector the Fisheries Division is currently undergoing transformation into an executive agency. This will result in a semi-autonomous agency with greatly improved efficiency. As part of the modernization process a Chief Executive Officer (CEO) is in place to drive the transformation into an executive agency. The transformation is expected to be completed by 2012. An organogram of the new executive agency which is still undergoing development, is not available.

[5] See Espeut (2006) for a report of a census taken on the Pedro Cays.
[9] The Team Leader for this study is the founder of the C-CAM Foundation, and the first chairman of the PBFMC.

CHAPTER 2: COMMUNITY-BASED FISHERIES MANAGEMENT COMPONENT

2.1 Coastal Community Characteristics

The archipelagic state of Jamaica consists of over sixty (60) islands and cays, of which five (5) are inhabited and serve as important bases for fishing. Jamaica's two cities (Kingston and Montego Bay) are on the coast, but the three next largest towns (Spanish Town, Mandeville and May Pen) are in the interior away from the coast.

The north coast of Jamaica is a major tourism destination, and several world-famous resort destinations (like Ocho Rios and Negril) were small fishing communities a few decades ago. This transformation of rural fishing settlements into tourism areas continues, and several traditional fish landing sites have in recent years, seen their fishing populations displaced. The sitting of major industrial plants and public infrastructure on the coast (like the Kingston oil refinery and the new toll bridge) have also resulted in the displacement of fishers.

Table 4 below show some of the major coastal settlements of Jamaica with their populations as measured by the Jamaica 2001 Population Census

TABLE 4:
POPULATIONS OF SELECTED COASTAL SETTLEMENTS, JAMAICA, 2001

PARISH	SETTLEMENT	MALE	FEMALE	TOTAL
St. Catherine	Old Harbour Bay			5,405
Clarendon	Rocky Point			
Westmoreland	Whitehouse			
St. Elizabeth	Great Bay			
Portland	Orange Bay			
St. Mary	Annotto Bay			
St. Thomas	Rocky Point			
Trelawny	Rock			
St. Ann	Runaway Bay			
Hanover	Cousin's Cove			
Kingston	Port Royal			

Source: Jamaica Department of Statistics, 2001 Population Census.

The male populations of some of these coastal settlements are quite small, and fishing is very important to the local economy.

2.2 Policy, Legislation, and Supporting Institutional Arrangements

POLICY

The first draft of Jamaica's first ever National Fisheries Policy was prepared in 2004 with the assistance of the FAO. After some stakeholder review, a second draft was prepared. That draft was the subject of island wide consultations during 2004 and 2008; the final document has not yet received the seal of approval as official government policy.

Jamaica's Draft **National Fisheries Policy** (JNFP) contains the following general **Policy Statement**:

The general fisheries resource management policy is to control and limit access to all capture fisheries in Jamaican waters, including inland waters, and to extract a rent or cess that will (partly) cover the costs of fisheries research and management. The capture fisheries will be managed by zones and by means of Fishery Management Plans for the most important fisheries, which will be discussed and agreed upon by all major stakeholder groups.

Strategy

- The capture fisheries of Jamaica will be divided into five Zones:
  - Zone 1: The continental shelf surrounding the main island, including the slope down to 100 fathoms (200 m) adjacent to it;
  - Zone 2: The Banks inside Jamaica's Territorial and Archipelagic Seas, including Pedro Bank, Morant Bank, Formigas Bank, etc., down to 100 fathoms (200 m);
  - Zone 3: The remainder of the EEZ of Jamaica, consisting of waters deeper than 100 fathoms (200 m)
  - Zone 4: The Jamaica/Columbia Joint Regime AreaZone 5: Internal waters including rivers, natural ponds, wetlands and other water bodies.
- The GOJ will impose access limitations on ALL fisheries in all five Zones.
-

The following is the Policy Statement with respect to the **Social Development of the Fisheries Sector of Jamaica**:

The GOJ wants to improve the social and economic status of fisherfolk (fishermen and all others associated with capture fisheries and aquaculture). Where opportunities will be created for fishermen to participate in new or expanded fisheries, licences will preferably be issued to fishermen that were previously operating in areas that are overfished. The GOJ shall ensure that all regulations regarding safety at sea, including safety equipment to be carried, are enforced. Through the co-operation of various Ministries and Agencies involved in managing the coastal areas, the GOJ will establish rules for the tenure of Fishing Beaches and improve the living conditions of fisherfolk living on or near such beaches.

Strategy

- The formation of co-operatives or other types of association of fishermen will be encouraged, since many development and management issues can best be dealt with through local groups.
- Fisheries management shall preferably be implemented in close collaboration with all stakeholders (co-management).
- Since offshore fishing is risky, the GOJ will aim to provide basic training in navigation, safety measures and safe diving practices to all fishermen engaged in fisheries in Zones 2, 3 and 4. This may eventually lead to an entry level "standard" for prospective applicants for a fishings license.
- The GOJ will investigate possibilities to provide life insurance for all licensed fishermen. (Perhaps this can be done through co-operatives or other forms of organization.) It is likely that any insurance policy will be closely linked to a strict enforcement of safety regulations and safety equipment.
- The socio-economic situation of the capture fisheries for so-called reef fish in Zones 1 and 2 can only be improved by drastically reducing the fishing pressure. Unfortunately, that means drastically reducing the number of fishermen fishing in those zones, and limiting the amount of gear that can be used for each fishing licence.
- The number of fishermen in Zones 1 and 2 will be reduced by
  - Not issuing licenses for those zones to new entrants,
  - Encouraging fishermen to join forces and enter into fisheries in Zones 3 and 4, and
  - Encouraging fishermen and their children to aim for different jobs.
- The number of beaches designated as fishing beaches should gradually be brought down. No new fishing beaches should be created and landing of fish should not be allowed on the shores of non-fishing areas, including Marine Parks and Marine Protected Areas.

The JNFP is quite comprehensive, and space does not allow extensive reproduction of all the provisions relating to encouraging the involvement of fishers, fisher organizations, fishing communities and other stakeholders in the management of fishery resources. The JNFP makes it quite clear that the GoJ is committed to this participatory approach. The JNFP is also clear that the GoJ has a clear policy of achieving optimal yield by reducing fishing effort and redirecting fishing effort to allegedly underexploited fisheries and out of the capture fisheries altogether. Clearly, the Jamaican government's views are consistentt with the objectives of this JICA-CRFM project.

The Jamaican government is the only CARICOM member state to have a National Fisheries Policy. This approach is optimal, as there are now clear criteria and guidelines for the amendment of fisheries legislation and the preparation of fishery management plans. One option for the JICA-CRFM project is to spread this approach to the other member states.

LEGISLATION

Jamaica's first dedicated fisheries legislation was the **Fishing Industry Act 1975** and the **Fishing Industry Regulations 1976**. The **Wildlife Protection Act 1945** (which regulates hunting) and the **Beach Control Act 1956** (which regulates the use of bathing beaches and fishing beaches) – both administered by the Natural Resources Conservation Authority – contain provisions which relate to fisheries management and to the conservation of marine wildlife, and there is some overlap of jurisdiction.

The **Fishing Industry Act 1975** contains very little provision for the iinvolvement of fishers, fisher organizations, fishing communities and other stakeholders in the management of fishery resources.

The 1975 Act provides for all fishers and boats to be registered and licensed, but no license fees were charged, and few fishers bothered to keep their licenses current; the benefits of licensing were therefore neutralized. The 1975 Act allowed for the creation of fish sanctuaries, but in a quarter of a century only two were created – one to protect the mangroves where oyster spat were produced, and one in Montego Bay. The 1975 Act makes no provision for the appointment of a National Fisheries Advisory Council, or for fishers to be involved in the management of fish sanctuaries. Although it empowers Fishery Inspectors to search without warrant and arrest without warrant, it does not provide for Fishery Inspectors to be appointed under the Act (Game Wardens appointed under the Wildlife Protection Act, police constables and members of the military are automatically fisheries inspectors). This Act has long been recognized as so woefully inadequate that amendment would be futile; it will need to be repealed and replaced with a wholly new Fisheries Act.

The **Fisheries Regulations 1976** contain measures to protect berried and juvenile lobsters , and regulate the mesh size of various fishing nets such as seine nets . The 1976 Regulations define application forms and schedules and boat markings, and prescribe the safety gear to be carried on all fishing boats. The provisions fall far short of what is required for effort reduction and to eliminate destructive practices, and in any case, were lightly enforced. They will be replaced with a more comprehensive set of regulations associated with the new fisheries act.

The process of drafting new Fisheries Act has been under way since 1995. A consultant was provided by the FAO and a draft of a new Fisheries Bill for Jamaica was produced. The draft was reviewed by a number of stakeholders a numerous times, and is now with the Office of the Chief Parliamentary Counsel receiving its final adjustments before being tabled in Parliament by the minister of Agriculture and Fisheries. The new fisheries law is expected to be enacted sometime in 2011.

Until then, the present Jamaican government continues to use the current Act to move forward. In September 2009 the Minister of Agriculture and Fisheries signed an Order establishing eight (8) new fish sanctuaries. The new fish sanctuaries will be managed (patrolled and monitored), by stakeholder groups in partnership with the FD (i.e. participatory management). The sanctuaries and the designated managers are named below:

TABLE 5:
NEW JAMAICAN FISH SANCTUARIES, LOCATIONS, AND MANAGERS, 2009

	Fish Sanctuary	Location	Manager
1	Orange Bay	Negril,Westmoreland	Negril Coral Reef Preservation Society
2	Bluefields Bay	Bluefields, Westmoreland	Bluefields Bay Fishermens' Group
3	Malcolm Bay	St. Elizabeth	The Fisheries Division
4	Salt Harbour	Clarendon	Caribbean Coastal Area Management (C-CAM) Foundation
5	Parts of Galleon Harbour	Old Harbour, St. Catherine	
6	Three Bays Area	Hellshire, St. Catherine	
7	Montego Bay Marine Park	Montego Bay, St. James	Montego Bay Marine Park Trust
8	Discovery Bay Lagoon	Discovery Bay, St. Ann	Alloa Fishermens' Co-operative

Source: National Fisheries Advisory Board, Jamaica

This approach by the Jamaica FD is a concrete case of stakeholder participation in fisheries management, and fits in with the objectives of this JICA-CRFM project.

The Caribbean Coastal Area Management (C-CAM) Foundation has been working closely with the fishers and fishing communities in south St. Catherine and south Clarendon since 1993. With their encouragement the Jamaican government created the Portland Bight Protected Area (PBPA) in 1999 (520 sq. km of land and 1,350 sq km of marine space) and delegated to them natural resource management functions in 2003. C-CAM assisted five fishing communities to form fishers' organizations, and midwifed the Portland Bight Fisheries Management Council made up of representatives of all the stakeholders, including the government[9]. A management plan for the fisheries of the PBPA was prepared, including the identification of eight (8) sites to be designated fish sanctuaries. Three have since become designated under law in September 2009 . The PBFMC arranged for about fifty (50) fishers and vendors (men and women) to be appointed as game wardens under the Wildlife Protection Act, to therefore become Fishery Inspectors under the 1975 Fishing Industry Act. Training was provided, and a successful experiment in community enforcement began as another example of community empowerment and participatory fisheries management. In no case did the community members abuse their powers of search or arrest without warrant, and all cases brought to course resulted in conviction. The greatest success, however, was the deterrent created by having family and friends put social pressure favouring compliance with the law.

The new draft Fisheries Act for Jamaica contains the following provisions relevant to community-based fisheries management:

- The Fisheries Licensing and Management Authority (FLMA) will be created to oversee Jamaica's fisheries;

- There shall be thirteen (13) members; six (6) ex-officio (the permanent secretary, the Director of Fisheries, the CEO of the NRCA, the Director-General of the Maritime Authority of Jamaica, the Commissioner of police, the Chief of staff of the JDF); and seven (7) persons (including the chairman) appointed by the minister;
- The remit of the FMLA shall include the management and development of fishing beaches;
- In exercising the powers under this Act, the following principles shall be considered: (h) stakeholders shall be consulted concerning the conservation and management of fisheries resources;
- The Minister shall appoint a National Fisheries Advisory Council which shall be an advisory body to the Minister on all matters relating to fisheries management and development, and shall include stakeholders and persons experienced in fisheries management;
- The Minister, may by order, declare an area to be a fishery management area;
- The Authority, in consultation with the National Fisheries Advisory Council, shall, every five years, prepare and submit to the Minister for his approval, specific capture fishery management plans for each fishery management area or a specific fishery;
- The Minister may, from time to time, by order declare any area specified in the order to be a fish sanctuary;
- The Authority may, subject to the approval of the Minister, delegate any of its functions under this Act (other than the power of delegation) to any member, officer or agent of the Authority;
- The Minster may, by order designate any person or any category of public officers to be fishery inspectors for the purposes of this Act;

Although the new draft Fisheries Act was drafted before the preparation of the draft Jamaica National Fisheries Policy, it does provide the enabling clauses to implement the initiatives defined in the policy. Many of the policy initiatives will have to be facilitated through regulations in this regard. There is still much work to be done.

The new draft Fisheries Act will allow the management of "fishery management areas" and "fish sanctuaries" to be "delegated" to a "member, officer or agent of the Authority"; and so a stakeholder group may be appointed the "agent" of the authority and then have management responsibility for one of these MPAs delegated to it. The new draft Fisheries Act will also allow fishers and other stakeholders to be designated as "fishery inspectors" under the Act.

This will give fishers and their organizations real power, and not just the right to be consulted.

Other fisheries-related legislation:

- *The Natural Resources Conservation Act*
- *The Wildlife Protection Act*
- *The Beach Control Act*
- *The Morant and Pedro Cays Act.*
- *Endangered Species (Protection and Regulation of Trade) Act (2000).*
- *Aquaculture Inland and Marine Products and By-products (Inspection, Licensing and Export) Act (2000).*
- *Exclusive Ecomonic Zone Act*
- *Shipping Act.*

SUPPORTING INSTITUTIONAL ARRANGEMENTS

The concept of participation was embraced by the draft JNFP and some aspects have been included in the new draft Fisheries Act. The FD has already begun to collaborate with fishers and other stakeholders in fisheries management even before there is the formal legal framework to do so. The FD is a foundation member of the Portland Bight Fisheries Management Council (PBFMC), a stakeholder entity midwifed by the Caribbean Coastal Area Management (C-CAM) Foundation; an NGO delegated the management of the Portland Bight Protected Area (under the NRC Act). The FD has collaborated with the Montego Bay Marine Park Trust, an NGO delegated to the management of the Montego Bay Marine Park (under the NRC Act).

Although there is no provision under the **Fishing Industry Act** for the appointment of a Jamaica National Fisheries Advisory Board, the minister has gone ahead and done so[10]. It presently has no legal status, but is consulted on a wide range of fisheries matters.

There is no staff member at the Fisheries Division trained in the formation and strengthening of fishers' organizations.

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

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

The abovementioned effort to establish fish sanctuaries and to contract NGOs and fishers' organizations to manage them is such a national programme.

The abovementioned appointment by the Minister of Agriculture and Fisheries of a National Fisheries Advisory Board is such a national effort.

The implementation of the provisions of the draft Jamaica National Fisheries Policy under the new Fisheries Act (when it is finally passed) will see widespread stakeholder involvement in fisheries management around Jamaica's coast and on its inshore and offshore banks.

The FD has an active programme – Community Participation in Fisheries Management, which routinely meets with fishers and other stakeholders regarding fisheries management and other issues. Such information is available as reports at the FD. The Division also has an active, even if limited, extension service, which is our primary communication mechanism with fishers at their work place.

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

In recent months, Jamaica has taken concrete steps towards national and community-level participatory approaches to fisheries management by contracting local stakeholder groups to manage the new fish sanctuaries. Implementation is in the very early stages (the Memoranda of Understanding are to be signed in 2010), and they have not yet had the opportunity to be effective.

[10] Declaring interest, the Team Leader for this Baseline Study is a foundation appointee to the Jamaica NFAB.

The efforts of C-CAM towards community-based fisheries management in the PBPA have been on going for over fifteen (15) years, and the results suggest that this approach would be very effective when extended across the Jamaican archipelago.

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

CHAPTER 3: PELAGIC FISH RESOURCE MANAGEMENT AND DEVELOPMENT COMPONENT

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

National Fisheries Policy

A few years ago, the Ministry of Agriculture developed a draft "Fisheries Policy" regarding the development and management of fisheries resources in Jamaica. The main goals of this National Fisheries Policy are for the fisheries sector to:

- Contribute to economic growth and reduction of poverty;
- Contribute to the sustainable livelihoods of Jamaicans through employment in fisheries and related activities;
- Contribute to the provision of Food Security.

Further, the "Fisheries Policy" has the following immediate objectives to:

- Ensure sustainable development of the fishing industry;
- Promote efficiency of the fishing industry;
- Promote economic and social development of fishing industry;
- Improve systems and procedures for the management of the fishing industry;
- Promote partnerships with stakeholders in the management of fisheries and ensure transparency and accountability in the governance of fisheries resources;
- Comply with international standards and best practices for fisheries development and management in keeping with Jamaica's commitments under various agreements and conventions.

A major goal of this "National Fisheries Policy" is to achieve sustainable development of the fisheries resources. Thus, it seeks to strengthen existing management measures, while proposing new measures to limit entry of fishermen into the industry and to encourage their exit as necessary. In this context, some of the management objectives and strategies regarding the large and small coastal pelagic fisheries are summarized below:

- **Large pelagic fishery :**
  - ***Objectives***
    - Attain the sustainable development of the fishery;
    - Cooperate with other states, particularly Caribbean states;
    - Assess, protect and conserve the large pelagic resources.
    - harvest each stock as close as possible to its optimal sustainable yield;
  - ***Strategy***
    - Full use of resources in waters over 200m deep and on distant shoals and extracted rent from their exploitation, both through developing fisheries that will allow employment of license holders now operating in areas that are considered to be overfished, and by licensing new entrants;
    - Fishery will need to be studied preferably on a regional basis, and a regional FMP should be developed.

- **Coastal pelagic fishery:**
  - ***Objectives***
    - Maintain and enhancing fish habitats;
    - Protection of nursery areas;
    - Harvest each stock as close as possible to its optimal sustainable yield.
  - ***Strategies***
    - As coastal areas have multiple users, with different interests (i.e. water sports, tourist, and harbour uses), management strategies must aim at: reducing conflicts; controlling land-based pollution and coastal development; and prohibiting destructive practices.
    - Limited and fully controlled access to this fishery.

Note that most of these objectives and strategies were defined within the draft Fisheries Policy.

Current Management Policy Strategy

Under the framework of the Fishing Industry Act, several regulatory measures have been put in place in the lobster and coastal pelagic fisheries, such as:

- The "Fishing Industry (Declaration of Close Season) (Lobsters) Order of 1987 establishes an annual close season in the lobster fishery from *April 1 to June 30;*
- The Fishing Industry Regulations 1976 established fishing rules, including:
  - **Spiny Lobster Fishery**
    -
    - Minimum size limit: prohibition of harvesting P. argus with carapace length of less than 7.62cm;
    - Prohibition on taking berried females;
  - **Coastal pelagic fishery**
    - Size restrictions for beach seines; minimum mesh size: stretched mesh size of the bunt should be greater than 3.17cm; stretched mesh size of the corners should be greater than 4.43cm; and stretched mesh size of the wing should be greater than 5.08cm.

Legislation

The "*Jamaica Fishing Industry Act No 17 of 1975"* is the major law that addresses the development and management of fisheries, and the regulation of fisheries and fishing related activities in Jamaica. This Act provides an institutional framework for the management, planning, development of fishery resources in Jamaica. This Act was amended in 1977 (LN 31/1977), 1993 (LN 90/ 1993). In general this Act and its amendments provide for:

(1) Registering and licensing fishermen;
(2) Registering and licensing fishing vessels;
(3) Regulating the processing of fishery products;
(4) Preserving marine resources by creating fish sanctuaries;
(5) Enforcing fishing regulations.

The Act gives the Minister responsible for fisheries the authority to make regulations for "*giving effects to the purposes and provisions of this Act*." Under this framework, several Orders and regulations were created and passed, such as:

- The Fishing Industry (Exemption) Order, 1976;
- The Fishing Industry (Declaration of Close Season) (Lobster) Order, 1987;
- The Fishing Industry Regulations, 1976;

- The Fishing Industry (Conservation of Conch Genus Strombus) Order, 2000.

Finally, the Jamaican government has also enacted several other Acts related to Fisheries management such as:

- The Harbors Act of 1874,
- The Morant and Pedro Cays Act of 1907, and
-
- Natural Resources Conservation Authority Act
- Exclusive Economic Zone Act

Enforcement of Regulations

The government agencies responsible for enforcing fisheries regulations in Jamaica are the marine police, the JDF Coast Guard, and the Fisheries Division.

Level of enforcement

In general, there is inadequate surveillance of Jamaica's coastline and marine space. The area is large, requiring a fleet of patrol craft probably beyond the pocket of the Jamaican government. In addition to policing Jamaican fishers, there is also the problem of illegal foreign fishing in the offshore conch and lobster fisheries, which is widespread. Jamaican laws are lightly enforced with respect to Jamaicans, and poaching by foreign vessels is yet to be controlled.

Level of compliance

No empirical assessment is available on the level of compliance of fisheries and related laws. However, it is widely accepted that though improving the level of compliance is far below acceptable.

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

The realization of policy goals and management objectives related to fisheries is currently being pursued vigorously. The GOJ has embarked on a comprehensive programme to modernize the institutional and legislative framework that will facilitate sustainable fisheries management and development. The transformation of the FD into an executive agency is expected to be completed by 2012 and new fisheries legislation is in an advanced state of preparation and is expected to be enacted in 2011.

The conch fishery of Jamaica is regarded as one of better managed conch fisheries in the world while the spiny lobster fishery is considered fully to overexploited. New lobster regulations prohibiting the sale and possession of spiny lobsters after the first 21 days of the beginning of the annual closed season for lobsters has addressed a significant loophole in management and improvement in the status of lobster stocks is expected.

It is also well known that the Jamaican near-shore reef habitats have been severely degraded and their resources over-exploited, in particular on the north shelf of the country. Nine fish sanctuaries have been established in partnership with key stakeholders to address this problem and more will be established in the near future. This initiative coupled with others as identified in the national fisheries policy such as the reduction of fishing effort is expected to improve the status of the near-shore stocks. The outcomes of past management and development of fisheries programs have been characterized by mixed results.

3.3 Fishery and Market Characteristics

FISHERIES CHARACTERISTICS

Exploited Species

Table 6 summarizes the exploitation and the management status of coastal pelagic fisheries in Jamaica. Large pelagic fish such as dolphin, king mackerel and blackfin tuna are caught by artisanal fishermen trolling from canoes. These species may also be caught in the sport or recreational fishery that primarily targets marlins. Commercial activity directed at the larger pelagic is small and catches are low. This may be a function of the fishing method used (i.e., trolling) but it is also generally accepted that the abundance of larger pelagics is generally low in Jamaican waters. Coastal pelagic species such as the Atlantic thread herrings (sprats) and jacks are caught in gillnets set in bays, mangroves, and sea-grass beds.

Since the 1980s, an industrial fishery has developed on the exploitation of spiny lobster and conch in Jamaica. This industry is mostly geared toward the processing and exportation of these fishery products. Jamaica is the largest exporter of conch (*Strombus gigas*) in the world.

Table 6:
Status of Coastal Pelagic Fisheries in Jamaica

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

Notes

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

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

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

Stock Status

The overall status of large pelagic stocks is uncertain because of their regional dynamics. Catches of large pelagic species in the Atlantic are monitored by the International Commission for the Conservation of Atlantic Tunas (ICCAT 2008). In addition, in 2004 the CRFM conducted an evaluation of the wahoo stock in the eastern Caribbean. This evaluation of the stock determined that wahoo catches in the region were sustainable (CRFM, 2005).

There has been much concern on the level of exploitation of the Jamaican stocks of conch, because this species is considered globally to be endangered. During 1995-96 the Jamaican Fisheries Division set up a quota of 1,900 mt in the fishery which was based on the results of an abundance survey of the conch population on the Pedro Bank . However, in 2000 the fishery was closed due to litigation. At its re-opening in 2001 the quota was lowered to 946 mt, in keeping with the results of scientific assessment and the estimation of the level of conch harvested by IUU activities. . Today the fishery is strictly managed and is in full compliance

with the relevant provisions of the CITES , and the stock seems to have been rebuilt and fished at a sustainable level.

The current status of the spiny lobster stocks of Jamaica is not well known. The stocks however, are believed to be fully over-exploited. In general, landings from industrial trap boats have decreased to an average of 8,000 lbs of tails per fishing trip down from an average of 12,000 to 18,000 lbs of tails per trip. IUU fishing is believed to be largely responsible for the decline in spiny lobster stocks. Recently enacted regulations prohibiting the possession of spiny lobsters after the first 21 days of the commencement of the closed season for lobsters is expected to significantly cut down IUU lobster.

MARKET CHARACTERISTICS

Jamaican artisanal fishermen traditionally sell their catches to the public or to vendors right on the beach. However, a few fishermen deliver their catch to hotels, supermarkets and fish processors. Note that there are only a few fish markets in the country, but their hygienic conditions are usually below local and international standards. Large pelagics are not easily absorbed by the local market, and hotels that used to buy these products are now concentrating on cheaper imported fish (FAO 2003).

Most of the lobster production of Jamaica is frozen and exported to foreign markets. Table 7 shows that the industry exported 224 mt of lobsters on average from 1998 to 2007. The contribution of lobster exports to the Jamaican economy ranged from US$1,308,000 to US$6,911,000 during this period.

Table 7:
Total Weight (mt) and value (US$) of Lobster Exports* (frozen, nei), Jamaica, 1998-2007

Fish Product	Year									
Lobster (frozen, nei)	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Exportation (MT)	106	284	297	167	130	229	457	367	93	112
Value (US $ x 1000)	2,483	6,656	6,911	4,247	3,596	5,300	4,485	3,523	1,308	1,775

Source FAO FishStat

Jamaican supermarkets primarily carry imported fish products that they sell to local consumers. Salted fish dominate fish imports, which is a traditional component of breakfast in Jamaica[11]. Indeed, Jamaica is a major importer of processed fish products. Between 1997 to 2007 importation of preserved or prepared mackerel averaged US$8,912,000 annually in value, whereas frozen mackerel imported to Jamaica averaged US$2,689,000 in value from 1998 to 2008 (Table 8). Processed herrings are also among the most imported fishery products, with average values of US$362,000 and US$831,000, respectively for imports of smoked nei and prepared orpreserved fish from 1997 to 2007. Fishery products from several other species are also imported and are included in the marine fish category (Table 8).

[11] "Ackee and saltfish" is Jamaica's national dish.

Table 8:
Value (US $ x1000)* of Imports of some important Fishery Products to the Jamaican Local Market, 1997-2007

Fish Products	Year										
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Herring (nei frozen)	9	-	-	1	6	8	6	16	13	1	1
Herring (nei, smoked)		396	330	306	362	330	253	389	366	407	485
Herring (preserved or prepared)	7,135	311	109	73	101	206	219	176	256	227	327
Mackerel (preserved or prepared)	8,580	6,694	8,503	6,076	8,151	6,604	9,198	8,279	12,314	9,977	13,653
Mackerel (nei, frozen)	-	3,397	2,427	2,624	3,243	3,095	2,799	2,336	2,558	2,341	2,071
Mackerel (nei, fresh or chilled)	-	23	28	22	-	53	78	-	-	479	-
Marine fish (nei,minced, prepared)	.	364	364	86	98	194	215	261	536	228	13
Marine fish (nei,preserved or prepared)	132	24	10	118	145	167	113	139	143	160	522
Marine fish (nei, smoked)	-	56	74	155	28	60	111	46	227	179	433
Marine fish (fresh or chilled)	39	-	-	-	1	-	-	216	3	-	40
Marine fish (nei, frozen)	8,766	-	-	-	10,287	-	-	9,742	12,388	-	17,340

Source FAO FishStat

The Contribution of Fisheries to the Jamaican Economy

The fisheries sector makes a significant contribution to the economy of Jamaica. Fishing activity has provided on average 12,287 primary and secondary jobs to Jamaicans from 2001 to 2006. The contribution of fisheries production to Jamaica's economy has been very stable and averages about 0.39% from 2001 to 2005 (Table 9).

Table 9:
Contribution of Fisheries to Employment and GDP, Jamaica 2001-2006

Year	2001	2002	2003	2004	2005	2006
Employment (Primary and Secondary)	14,287	14,998	15,682	16,789	17,647	18,305
% GDP	0.45	0.44	0.41	0.39	0.41	

Compiled from Murray (2008).

3.4 Catch and Effort

There are about 142 officially designated fishing ports (fishing beaches) and numerous other landing sites on mainland Jamaica. Additionally there are two (2) on the Pedro Cays and one (1) on the Morant Cay. These sites comprise mostly beaches, where a small number of canoes or vessels such as steel-hulled industrial ships may harbor (Murray 2008). The most important fishing beaches are located in Old Harbour Bay, Port Royal, Rocky Point and the modern fishing complex in Whitehouse (Murray 2008).

Effort Data

There are more than 20,000 artisanal fishers involved in fishing activity in Jamaica, but only 17,151 were officially registered in 2007. These fishers use mostly canoes or reinforced fiberglass boats powered by outboard engines; 9,000 boats (4-9 m) were registered in 2007 and operated from 187 landing sites. Note that fishing vessels whose length is greater than 12 m, are usually considered as industrial vessels (Murray 2008). Decked fishing vessels (15-30m) form 5% of the fleet and are mostly used in the conch and lobster fisheries. Also, large vessels outfitted with trolling gear are also used in the sport fishing and in the tourism industry.

Also, a few processing plants operate small number of vessels in Jamaican waters. These vessels are equipped with dinghies and use SCUBA or hookah diving technology to harvest conch. These plants are licensed by the government to take a percentage of the national quota. However, vessels, divers and crew are often leased or hired from Honduras and the Dominican Republic (FAO 2003).

Catch Data

Table 10 shows the temporal trends in total landings of marine fish, conch and lobster in Jamaica from 1998 to 2007. An annual average of 8,221.29 mt of marine fish was landed during this period; however, no information was made available regarding species composition of these catches (Murray 2008).

Production of conch averages annually 882.47 mt from 1998-2007, but production in this fishery has generally declined over the period. This is a result of deliberate management initiative whereby the national quota have been reduced in accordance with population assessments done by the FD. In 1998, conch catches amounted to 1,700 mt whereas in 2007, only 640 mt were landed. It is important to note that in 2000 the fishery was closed due to litigation. By the opening of the fishery in 2001 the national a conch quota of 946mt was imposed by the government (FAO 2003) . In contrast, lobster industrial landings have generally increased over the last decade, passing from 170 mt in 1998 to 300 mt in 2007.

Table 10:
Estimated Landings (mt)* of Marine Fish, Conch and Lobsters caught in Jamaica, 1998-2007

Species Type	Year									
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Marine fish	6,045.18	7984.13	5139.52	6327.84	8342.21	5436.16	9495	8536.78	13067.83	11838.24
Conch	1700	1366		946	946	504.25	550	640	650	640
Lobster (Industry)	169.66	284.23	287.77	166.77	130.23	294.69	450.81	300	300	300

Source: Murray (2008)

<u>Technology Improvement & Extension Programs</u>

The Fisheries Division generally conducts research to improve the management of fisheries and preserve marine resources. According to Murray (2008) the following projects/researches are the main priority areas for the Division:

- **Lobster Conominium Project**
  - **Objectives**:
    - Investigate the feasibility of deploying lobster condominiums to enhance the survival of juvenile spiny lobsters.
    - Establish juvenile enhancement systems and lobster larvae monitoring programmes.
  - **Strategy**
    - A pilot project is being conducted in Bowden Bay in St Thomas;
    - Seek technical assistance from Mexico and Cuba.
    - Train staff in the use and management of condominiums and larval monitoring systems.
  - **Funding**: funds are still needed and this project would be a good candidate in terms of a short term project to be supported in the context of this baseline survey.
- **Fish Aggregating Device (FADs) project**
  - **Objectives:**

        - Employ FADs to assist in the further development of the fledging pelagic fishery
    - **Strategy:**
        - Conduct experimental trials in Whitehorses, St Thomas with fishermen.
    - **Funding:** financial and technical support is needed to design, deploy, maintain and manage resources. FADs.

- **Diamond-Back Squid Fishing**
    - **Objective:**
        - Develop a diamond-back fishery in Jamaica.
    - **Strategy:**
        - The search for diamond-back squid began in 2004 with the collaboration of: The University of the West Indies, the Caribbean Maritime Institute, the Caribbean Fisheries and Training and Development Institute (CFTDI), and the Japan International Cooperation Agency (JICA).
        - Training in diamond-back fishing of staff and fishermen.
    - **Funding: Financial support is needed to conduct a comprehensive assessment to determine the potential for the development of a diamond back squid fishery.**
- **Assessment of Fish Production**
    - **Objectives:**
        - Collect catch and effort data;
        - Collect biological data;
        - Assess exploited fish and shellfish stocks;
    - **Strategy:**
        - A sampling plan has been implemented for the collection of biological and fishery data.
    - **Problems:**
        - Limited number of staff to cover a large number of beaches; hence number of sampling days is high;
        - Limited resources available for transportation;
    - **Funding:** financial support is needed to reduce the limitation of human resources and materials.

Technical and Research Capabilities

Research has been a priority for the Fisheries Division of Jamaica. The division has both wet and dry laboratories, vessels and various equipment to conduct basic fishery biology research. Further, the qualifications of the ten (10) officers that are involved in fisheries research ranges from a first to a second degree. Finally, most of these officers are trained in using software such as Excel, S-Plus, FISAT, SPSS, and Statistica.

CHAPTER 4: AQUACULTURE DEVELOPMENT COMPONENT

4.1 Policy, Supporting Legislation, Development Plans

Policy

Despite the fact that Aquaculture has been practised in Jamaica for over 30 years, there is no approved and recognized National Policy. However the draft national fisheries policy addresses aquaculture development and management. The draft policy has undergone several layers of stakeholder consultation, and is currently sitting to presentation to the Government for approval.

Given concerns about declining fish stocks and the rising demand for fish aud fish products in the domestic market as well as globally, aquaculture is seen as a most important component in the development and management of fisheries resources. The GoJ will therefore establish, maintain and develop an appropriate legal and administrative framework that facilitates the development and management of responsible aquaculture, including an advance evaluation of the effects of aquaculture development on genetic diversity and ecosystem integrity, based on the best available scientific infonuation.

The policy adopts the following key strategies:

- To regulate and control aquacuiture activities, including preventing the release of exotic species into the wild
- To promote development and expansion of the culture of aquatic flora and fauna to limits dictated by marketing possibilities, including export, without damaging wetlands, lagoons. mangroves, reefs or other sensitive areas.
- To improve collaboration with other stakeholders and to ensure the development of standards for both food fish and ornamental fish species.
- To foster the development of culture of indigenous species.
- To achieve cost recovery for assistance to aquaculture enterprises, research and evelopment.

Key elements of the Strategy are as follows sumarised in ANNEX 1

Direct Legislation

The Fisheries Division is the Administrative Management Authority for the aquaculture sector. There is no legislation in the current Fishing Industry Act (1975) for the management and development of Aquaculture.

The Fisheries Division is in the process of reviewing its legislation and a draft bill has been prepared which contains a component on Aquaculture, and makes provisions for the following:

- Aquaculture permits.
- Matters to consider for aquaculture permit.
- Cessation of aquaculture activity.
- Permit holder to remove aquaculture.
- Control of importation and introduction of live fish into Jamaica.

Supporting Legislation

The Water Resources Act (1995)

The Water Resources Authority regulates ground water supply in Jamaica using the Water Resources Act (1995). Under the Act, a license is required for the abstraction and use of water. However, if the person has the right of access to the source of water, a permit is not required. The sinking or alteration of well requires a permit.

The Natural Resources Conservation Act (1991)

This act established the Natural Resources Conservation Authority, which is mandated to manage the physical environment of Jamaica thus ensuring the conservation, protection and proper use of the island's natural resources. Under the NRCA Act, the discharge of effluents into open bodies of water requires a permit. The NRCA also has the authority to request environmental impact assessments where this may be deemed necessary. Aquaculture licenses are required for farms above a minimum stipulated acreage.

The Wildlife Protection Act (1945)

The Wildlife Protection Act prohibits the release of noxious substances into the environment. Consequently, it is important for consistent monitoring and regulating of effluents. The Natural Resources Conservation Authority has developed general industrial trade standards for effluent discharge. Effluent permits are required for the discharge of effluent into waterways. The agency is in the process of developing standards more suited to aquaculture. The Wildlife Protection Act also protects endangered species and prohibits the killing of endangered species (e.g. crocodiles). Mangrove permits are required for the removal of mangroves. Predator control permits are required for the control of predators e.g. crocodiles and water birds that prey on fish.

The Beach Control Act (1956)

This Act vests the rights in the foreshore and floor of the sea in the hands of the Crown. Any encroachment or use of the sea floor will require a license.

The Endangered Species (Protection, Conservation and Regulation of Trade) Act 2000

This act prohibits the international trade in endangered species. This may only be done through appropriate permits and licenses. Scientific and Management Authorities have been established to monitor the trade in animals on the first, second and third schedules of the Act .

The Animal (Diseases and Importation) Act.

This Act is administered through the Veterinary Services Division of the Ministry of Agriculture and Fisheries. It controls the importation of animals into the country. It also establishes procedures for the quarantine of imported animals, and in the case of diseased animals: quarantine, control and slaughter of animals in the event of an outbreak of a communicable disease.

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

The Veterinary Services Division also administers this act. It provides legislation for the export of aquaculture and fishery products and by-products from Jamaica. All processing facilities on land and at sea require licenses. An export health certificate is required for the export of such products.

Institutional Support for Aquaculture in Jamaica

The above-mentioned legislative framework suggests a high level of institutional support for the sector in Jamaica. The specific institutions that contribute to the aquaculture sector are as follows:

- Fisheries Division, Aquaculture Branch
- Tilapia Fish Farmers association.
- Jamaica Ornamental Fish Farmers Association.

- Ministry of Agriculture and Fisheries.
    - Veterinary Services Division.
- NEPA.
- Water Resources Authority.
- Ministry of Health.
    - Pharmaceutical Div.
    - Pesticide control Div.
- Ministry of Industry and Commerce.
    - Jamaica Exporters Association.
    - Jamaica Trade and Invest.
- Environmental NGO's

However from discussions with sector stakeholders it is recognized that there exists considerable institutional support; however there is a concern that

- There is fragmentation and duplication of services which often create bureaucratic bungling
- The uncoordinated approach often results in agency roles and support not being clearly defined.
- Lack of technical know-how, especially in the departments outside of the Ministry of Agriculture and Fisheries.

To this end, it is felt that there should be consolidation of roles with the creation of a one-stop portal to facilitate sector development.

The layered nature of institutional support stems from the lack of a clearly defined or articulated policy/development plan for the sector.

One possible objective of this JICA-CRFM programme could be to identify all the agencies and their roles, review same, and streamline them to conform to the current draft policy initiative. Such an activity would fit neatly into current Public Sector rationalization and restructuring efforts.

4.2 Aquaculture Development Status regarding Stated Policy Goals and Development Objectives

In the absence of a formal policy on Aquaculture, such a comparison is not possible; however at best one can look at the draft policy and see where the industry is within that context of the key element of the policy

- To regulate and control aquaculture activities, including preventing the release of exotic species into the wild; *Several exotic cultured species (notably the Australian Red Claw, Plecostomous spps, Haplosternum spp, Carps and Ornamental Cichlids) have become established within the natural environment and are cause for concern. The number of invasive species and their effects on local flora and fauna should be investigated.*
- To promote development and expansion of the culture of aquatic flora and fauna to limits dictated by marketing possibilities. including export, without damaging wetlands, lagoons, mangroves, reefs and /or other sensitive areas. *Effects of aquaculture effluent on waterways were not considered during early development, and is reflected in farm designs. Attempts to retro-fit farms to satisfy environmental standards are most often cost phrobitive and in some instances physically impossible.*
- To improve collaboration with other stakeholders and to ensure the development of standards for both food fish and ornamental fish species. *Stakeholder collaboration/dialogue is healthy and in absence of policy has guided R&D, grants and general direction of the industry to date.*
- To foster the development of culture of indigenous species. *Except for efforts at the culture of the Mangrove oyster, efforts in this direction have been woefully lacking. It is hoped that there will be renewed efforts in this direction, particularly with respect to select marine finfish species.*
- To achieve cost recovery for assistance to aquaculture enterprises, research and evelopment. *Current cost recovery to the Administrative Authority IFU is negligble, primarly due to absence of enforcement/regulatory powers. This should soon change if new Fishereies Act is tabled. The IFU should also play a greater R&D role especially in the area of Broodstock development and seed supply*.

The absence of policy, legislation and formal development objectives has seen the emergence of farmers associations and cluster groupings, the more important being the Jamaica Tilapia Growers Association, The Tilapia Cluster, and the Jamaica Ornamental Fish Association. All three sector associations have in the past (and continue to) lobby government to facilitate industry growth. Some requests have been sector-biased; but for the most part, representation has been fair and has contributed to the continued survival and growth of the sector.

4.3 Aquaculture and Market Characteristics

Tilapia

The Local Market

Most fish farmers rely on vendors to buy and distribute their product. The product is sold at the farm-gate to the vendor who will take it from there to market. The farmer may also sell tilapia to restaurants, hotels, supermarkets and other distributors. Some retail their own products. The local vendor trade and associated post-harvest handling of fish is unhygienic at best, and appropriate cold chain processes can be employed to ensure adequate phytosanitary standards.

The Export Market

Up until 2007, one major company sold tilapia on the export market. The main importing countries were the United States of America, the United Kingdom and Belgium. Increased local cost of production relative to global competition has resulted in the cessation of tilapia exports outside of Jamaica.

In 1997, 283.7 tonnes of fresh tilapia fillets, 97.2 tonnes of frozen fillet, and one tonne of frozen whole tilapia were exported to the USA. This is the equivalent of around 1,155 tonnes of whole live tilapia. In 2003, Jamaica exported 39,950 pounds of frozen tilapia fillet to the USA at a value of US$77,952

Jamaica is not able to compete with Taiwan Province of China on the price of whole frozen tilapia, which fell from US$1.56 to US$1.12/kg on the US market from mid 1997 to mid 1998. The main competitive advantage is Jamaica's proximity to the USA and good air links, which enable Jamaica to compete on the fresh fillet market. Wholesale prices for fresh tilapia fillets were between US$7.37/kg and US$8.25/kg in the USA during 1997. Prices for frozen fillets were a little lower at US$5.50 to US$6.60/kg. (Halcrow, 1998).

Jamaica's fish farmers have lost market share over the past 18 months, with locally produced frozen tilapia fillets replaced by imported Chinese product. After minimal duties this product is around half the price of the comparable domestic product. Despite speculation the effects of competition from cheap imports has yet to berealized.

Locally, *Tilapia* also suffers from initial issues it had with off-flavor when the product was first introduced, which led to resistance from the marketplace that still has a residual effect on both the demand for the product and the price it can command. Most local farmers have solved this problem by producing 'off-flavor-free' fish. However, the problem of acceptability has been further exacerbated in recent years by large scale importation from China and Latin America of *Tilapia* (sometimes with an off flavor).

Export of aquaculture products to the USA requires that the farm and processing facility meet HACCP certification standards. The Veterinary Services Division of the Ministry of Agriculture and Fisheries administer the oversight of these standards. There are no specific labeling standards for aquaculture products, only general labeling requirements. The Jamaica Bureau of Standards administers the labeling standard and executes labeling and packaging laws.

At present, only one processing plant exists which is EU-certified for Tilapia and marine shrimp.

The demand for farmed marine shrimp is also strong with local demand completely absorbing all the supplies of the locally farmed product.

Fresh water prawn demand is on the rise partly fuelled by the influx of Spanish Hotels and by extension European visitors to the Island.

The volumes of Oysters traded locally are unknown. The product is sold on the streets by local vendors and the product form is "fresh on the half shell" with a local pepper sauce, and a drink "Oyster Punch". There is currently a project spearheaded by the FD to increase market acceptance of the product, which will eventually be realized. Investment in increasing levels of production should also follow.

High numbers of tourist arrivals (2 million/year) coupled with a resident population of 2.98 million present a target market of approximately 5 million persons. As consumer preferences develop, post-harvest handling, packaging and value added products have the potential to be developed and improved..

4.4 Current Levels of Aquaculture Production by Species

History

Inland Aquaculture

- 1949, when *Oreochromis mossambicus* was brought to Jamaica from St. Lucia in the eastern Caribbean, this was part of a Government program to increase rural protein through subsistence farming. Community watershed ponds were stocked with tilapia.
- 1960's used a monosex culture of hand-sorted male tilapia fingerlings. At that time yields in earthen ponds was 1 250 lbs/acre/yr.
- 1976, Commercial aquaculture was introduced through a jointly sponsored USAID/GOJ Project. This was a two phase project. In the first phase Auburn University was granted a contract to supply the technical expertise for this project. The first phase of the project led to the development of the Inland Fisheries Unit which trained staff in the various disciplines in aquaculture and equipped the Government of Jamaica with an institution with the capability and technical expertise needed to design and implement inland fisheries and aquaculture development.
- another variety of tilapia *Oreochromis niloticus* was introduced. This led to major increases in tilapia production. At the beginning of 1977 tilapia production was 2.2 tonnes and by 1987 it had increased to 2,600 tonnes.
- 1980 The second phase of the project began and was entitled the Fish Production System Development Project. The aim of this project was to expand the practice or rural aquaculture development. This was met with great success and led to commercialization of tilapia farming. Most people who participated in the early programs are still involved in fish farming.
- 1984 Major investment by an Israeli firm growing Tilapia and *Macronbrachium Spps*. was seen as successful and eventually was bought by Local firm Jamaica Broilers Group.

Several other species were introduced; (Chinese/Indian carps, *Collosoma spps*. and Australian red claw), however these were not well received by the public.

Most farms in Jamaica operate semi-intensive units. There was an increasing trend towards intensification of fish culture especially among the larger farmers. Semi-intensive culture occurs when the only input is feed, whereas intensive culture is when fish are fed, aeration is added and the stocking density of the fish is increased.

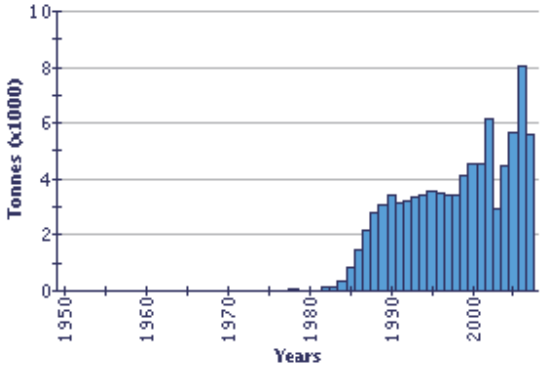
In semi-intensive culture fish are stocked at a density less than 30,000/ha, in green water and fed supplemental diets with minimal water exchange occurring..

The 1998 Halcrow Study gives an overview of the freshwater tilapia production systems that are used in Jamaica; the details of which are in **APPENDIX 3.**

The Jamaica Broilers Group has a feed mill (Master Blend) that produces tilapia diets. These contain 28 percent to 32 percent protein and cost approximately J$10.50/kg (US$0.16) to J$14.00/kg (US$0.21) depending on exact formulation, whether they are supplied in bulk or in bags and whether they are formulated as pellets or a mash. For super intensive culture, extruded (floating) feed is imported (mainly from Burris Mill & Feed Inc., USA) costing from J$17.50 /kg (US$0.26). Feed conversion rates are in the region of 2.1-2.5 in the hatchery, improving to 1.5-2.0 in grow-out. There is one other company producing fish diets in Jamaica – Seprod – although Master Blend accounts for most of the market. Ingredients for the diets are almost all imported and include fishmeal, soya, corn, wheat flour, vitamins and minerals.

Historic levels of Tilapia production and recent earnings and current levels of Tilapia production are presented in Figure #1, Table 11 and Table 12 respectively

Figure 1:
Reported aquaculture production in Jamaica (from 1950)



(Source: FAO Fishery Statistics, Aquaculture production

Table 11: Economic Value of the Aquaculture Industry[12]		
Descriptor	**Output (Tonne)**	**Value (J$'000)**
Tilapia (actual 2006)	7,543.3	1,508,600
Shrimp (actual 2006)	476.1	238,050
Total (2006)	8,019.4	1,746,650
Shrimp (estimated 2007)	1,000.0	500,000
Total (estimated[13] 2007)	8,540.0	2,008,000
Total Seafood Trade (exports and imports, 2007)	-	6,658,710

TABLE 12:
Source and Consumption of Fish in Jamaica 2001-2007

	2001	2002	2003	2004	2005	2006	2007
Estimated domestic marine catch (mt)	6,327.84	8342.21	5436.17	9,495.50	8,536.78	13,067.83	11,838.24
Total imports of fish (mt)	31,225.18	33,546.55	36,052.10	18,352.81	18,369.95	22,125.33	22,062.19
Farmed Tilapia (mt)	5,000.00	5995.44	2968.50	4,200.00	4,795.00	7,543.35	5,600.00
Estimated total fish consumption (mt)	42,553.02	47,884.20	44,456.77	32,048.31	31,701.73	42,736.51	39,500.43
Estimated total fish consumption (kg)	42,553,022.00	47,884,203.00	44,456,765.00	32,048,307.00	31,701,726.89	42,736,513.36	39,500,427.51
End of Year Population	2,611,100.00	2,619,400.00	2,632,000.00	2,644,100.00	2,656,700.00	2,669,500.00	2,682,100.00
Estimated per capita consumption (kg/cap)	16.30	18.28	16.89	12.12	11.93	16.01	14.73

Sources: Fisheries Division, Ministry of Agriculture & Fisheries and Statistical Institute of Jamaica (STATIN)

Tilapia production has been steadily increasing year to year since its inception. Within the past 5 years, the production levels have fluctuated around the 5000 MT figure with dips in production attributed to damage from hurricanes.

[12] Economic and Social Survey Jamaica, 2006, Planning Institute of Jamaica (PIOJ)
[13] Jamaica Fish Cluster Baseline Survey, 2008

A more recent and possible reason for production decline can be attributed to the loss of export markets and subsequent dismantling of contract farming arrangements.

Table 12 indicates that there is a slight decrease in the annual Per Capita consumption of fish, and that if a targeted campaign to increase this value were interlinked to locally produced tilapia as the supply source, local market requirements would increase considerably.

Marine Aquaculture

History

- 1977; a pilot project to study the culture of local oysters in Bowden Bay, St. Thomas by the University of West Indies, Mona Campus, with the support of IDRC. In Bowden Bay spawning of the oysters and subsequent spat collection occurs during the rainy season.
- 1984; Expanded oyster culture project supported by Ministry of Agriculture, UWI and CIDA. Project saw some amount of success in production technologies; however requisite marketing efforts were lacking. Project still exists, however the natural spat fall is threatened due to coastal zone development.
- 1987; Post-Graduate research mariculture of red hybrid tilapia at Dept of Life Sciences UWI. Results demonstrated that there was a red hybrid strain that demonstrated equal growth and fecundity to its freshwater counterpart. Attempts to conduct low cost cage culture systems failed due to parasitic infection by monogenetic trematode.
- 1995; *Penaeus Vannamaei* hatchery went in operation, owned by the then Jamaica Flour Mills (JFM). Business model was to import naupli and carry them through to PL stage and re-export to Panama; proposed maturation facility never materialized, and JFM was taken over by ADM, which divested itself of all activities outside of it's core business i.e. flour milling.
- 2000; Pilot 20 Ha commercial shrimp grow-out facility, (Caribbean Mariculture Products) along with support facility for maturation and hatchery included. The project was supported by the then Jamaica Agricultural Development Foundation (JADF) and, UWI
- 2002; 200 Ha commercial penaeid shrimp farm went into operation supported by Trans Global Fishery.
- 2008 Major disease problems associated with imported naupli, coupled with high costs associated with the importation of feed has seen diversification into mariculture of tilapia.

Data for shrimp production is sketchy. However in 2006,476.1 tonnes were produced. A recent baseline study completed by the Jamaica Fish Cluster has indicated that the production of shrimp has increased significantly to 1,000 tonnes.

Oyster production data is sparse. In the mid 1980s to the early 1990s oyster production average some 3,000 dozens of marketable oysters yearly. The 3 active oyster farms (East Harbour, Port Antonio, Geen Island, Davis Cove, Hanover and Belmount, Westmoreland) have been closed since 1993-1994. The FD still maintains the oyster spat collection system and produces spat that would translate to some 17,000 dozens of oyster.

Fresh water prawn production was recently (2007) restarted by a private firm and production data was not available.

Marine aquaculture is a relatively new and possibly high-risk area given the vagaries of Hurricanes. A general lack of resources and capacity currently hinder further development in this area.

4.5 *Knowledge on Aquaculture Issues by Category*

General issues relevant to the overall sector are highlighted in **ANNEX 2.**

Some of the issues critical to the sustainability of the tilapia sector are as follows:

- Given WTO agreements, cheap tilapia imports are flooding the local market. If allowed to continue at the current rate, local aquaculture producers will face business closure as happened in the past with the Dairy and Cattle industries. Efforts to combat this situation could be:
  - Non Tariff Barriers
  - Lower the cost of production by
    - Expanding area under production whilst adopting a more extensive production model
    - Establishment of clusters / cooperatives to achieve economies of scale allowing for trade advantages with respect to border in and out inputs.
    - Make available adequate terms of financing primarily reduction of interest rates.
- High feed costs
- Security
- Creation of a National Policy which is critical to the provision of direction to the sector.
- Product eco labeling

Current coastal marine shrimp farming activity is extremely dependent on imports of all inputs necessary for production. Given the fact that local demand for marine shrimp exceeds local farm output tenfold, competing uses for coastal zone resources along with possible environmental concerns is justification for closer examination of the viability of the sector.

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

Small-scale aquaculture operations are a critical tool to rural agricultural diversification especially on the heels of heavy dislocation arising from the fall-out associated with cessation of preferential trade agreements offered to sugar and bananas. Issues specific to small-scale aquaculture are as follows

- Post harvest handling.
- Land tenure and availability
- Availability of good quality seed stock
- Adequate extension support given the fact that any increase in production would have to take place within a geographic location far away from the current productive focal points.
- Adequate market support.

Priority areas; for which targeted interventions would greatly strengthen the institutional framework and capacity of the IFU toward supporting small-scale aquaculture enterprise in Jamaica are as follows:

a. Improvement in Extension Services.
b. Research and Development specifically brood stock improvement and determination of optimal production models given current completion from cheap imports.
c. Institutional Strengthening through the granting of equipment to facilitate R&D efforts
d. Training.

There are currently no stock enhancement programs in Jamaica. However rapid/dramatic decline in the health of the coastal environment threatens to diminish coastal food resources, and as such acts as justification for efforts towards using aquaculture to support stock enhancement.

4.7 Technical and Research Capabilities of Fisheries

Research is driven by the needs of the Industry. However, no single body establishes what the research priorities should be.

The organizations and institutions involved in applied research, education and training in Jamaican aquaculture are as follows

- Fisheries Division,
- Scientific Research Council,
- University of the West Indies
- College of Agriculture, Science and Education
- Private sector

The Fisheries Division has an Aquaculture Branch, which provides support to the development and management of aquaculture in Jamaica. The unit is comprised of a Director, a Research Officer, Aquaculture Extension Officer, technical and non-technical support staff. The major work programs of the Aquaculture Branch centre around providing technical and extension support to food fish and ornamental fish farmers. The staff is competent; most with over twenty years of experience in aquaculture. They have also benefitted from a range of training in the field of aquaculture and mariculture.

The Fisheries Division through the Aquaculture Branch (formally the Inland Fisheries Unit) has been conducting applied research and training in aquaculture since its inception. However, due to inadequate resources, most of these activities are curtailed.

The Aquaculture Branch has a strong extension service but minimal research capabilities. Research is in collaboration with other research institutions such as the Scientific Research Council and the University of the West Indies (Mona). In recent times, research into the preparation of locally available fish feed material has been conducted. A market study on oysters using a local research company was produced.

UWI has offered a final year six-week course in aquaculture since 1984. This course in now combined with Fisheries and titled “Fisheries and Aquaculture Technologies”. In the academic year 2005/2006, the UWI introduced a new MSc. Program in Coastal, Estuarine and Marine Biology of which aquaculture/mariculture is a component (Department of Life Sciences).

The Department of Life Sciences also operates a marine laboratory at Port Royal, Kingston Jamaica. Research at this facility has centered mainly on mariculture e.g. mariculture of corals, sea urchins, sea horses, and the culture of algae for the feeding of penaeid shrimp. Applied research in the Life Sciences Department in relation to tilapia culture has largely centered on acclimatization of red hybrid tilapia in cages to seawater, stocking density variations and effects on growth rates and protein digestion.

The College of Agriculture Science and Technology offers aquaculture both in their Natural Science Program and in their Agriculture Program. This operates as an elective in both its Associate of Science Degree Programs in General Agriculture and Natural Sciences and an elective in its Diploma of Agriculture Program.

An aquaculture program is offered through H.E.A.R.T at a technical and vocational facility at Ebony Park, Clarendon.

CHAPTER 5: REGIONAL FISHERIES DATABASE DEVELOPMENT COMPONENT

5.1 Policy and Data Management Documents

The Draft Fisheries Policy and the Draft Management Plan do not explicitly state the importance of the FIS to fisheries management. However, there are some instances of implied relevance of the FIS to the management of the fisheries and the link to the goals and objectives.

There is currently no documented Data Management Plan that would outline procedures to ensure consistency of data quality.

With respect to a policy on access to data, the Access to Information Act in Jamaica governs the dissemination of data. Also, the Director of Fisheries would also from time to time grant permission for access to data. Sensitive data such as detailed fish catches by fishers are not divulged. However, there is the need for a policy and set guidelines to be formulated.

5.2 Data Collection – Current Situation

There are numerous landing sites across the country. The FD estimates that there are some 186 fishing beaches (142 legally recognized as Fishing Port under the Fishing Industry Regulations) which are divided into three (3) zones. Each zone has a Chief Fisheries Instructor who is responsible for the supervision of several data collectors (Fisheries Instructor) within each zone. In total, there are 15 Fisheries Instructors, 3 Chief Fisheries Instructors as well as 6 Fisheries Officers who has, as part of their core function, the responsibility of participating in the data collection activities across the island. The data collected by each Instructor/Officer is sent to the FD for data entry by the Data Entry Clerk. The Data Entry Operator checks the forms for any inconsistencies before entry is done, as well as after entry. This process takes a maximum of one month. The Data Manager receives the data from the operator on a monthly basis for assimilation and further validation. The Table below summarizes the data present in the FIS.

Data	From	To	Gap	Computer Programme	Form
Catch and Effort	1993	2009	None	CARIFIS and Art Basic	
Biological Data:					
Shrimp	1996	2009	3mth gap in 2008	CARIFIS	
Sprat	1996	2009	none	CARIFIS	
Lobster	1996	2009	3mth gap in 2008	CARIFIS	
Conch	1996	2009	none	CARIFIS	Database
Catch and Effort	1993	2009	none		
Biological Data:					
Shrimp	1995	2009	3mth gap in 2008		
Sprat	1995	2009	none		
Lobster	1995	2009	3mth gap in 2008		
Conch	1993	2009	none		Data forms

Queries are conducted in Microsoft Excel.

5.3 Data Management – Current Situation

The Data Unit of the Fisheries Division in the Ministry of Agriculture and Fisheries is the entity responsible for the FIS. Data is stored on one (1) desktop computer and an external hard drive is used to keep a back-up copy of the data. This back up occurs at 2-week intervals. Compact discs are used to store back-up data. There is no off-site back up and the computer, paper files, external hard drive and CDs are kept in the same room. There is a high risk for loss of data due to fire, flood or theft.

Multiple computer programs are used to enter and store data. These include CARIFIS, Microsoft Excel® and Microsoft Access®. Problems cited with CARIFIS include instances where the software malfunctioned, lack of technical support and the need for more training in the program.

Summary Statistics are periodic, mainly on a monthly and quarterly basis. Some stock assessments are periodically carried out in Jamaica. Stock assessments are performed at the Annual CRFM Scientific Meetings on lobster and conch.

5.4 Information Dissemination

The summarized fisheries information is sent to the Ministry of Agriculture and Fisheries, FAO, CRFM, Planning Institute of Jamaica, Statistical Institute of Jamaica, Jamaica Defense Force - Coast Guard, University of the West Indies, Mona, amongst other key stakeholders.

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There is some link between the data and management decisions. In recent times, the FIS has provided information used to change the mesh size for finfish traps and adjust the minimum size for lobsters. However, much more can be done if more in-depth stock assessments were done in-house.

There is need for improved stakeholder involvement in the 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 Jamaica Fisheries Department is close to adequate 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*	22	24	2	Yes
Data Input Clerks	2	2	0	Yes
Fisheries Statistician	1	2	1	Yes
Total	**17**	**29**	**12**	

** 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 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
- One External Hard drive
- One portable hard drive

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 offices and vehicles dedicated to meet the needs of 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 Workshop with the Staff of the Fishery Division

Brief Overview of the Workshop

PCM and ID/OS workshop has been held on August 14, 2009, in a meeting room of the fisheries department. PCM workshop has been held separately for marine fisheries and aquaculture. The staff members from the head office and the aquaculture branch have taken part in the workshop.

Problem Analysis

In the problem analysis of the aquaculture sector, "inadequate extension service" for small-scale farmers was set as the core problem and was broken down to its root causes. According to the discussion, many of these root causes may be attributed to lack of clear aquacultural development policy and strategy.

With regard to the marine fisheries sector, declining coastal resource seems the biggest concern. Unlike the aquaculture analysis, there is no single root cause for the problem. Therefore, to find a solution, this issue has been analyzed from artisanal fishers' perspective in terms of catch amount, price of fish and operation cost. The result shows the important issues related to resource depletion are "pollution by economic activity" and "illegal fishing" and "environmental impact".

ID/OS Analysis

In the external analysis session, many community- related issues were addressed as negative factors both in marine and aquaculture sectors. As community participation and capability are vital to succeed in coastal resource management in many countries, there is a need for a strategy to improve these community related issues. Many environmental issues were also addressed. There are concerns of the negative impact on fisheries by industry development, including the tourism industry. Water and irrigation issues are also serious concerns for the aquaculture sector. There are also many issues, both positive and negative, in relation to other government organizations.

The internal analysis shows that the fisheries division has many weaknesses rather than in organization framework such as strategy, structure and human development. Like other countries, "input" also has many weaknesses. However, the quality of the staff was addressed as a strength and output of the organization also strength.

Other Information

During the survey period of the JICA study team, two researchers from Cuba had been conducting a study for their stock enhancement program for lobster. They also participated in workshops and provided comments.

6.2. Output from Workshop with Local Fishers

Brief Overview of the Workshop

A workshop with 21 small-scale fishers was held to assess the issues and their needs in Raetown on the 13th of August 2009. An Interview survey was conducted in Hellshire, Port Henderson for coastal fisheries and Hillrun, Bogwalk, Bowde, St. Thomas and Portland for small-scale aquaculture from the 11th to the 20th of August 2009.

Summary of the Community

Many small-scale fishers in the southern region of Jamaica live along the coastline and sometimes form fishing villages. There are cooperatives in those fishing villages as well as landing sites. However, a cooperative's function is usually limited to providing gear storage and selling fishing gear. Many fishers are not members of a cooperative, with the exception of boat owners. Thus, fishing operations and marketing activities are mostly done individually and organized community activities are hardly observed.

Although Jamaica is famous for its tilapia culture, most production comes from large and middle scale farmers. However, the number of small-scale farmers is increasing. Those farmers are operating individually with no community organization.

Present Status of Local Fishery

In the southern region of Jamaica, there are two types of fishers. The first type is targeting coastal fish especially yellowtail snapper using long line, gill net and fish pot. They have been able to identify fish catch trends for yellowtail snapper. According to their experience, the high season for the species is July and the low season is January. The fishing area is relatively far from their landing site. In the past fish were caught along the coastline. However, recently only few fish were caught, necessitating the fishing to occur 20 to 90 miles away from coastline, thus increasing their operation costs. As small-scale fishers don't have access to various market channels, they usually sell their catch locally. According to fishers, Jamaicans prefer purchasing fish with both the head and tail still intact rather than a filleted fish. Therefore the fishers focus more on snappers as opposed to large pelagic fish.

The study teams interviewed scuba diving fishers who target lobster and coastal fish with spear guns. According to their reported experience, the resource condition has worsened due to sewage as well as the anchoring of large vessels adversely affecting the environment. The fishers are also concerned about restrictions imposed upon spear fishing Small-scale aquaculture farming is still in the development stage and only a small number of people have operations. As of the survey period, three farmers out of four have not yet gotten a harvest. However, many people seem interested in aquaculture as an alternative, especially after the recession of 2008.

Needs of Local Fishers

Since the fishing ground is getting further away from the coastline, Fishers are requiring larger vessels. This necessitates proper storage for gear and outboard engines to decrease theft as well as a wharf for easier landing of the catch. Also the development of underutilized species will help the Fishers s to alleviate impact on decreasing coastal species. Lobster fishers have addressed the need for artificial reef deployment and support for cheap gear imports as their primary needs.

Small-scale aquaculture farmers identified the need for more technical assistance since many lack basic experience. Finance is another big issue for current farmers and new recruits since they usually lack sufficient capital.

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

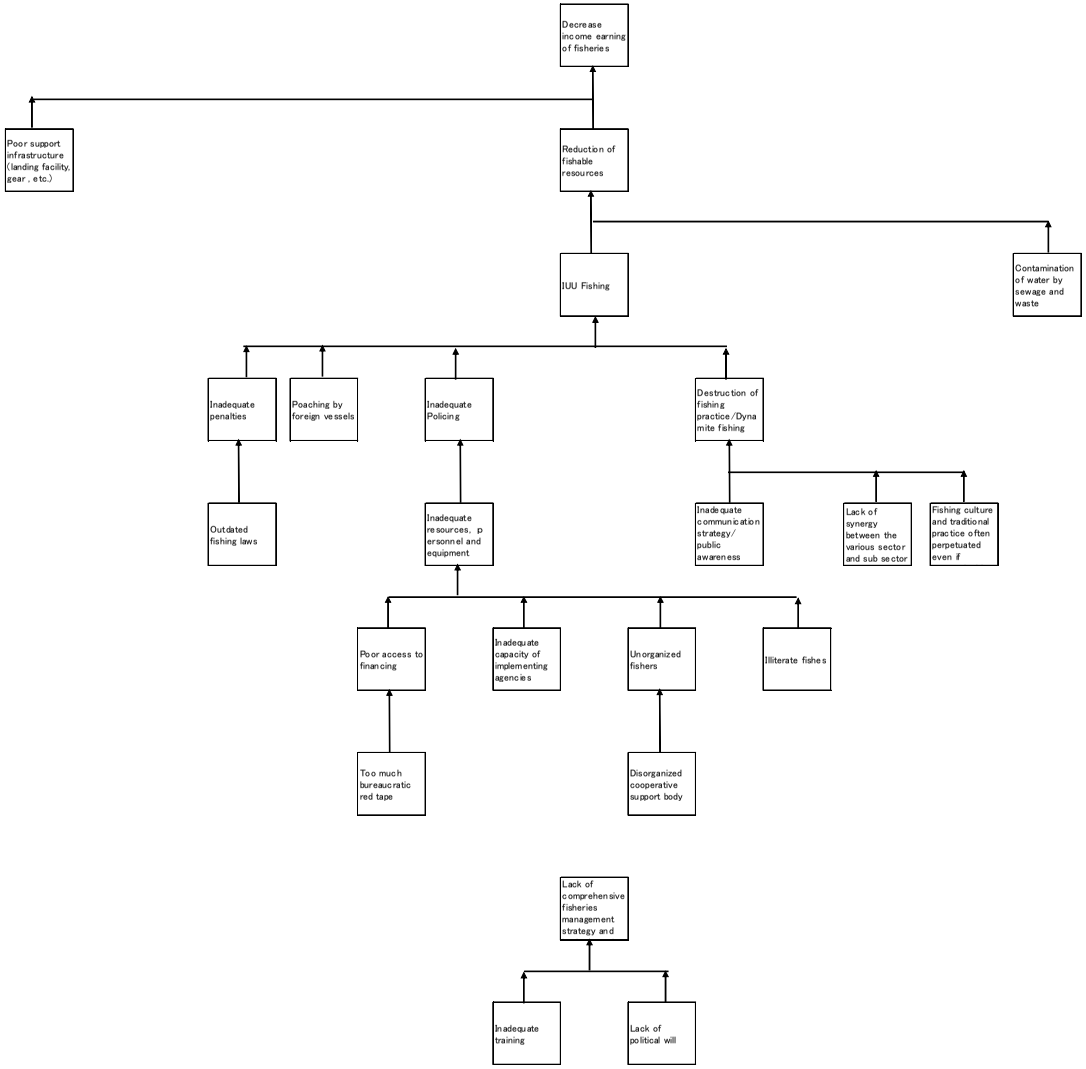
In Jamaica, three key fishery-related issues were identified; namely 1) the development of pelagic fish, 2) integrated management of lobsters and 3) the development of a community extension service for small-scale aquaculture.

The first issue reflects the pressure on coastal fish from many small scale fishers, despite the obviously declining stock. To reduce such pressure on the species and secure fishers' livelihood, diversification of fishing targets is vital.

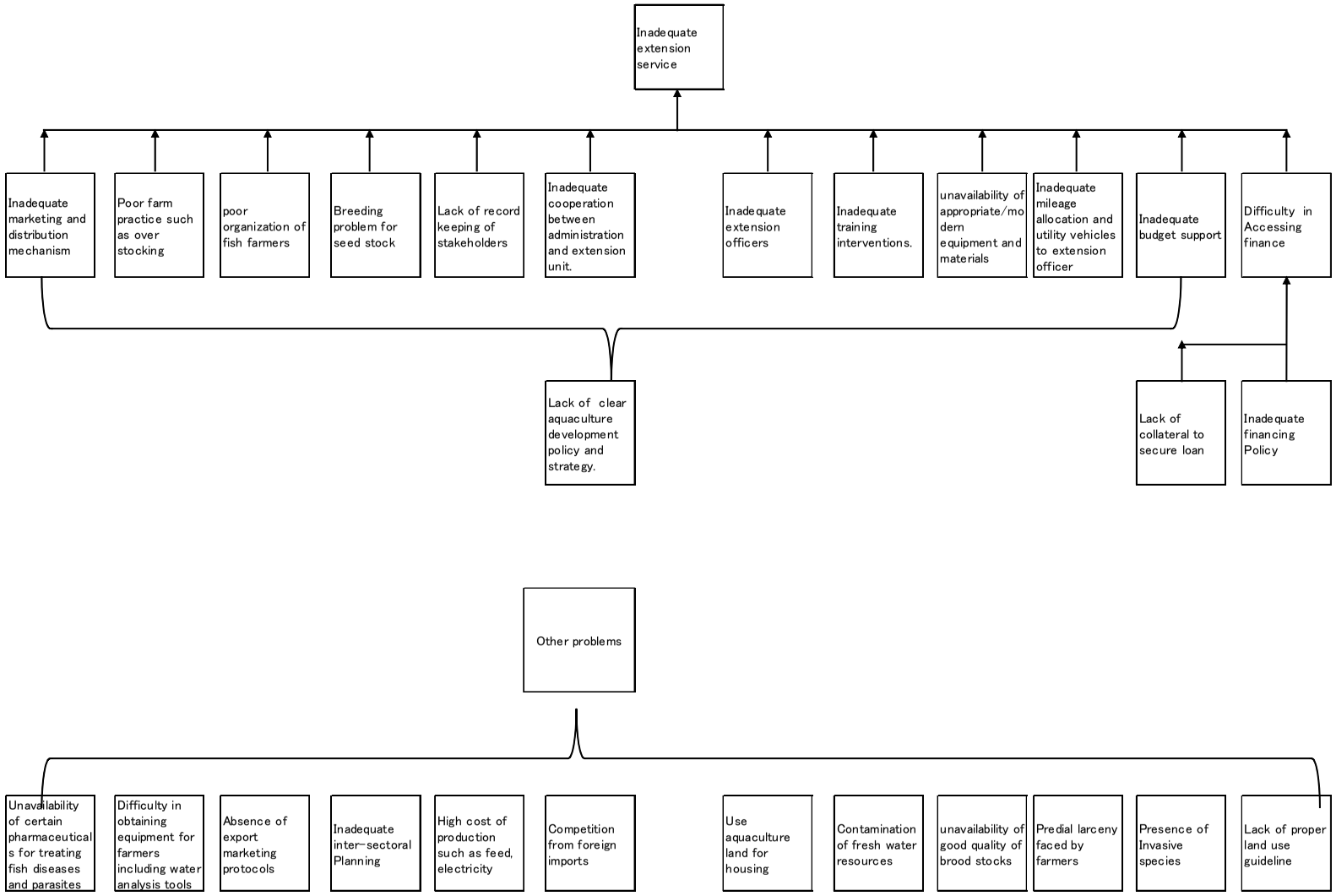
The second issue has already been addressed by a Cuban researcher, and the study team proposes the integration of the Cuban project with a JICA scheme in a synergistic manner. The Cuban project involves five areas of focused improvement: 1) monitoring; 2) management plan; 3) capacity building; 4) integrated law enforcement; and 5) resource enhancement.

The third issue is addressed through an aquaculture training program to improve small-scale aquaculture farming. The training comprises two different programs, the first of which targets domestic small-scale farmers. The objective of the domestic training is to improve technique and knowledge of small-scale farmers who are then able to be a community extension arm for small-scale aquaculture. The other training is to be held regionally, with the objective of disseminating techniques in aquaculture to other countries.

RESULT OF THE PCM WORKSHOP (Fishery)

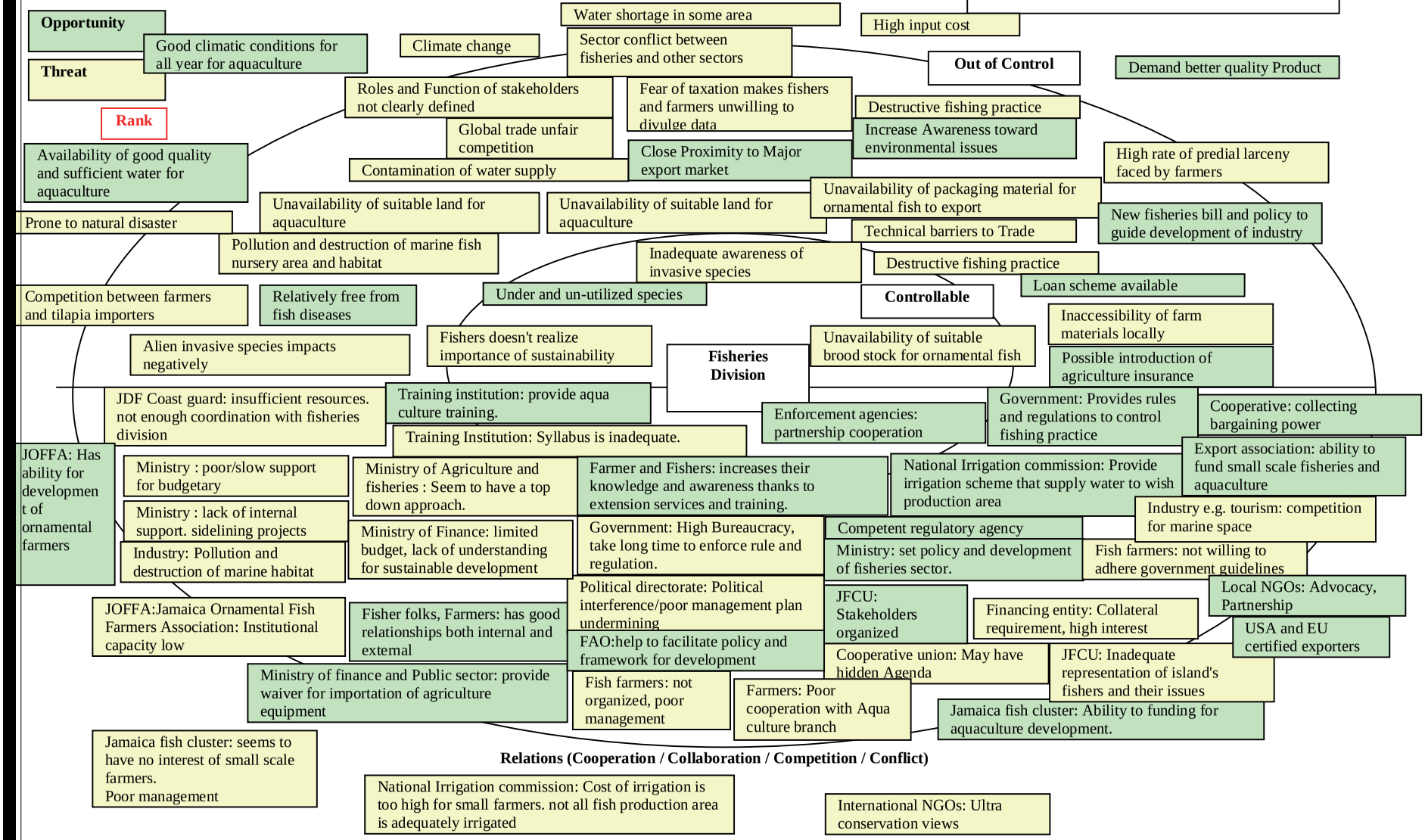


RESULT OF THE PCM WORKSHOP (Aquaculture)

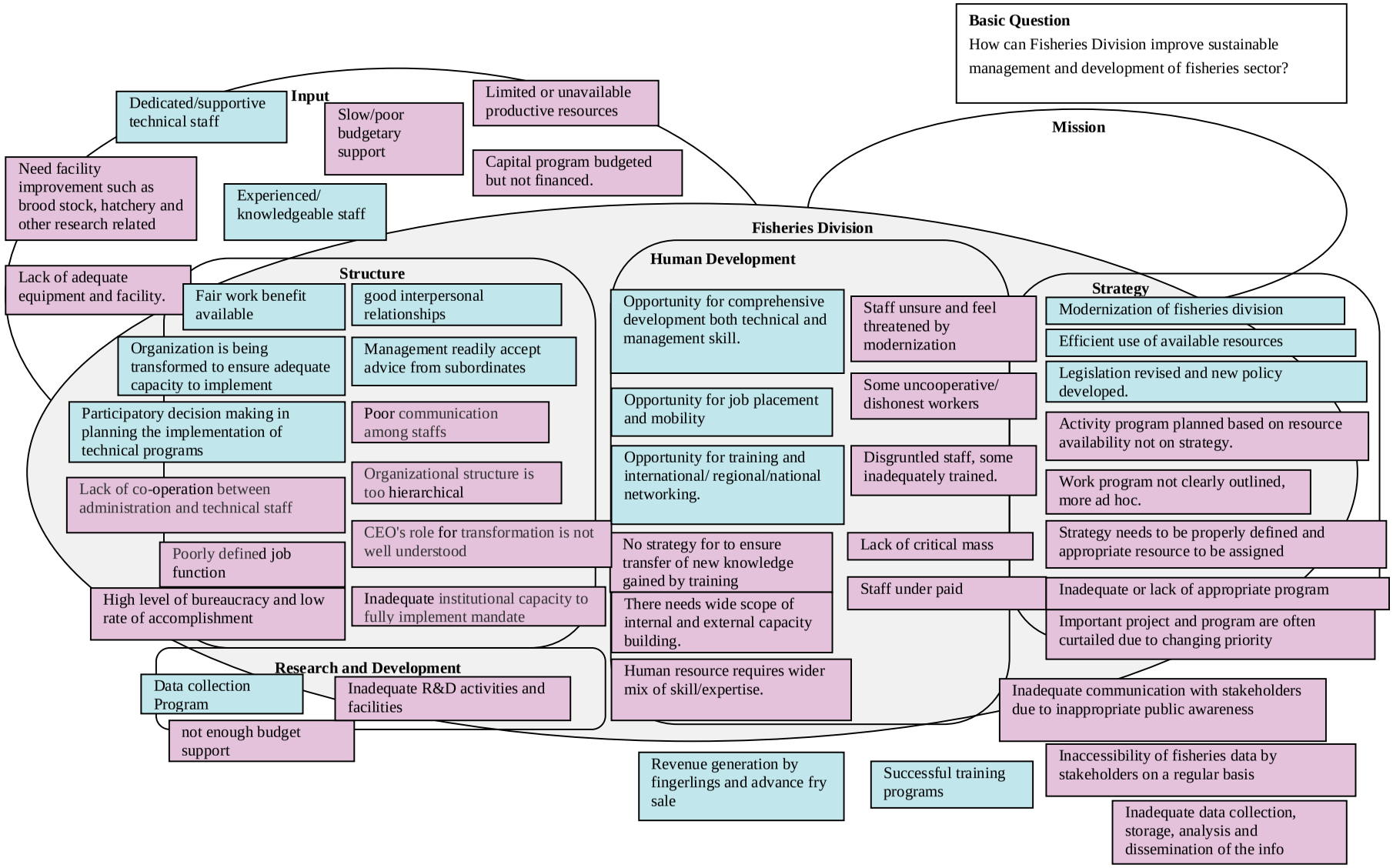


RESULT OF THE ID/OS WORKSHOP (External Factor Analysis)

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



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



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ANNEX 1

Key Elements of Strategy associated with the Draft Aquaculture Policy

1. Produce and regularly update aquaculture development strategies and plans, ensuring ecological sustaniability and compatability with shared user resourses
2. Develop and implement a registration and licensing system for aquaculture to be tied in with the management plauning process. (Registration and licensing of farmers and traders may be an effective means of combating praedlial larceny).
3. Promote active participation of aquaculturists. their communitiesand environmental organizations in the development of responsible aquaculture management practices.
4. Develop appropriate mechanisms to monitor the impacts of inputs used in aquaculture: Establish effective procedures specific to aquaculture for undertaking environmental assessment (EIAs) and monitoring with the aim of minimizing adverse ecological changes and related economic and social consequences resulting from water extraction. land use. discharge of efflueiits. use of drugs and chemicals and other aquaeulture activities: Require that before registration an aquaculture farm should meet the applicable environmental standards.
5. Establish appropriate mechanisms, such as databases and infonnation networks, to collect, share and disseminate data related to aquaculture activities in order to facilitate cooperation in planning for aqua culture development at the national level: establish mandatory data reporting standards.
6. Implement zoning of lands for aqua culture development plans and make provisions for adequate water supply.
7. Encourage aquaculture development particularly by fishermen who used to fish in Zones 12 and 2. in order to relieve the fishing pressure on the reef fisheries.
8. Rresearch to limit bird predation.
9. Execute plans to culture native species e.g. mullet (*Mugil* spp.)
10. Investigate possibilities for expansion of culture of Tilapia and other types of food fish (carps. collosoina etc.) and ornamental fish, in keeping with marker conditions.
11. Encourage the development of commercial oyster farming and Irish Moss culture, since the necessary research work has been done.
12. Provide key role (research, extension services) in the growth of aquaculture hence preventing monopolies.
13. Encourage aquaculture and marictilture research, in collaboration with scientific institutions and stakeholders.
14. Investigate subsidies and incentives and explore possibilities for an amicable financing regime for aquaculture development

ANNEX 2

Critical Issues affecting the General Aquaculture Industry

Primary activities	CRITICAL ISSUES
Seed Supply	Insufficient and inconsistent supply; Farmers require 10-15g while suppliers are only supplying 1g
Grow out	Inefficient aquaculture practices which reduce production capacity; Good management practices are needed extension and training would play a very important part in increasing productivity
Processing	Limited processing and present mainly among the larger farmers. There are three processing plants which process aquaculture products. One of these is HACCP certified and approved to export to the European Union. Most fish are sold live and are scaled and gutted upon purchase. These conditions are unhygienic and need improvement. However, large processing facilities exists
Market Aspects	Marketing and distribution of aquaculture products is limited and largely concentrated around the centres of production and in the major cities. There is a need to improve the marketing and distribution of the products so that they are more visible across the island. The potential exists for satisfying a reasonable portion of the local market. Marketing arrangement needs to be formalized. Presently, farmers complain about the farm gate price they get from vendors. Farmers need to work as a cooperative thus ensuring more effective distribution of the products.

	A market study and marketing strategy were recently devised through the Jamaica Fish Cluster to look at the scope of demand and strategies to effect better distribution of the product.
Consumer acceptance	Consumer acceptance of the red hybrid tilapia is improving; however, issues of off favor still persist.
Food Safety	Post harvest practices need to be improved.
Support Activities	**CRITICAL ISSUES**
Social	There needs to be better organization of fish farmers. This will ensure that there is a collective voice that can drive the further development of aquaculture and ensure that greater priority is placed on aquaculture development. In the 1980s it was proposed that a National Aquaculture Development Committee should be established in order to guide policy as it relates to aquaculture development.
Economic	Financing; availability of loans with low interest rates, reasonable repayment schedules and collateral requirements. Start-up costs are high due to the capital intensive nature of aquaculture. Some farmers experience limited cash flow during the crop cycle which results in their inability to provide sufficient feed to fish during the grow-out cycle. This leads to the crop cycle being longer than required. Increase earnings of small farmers
Human resources	90% of all farm laborers are literate
Technology Development	Limited due to financing

Health Management	Limited, however, Jamaica boast a disease free status
Feed and feed Management	Sinking feed is available locally and the Aquaculture Branch provides extension services as it relates to feed management and increasing Feed Conversion Ratio (FCR)

ANNEX 3 General Description of Tilapia Production Systems.

In Jamaica, the use of earth ponds predominates due to the relatively lower construction and maintenance costs. At least 50 percent of these ponds are supplied by irrigation schemes.

The most common system is still water ponds where water is only added to the ponds at the initial filling, and then again to make up for seepage and evaporation losses, although sometimes greater flushing is required if water quality deteriorates or a blue-green algae bloom develops. The stocking density of these ponds depends on whether there is any supplementary aeration. Without aeration, final densities of up to 4-5 tonnes/ha are possible. The use of aeration allows higher fish densities (approximately 10 tonnes/ha), whilst flowing water allows stocking densities to rise much higher (over 100 tonnes/ha).

Tilapia farming occurs in three or more phases. The general model for Jamaica is that fish are spawned in ponds with stocking densities of around 10 000-12 000 fish per ha. Fry are captured before they are 5 days old and transferred to concrete tanks. They remain in the tanks fed a diet containing methyl-testosterone (to produce all-male fry) for about 28 days. Then they are transferred to nursery ponds where they remain for about 120 days. Stocking densities at this point are 100 000-150 000/ha for non-aerated to moderately aerated ponds. For flow-though ponds, stocking densities can be over 600 000/ha. The final grow-out phase lasts between 90 and 180 days depending on the size of fish required.

Grow-out itself is split into two phases with the stocking density reduced in the final phase to improve growth rates. Any smaller females (unsuccessful sex reversals) are graded out at this point. For still water ponds without aeration, stocking densities are in the region of 15 000/ha. This climbs depending on the use of aeration and increase in water flow, through 60 000/ha to 200 000/ha. Aquaculture Jamaica, and a small number of other producers, have hatchery, nursery and grow-out facilities. Many of the smaller producers buy fingerlings and only have grow-out ponds.

Fingerlings are sold at a range of 15 - 40 g. Individual pond cycles are therefore in the region of 100-150 days with a couple of weeks between each to dry and treat the pond with lime. This gives approximately 2.2-2.8 cycles per year. However, a whole cycle of tilapia (fry to harvest) is between 240 and 360 days depending on final harvest size, stocking density, feed quality and time of year (growth is slower during the winter). Overall productivity cited by Aquaculture Jamaica was as follows:

- Toll Gate site = 11.7 tonnes/ha pond area/year.
- Barton Isle site = 34.5 tonnes/ha pond area/year.
- Contract farmers = 10.5 tonnes/ha pond area/year.

Most of the contract farms are supplied with 15 - 30 g fingerling fish from Aquaculture Jamaica. The higher production at Barton Isle is a reflection of the higher intensity of the methods used. It is estimated that smaller farmers, perhaps without aeration, are probably managing 5-6 tonnes/ha/yr. The normal harvest weight is between 3/4 and 1 1/4 lbs (340-570 g), the larger sizes used for fillets.

FINAL COUNTRY REPORT: ST. KITTS & NEVIS

October 2009

St. Kitts & Nevis

Country Profile

Geographic coordinates	17° 20' N, 62° 45' W
Total area	261 sq km (Saint Kitts 168 sq km; Nevis 93 sq km)
Land area	261 sq km
Water area	20,400sq km
Length of Coastline	135 km
Shelf Area	845 sq km
Territorial Sea	12nm
Claimed EEZ	20,400 sq km
Highest point (m)	1,156 m (Mount Liamuiga)
Climate	tropical, tempered by constant sea breezes; little seasonal temperature variation; rainy season (May to November)
Natural hazards	hurricanes (July to October)
Population	40,131 (July 2009 est.)
Annual Population Growth Rate	0.847% (2009 est.)
Life Expectancy at birth	total population: 73.2 years
Languages	English
Ethnic Mix	predominantly black; some British, Portuguese, and Lebanese
Work force	18,170 (June 1995)
Unemployment	4.5% (1997)
GDP (PPP)	$759.5 million (2008 est.)
GDP Growth rate	2.4% (2008 est.)
GDP per Capita (PPP)	$19,100 (2008 est.)
Currency Unit	East Caribbean dollars (XCD) US$1 = EC$2.7
Area of Mangrove Forests	n/a
Percent of Mangrove Forests Protected	n/a
Per Capita Food Supply from Fish/Fishery Products (2000)	*
Exports	machinery, food, electronics, beverages, tobacco

Sources: CIA World Factbook – St. Kitts and Nevis (2009); EarthTrends Country Profiles – St. Kitts and Nevis

Abbreviations and Acronyms

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

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CHAPTER 1: INTRODUCTION

St. Kitts (or St. Christopher) and Nevis are two volcanic islands with steep mountainous slopes. They are located to the east of the Virgin Islands, to the south and west of the Leeward Islands of Anguilla, Antigua and Barbuda, and to the south and east of Puerto Rico. Each island maintains a separate political identity, and as **The Federation of St. Kitts and Nevis** they became an independent state in 1983. It is a member of the Caribbean Community (CARICOM), the Organization of Eastern Caribbean states (OECS), and the British Commonwealth of Nations.

In 1998, a vote in Nevis in a referendum to separate from Saint Kitts fell short of the two-thirds majority needed. Nevis continues in its efforts to separate from Saint Kitts.

The fisheries of St. Kitts and Nevis (SKN) are mainly artisanal and marine. Fishing operations target demersal reef fish - with 80% of the registered vessels and 75% of fishers engaged in this activity. In 2002 and 2006 Japan funded the Basseterre Fisheries Complex and the Old Road Fisheries Complex, which are expected to boost fisheries production; the following facilities were established: a community fishery center building, a boatyard, a jetty, a slipway, an ice machine, lockers and other facilities.

In St. Kitts, most fish are sold directly from fishing boats to consumers or vendors, while some is sold at the Basseterre and Old Road complexes., In Nevis, a small proportion is sold to the Nevis Fisherman's Marketing and Supplies Cooperative. Much of the lobster and conch is exported or sold to local hotels and restaurants.

The majority of the catch consists of **demersal species** of the shallow reef and shelf areas. Target species include: hind (Serranidae), doctor fish/surgeonfish (Acanthuridae), triggerfish (Balistidae), grunts (Pomadasyidae), squirrelfish (Holocentridae), snappers (Lutjanidae), goatfish (Mullidae), parrotfish (Scaridae), and groupers (Serranidae). Conch (*Strombus gigas*) and the Caribbean spiny lobster (*Panulirus argus*) are also harvested.

Deep slope species include snappers and groupers.

Inshore/coastal pelagics harvested in St. Kitts include gars (Belonidae), ballyhoo (Exocoetidae and *Hemiramphus* spp.), jacks (*Selar crumenopthalmus* and *Caranx* spp.), herrings (*Clupea* spp.), silversides (Atherinidae), anchovies (Engraulidae), needlefish (Belonidae) and small tunas. Despite accounting for only 10% of registered vessels and less than 3% of fishers, coastal pelagics comprise approximately 40% of the landings each year.

Large pelagics targeted in SKN include sharks, dolphinfish (*Coryphaena hippurus*), tuna and mackerels. Billfish (swordfish and marlin) are reported in the large pelagic fishery of SKN.

There is no local or foreign shrimp trawling in SKN.

Demersal shallow reef and shelf fishes are caught by Antillean Z-traps or handlines, and sometimes by spear guns. Antillean 'Z" traps are more common in Nevis, while rectangular and arrow traps are more numerous in St. Kitts. Many vessels deploy a combination of handlines and traps. Conch and a very small percentage of lobsters are harvested by scuba divers. Most lobsters are caught with the same finfish traps which are baited.

Deep slope species are caught with traps or handlines. Mesh size restrictions apply to traps used in this fishery, according to Fisheries Regulations, No. 11 of 1995.

Coastal pelagics are caught mainly with seine nets, sometimes set from the beach, and sometimes by gillnets. There are about six seine vessels employing traditional seining methods and operated mainly by older fishers.

Trolling (sometimes referred to as towing) is used to catch **large pelagics** for both islands, and it is the fastest growing technique in St. Kitts over the five years leading up to 2001. In St. Kitts, trolling lines are usually of 80-100 lb test with a single hook. Mustard #4-#8 are used regularly. Artificial lures are sometimes used, especially for the tuna and mackerel species, but fishers prefer to use ballyhoo or flyingfish to catch dolphinfish. Live bait is sometimes used with hand lines to catch tunas. FADs (fishing aggregating devices) have been deployed successfully and have resulted in increased catches of large pelagics.

In 2001, the FAO reported that the fisheries sector comprised 331 registered fishing vessels (188 in St. Kitts and 143 in Nevis) and 613 registered fishers (263 in St. Kitts, and 350 in Nevis). The FAO (2000) reported general vessel information for St. Kitts: registered boasts are 10-30 feet long, with most (38%) between 16-20 feet, and about 7% over 25 feet. About 95% of the fishing vessels use outboard motors ranging from single 15 hp to twin 150 hp motors. Forty-five percent of boats have a power rating from 40-48 hp, while 14% have a power unit of 75 hp or more.

The shallow reef and slope fisheries occur in waters 9-180 m (5-100 fathoms). Trip duration is between 6-36 hours, typically including 1-4 crew members. Handliners set 4-12 hooks. For trap fisheries, the soak time is approximately 1-5 days. Crew size is reported as typically two persons. The quantity of traps carried by each vessel varies from 25-40. Inshore fisheries for coastal pelagics operate within 9 km (5 nm) from shore, although some vessels fish 27-31 km (15-20 nm) offshore. Vessels are between 8-10 m in length, powered by one or two 40-65 hp outboard engines. Crew size varies from 5-8, although 50 persons can be involved in hauling in a beach seine. Coastal pelagics are also caught by monofilament gillnets set in the near shore reef, rocks and reefs. Gillnets are 33-100 m in length and 3.3-5 m deep.

Nylon-constructed beach seines for coastal pelagics are 180-550 m long and 5-15 m deep. Seines have a stretched mesh size of 2.54 cm (1 in). The seines are deployed before dawn and are pulled in by mid-day.

In St. Kitts, efforts to catch large pelagics are concentrated from January to June, but some catch is reported from October to December, and fishers venture up to 56 km (35 miles) from home port to pursue these species.

Most full-time fishers in SKN average about 3-4 trips per week.

According to the CRFM website there are nineteen (19) fish landing sites on the two islands – eleven (11) on St. Kitts and eight (8) on Nevis. The map on the right shows five (5) on St. Kitts and seven (7) on Nevis. Data provided for 2009 on the number of fishers and fishing boats by landing site on St. Kitts (see Table 1) gives us three (3) additional landing sites there.

The CRFM web site advises that there were 350 fishers on St. Kitts (about 46% full-time), and 300 on Nevis (about 70% full-time). Data provided for 2009 on the number of fishers by landing site on St. Kitts (see Table 1) indicates that there were 576 fishers on that island (about 33% full time).

Whereas the laws of SKN require boats to be registered before they may be used for fishing, they do not need a license to engage in fishing. Fishers do not need to be either registered or licensed.

TABLE 1: Number of Registered Fishers and Boats by Landing Site, St. Kitts, 2008

LOCATION	BOATS	FISHERS
Basseterre East	104	156
Basseterre West	22	86
Boyds	10	15
Dieppe Bay	31	72
Sandy Point	27	54
Conaree	9	28
Old Road	17	53
Frigate Bay	4	21
TOTAL	**224**	**485**

TABLE 2: Number of Registered Boats by Landing Site, Nevis, 2008

LOCATION	BOATS
Charlestown	41
Jessups	16
Cotton Ground	5
Jones Bay	16
Newcastle	22
Long Haul Bay	5
Indian Castle	7
TOTAL	**112**

St. Kitts and Nevis has four (4) fisher's cooperatives (one on Nevis); and one fisher's association (not a legal entity). These are listed below with the approximate number of members.

TABLE 3: FISHERS' ORGANIZATIONS, LOCATIONS AND MEMBERS			
	Name of Organization	**Location**	**Approx. Membership**
1	Basseterre Fishermen's Association	St. Kitts	25
2	Sandy Point Fishermen's Co-operative	St. Kitts	22
3	Dieppe Bay Fishing Co-operative	St. Kitts	40
4	Old Road	St. Kitts	22
5	Nevis Fishermen's Cooperative	Nevis	60
		TOTAL MEMBERS	**169**

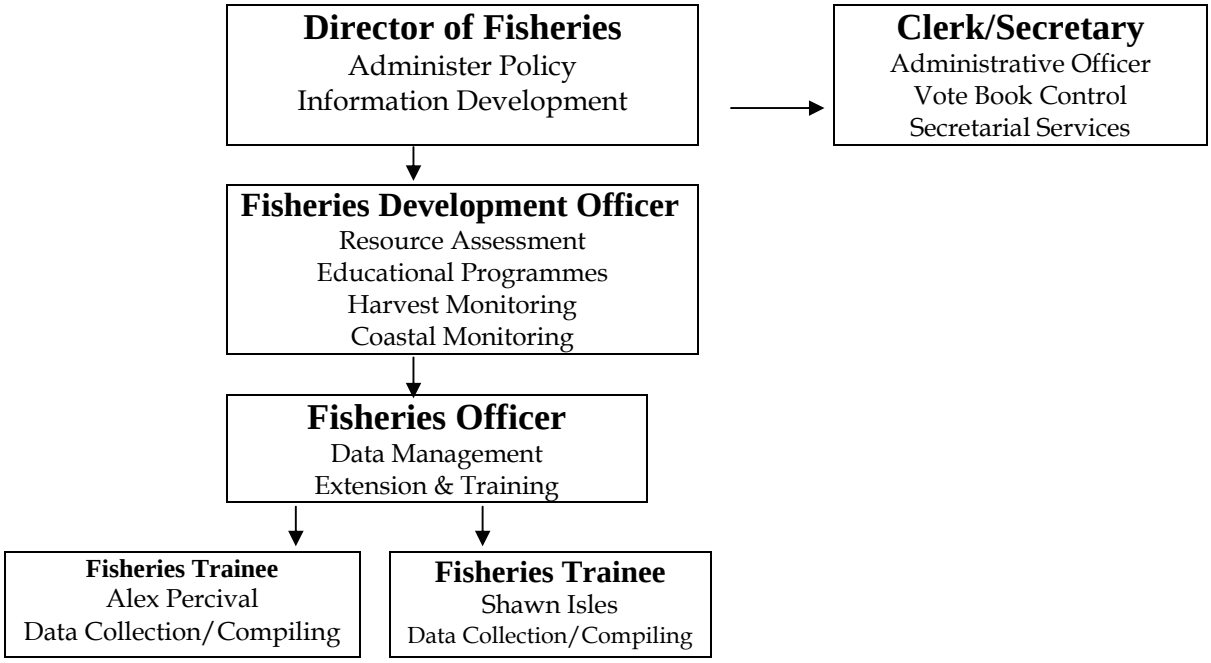
Source: SKN Fisheries Division (personal communication)

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

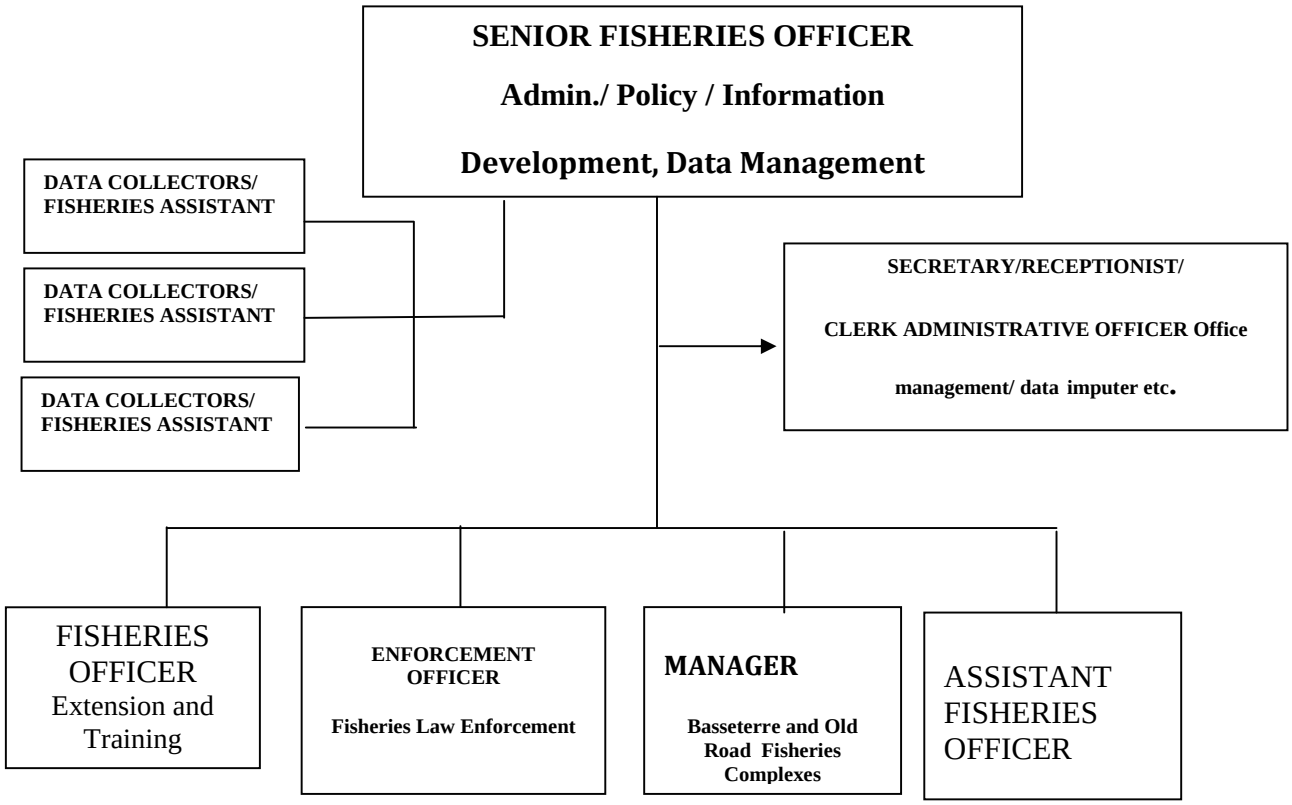
THE ADMINISTRATION OF FISHERIES IN ST. KITTS AND NEVIS

Although the islands of Nevis and St. Kitts are federated into one unitary state, and although fisheries falls within federal jurisdiction, the government of Nevis has assumed management authority over its local stakeholders while that of St. Kitts is under federal jurisdiction. *The Fisheries Departments,* in the *Ministry of Agriculture,* and the *Ministry of Agriculture,* are the fisheries management authorities in St. Kitts and Nevis respectively. The two Fisheries Departments are responsible for all aspects of fisheries development and management in their separate islands. The Senior Fisheries Officer for St. Kitts is also the Chief Fisheries Officer for the Federation, and in theory the Director of Fisheries of the Nevis Fisheries Department should report to him; but in practice they operate similar and with collaboration somewhat separately. A separate organigram of each Department is attached.

STRUCTURE, DEPARTMENT OF FISHERIES -- NEVIS



STRUCTURE, DEPARTMENT OF FISHERIES, ST.KITTS



CHAPTER 2: COMMUNITY-BASED FISHERIES MANAGEMENT COMPONENT

2.1 Coastal Community Characteristics

The vast majority of the population of the Federation of St. Kitts and Nevis live on the coast since the interior of the islands is thickly forested and uninhabited. The major coastal settlements in SKN with their populations as measured by the SKN 2001 Population Census are:

TABLE 4:
POPULATIONS OF THE MAIN COASTAL SETTLEMENTS, ST. KITTS AND NEVIS, 2001

ISLAND	SETTLEMENT	MALE	FEMALE	TOTAL
St. Kitts	Basseterre	6346	6905	13251
St. Kitts	Boyds	196	188	384
St. Kitts	Dieppe Bay	340	320	660
St. Kitts	Sandy Point	1610	1557	3167
St. Kitts	Conaree	471	421	892
St. Kitts	Old Road	564	5559	1123
St. Kitts	Frigate Bay	153	169	322
Nevis	Charlestown	883	907	1790
Nevis	Jessups	207	218	425
Nevis	Cotton Ground	238	250	488
Nevis	Jones Bay	34	35	69
Nevis	Newcastle	84	89	173
Nevis	Long Haul Bay			
Nevis	Indian Castle	63	66	129

Source: St. Kitts m& Nevis 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 4 above[1], the importance of fishing to the local economy becomes apparent.

2.2 Policy, Legislation, and Supporting Institutional Arrangements

POLICY

The GOSKN has ~~not~~ chosen to prepare a **National Fisheries Policy** for St. Kitts and Nevis.

One (1) **Goal of Fisheries Management** and eight (8) **Objectives of Fisheries Management** are outlined therein; the goal is to:

> *Develop and increase the potential of marine living resources to meet human nutritional needs, as well as social, economic, and development goals.*

The eight (8) **Objectives of Fisheries Management** are to:

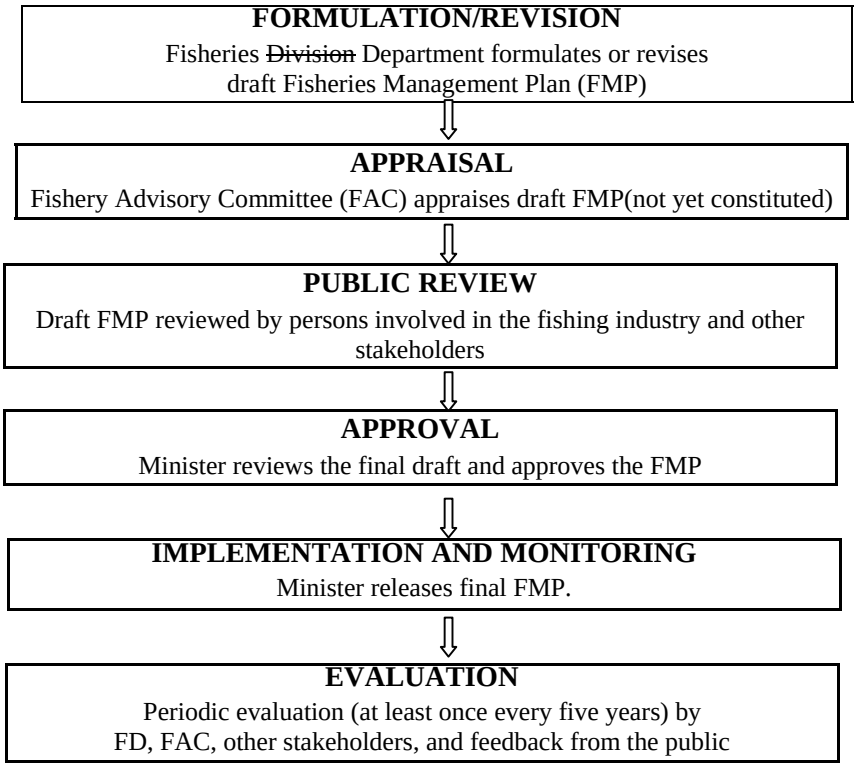
[1] Each boat may have as many as four or five crew members, and each boat may supply three or more fish vendors; and each player in the industry may support two or three other family members.

1) Ensure that the fishing industry is integrated into the policy and decision-making process concerning fisheries and coastal zone management.
2) Take into account traditional knowledge and interests of local communities, small-scale artisanal fisheries and indigenous people in development and management programs.
3) 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
4) Promote the development and use of selective fishing gear and practises that minimize waste in the catch of target species and minimize by-catch of non-target species.
5) Ensure effective monitoring and enforcement with respect to fishing activities.
6) 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.
7) Promote scientific research with respect to fisheries resources.
8) Cooperate with other nations in the management of shared or highly migratory stocks of commercial importance to Grenada.

The second policy objective states that it will "*take into account*" traditional knowledge and interests of local communities, small-scale artisanal fisheries and indigenous people, but it does not say that they will be consulted or that they will be able to participate in the process of fisheries management.

The 2007 draft **Plan for Managing the Marine Fisheries of St. Kitts and Nevis will be** approved following the process set out below:

Fisheries Management Planning Process



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

The 1996 FMP says very little about the involvement of the stakeholders in fisheries management planning. In the fishery-specific management plans "co-management arrangements" is almost always proposed as a management option, but then in the action plan following it, no concrete action is proposed. The fishermen are almost always to "be educated", not involved in finding solutions. In one place the strategy proposed to combat overexploitation is to "Encourage implementation and co-management of proposed Marine Protected Areas", and to "Institute local management authorities where appropriate". This has been pursued but was not successful.

At the end of the section, the meaning of "co-management arrangements" is discussed thus:

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

Source: Fisheries Division (1997)

The adoption of "co-management arrangements" is discussed as one option among many. The foreseen advantage is that it will be cost-saving, while the predicted disadvantage is that it will require difficult initial negotiations. No staffing or training preparations are recommended.

In summary, the 2007 draft **Plan for Managing the Marine Fisheries of St. Kitts and Nevis** does not pay sufficient attention to the involvement of fishers, fisher organizations, fishing communities and other stakeholders in the management of fishery resources.

The 2007 draft Plan for Managing the Marine Fisheries of St. Kitts and Nevis proposes thirteen (13) objectives of fisheries management are proposed, as follows:

- To ensure that the fisheries sector is integrated into the policy and decision-making process concerning fisheries and coastal zone management.
- To maximize the development of the fishery sector through efficient, well coordinated and cost effective management, thereby creating viable employment and stable sources of income for the fishers and the communities involved in fisheries related economic activities.
- To maximize the amount of fish protein available for domestic consumption consistent with sound resource management practices.
- To develop the fishing industry in terms of modernization of fisheries infrastructure and use of appropriate fishing vessels, gear and methods.
- To maximize the value to the economy of St. Kitts and Nevis of the limited fisheries resources exploited sustainably through cost effective harvesting, value added processing and expansion and diversification of markets.
- To take into account traditional knowledge and interests of local communities and small-scale artisanal fishers in development and management programmes.

- To maintain or restore populations of marine species at levels that can produce the optimal sustainable yield as qualified by relevant environmental and economic factors, taking into consideration the relationships among species.
- To protect and restore any endangered or threatened marine species.
- To preserve rare or fragile ecosystems, as well as habitats and other ecologically sensitive areas, especially, sea grass beds, reefs and other spawning and nursery areas.
- To promote scientific research with respect to fisheries resource management and development.
- To ensure effective monitoring and enforcement with respect to fishing activities.
- To cooperate with other nations in the management of shared or highly migratory stocks.
- To strengthen the capabilities of the governmental and related institutions to manage the fisheries and to provide the policies and investment incentives to achieve the above mentioned objectives.

In terms of the involvement of fishers, fisher organizations, fishing communities and other stakeholders in the management of fishery resources, the 2007draft **Plan for Managing the Marine Fisheries of St. Kitts and Nevis** does not show any improvement over the one a decade earlier. The "*traditional knowledge and interests of local communities and small-scale artisanal fishers*" are to be taken "*into account*", but participation is still not an objective. Interestingly, the last objective specifically seeks to "*strengthen the capabilities*" of the government "*and related institutions*" to manage the fisheries, but there is no proposal to strengthen the capabilities of the stakeholders.

Like the 1996 FMP, the 2006 FMP says very little about the involvement of the stakeholders in fisheries management planning. In the fishery-specific management plans "*co-management arrangements*" as a fisheries management strategy option has been replaced with "*participatory management*". However as before, in the action plan to realize it, no concrete participatory management is proposed.

Action Plan for Coastal Pelagic Fishery

Issues	Action	Implementation Strategy	Resources Required
Inadequate institutional capability within fishers organizations to sustain their economic activities and represent their members at various forums in the area of fisheries management and development.	Strengthen the institutional capability of the fishers' organisations to sustain their economic activities as well as to play their role in advocacy.	Conduct a study to determine the institutional capability of the fishers' organisations to sustain their economic activities as well as to play their role in advocacy. Based on the recommendations of the study develop and implement a plan aimed at strengthening fishers organisations.	Funds needed for training and activities to strengthen fisher organizations, DOF as lead agency.

The role here foreseen for fishers organizations is to "*represent their members at various forum in the area of fisheries management and development*" and "*advocacy*", not participation in actual policy formation or management. Again, the actions proposed do not match the strategy of "*participatory management*".

Hopefully the activities of this JICA-CRFM project will see advances in the area of the involvement of fishers, fisher organizations, fishing communities and other stakeholders in the management of fishery resources.

LEGISLATION

The St. Christopher and Nevis ***Fisheries Act (1984)*** and ***Fisheries Regulations (1995)*** which are based on the OECS harmonized legislation, govern the activities of both the Fisheries Departments of Nevis and St. Kitts.

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

Section 4: The Chief Fisheries Officer shall prepare and keep under review a Fisheries Management and Development Plan. The Chief Fisheries Officer shall consult with the local fishermen, local authorities, other persons affected by the fishery plan and with any Fishery Advisory Committee appointed under section 5.

Section 5: Minister may appoint a Fishery Advisory Committee to advise on the management and development of fisheries. It shall include the Chief Fisheries Officer and other such persons as the Minister may consider capable of advising on the management and development of fisheries.

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

Section 20: The Local Management Authority "may recommend by-laws to the Minister" regulating the conduct of fishing operations in the designated area. They must be approved by the Minister. [N.B. Other OECS jurisdictions have the wording "*The Local Management Authority* ***shall make by-laws***" (emphasis mine). The SKN Fisheries Act does not contemplate giving any such power to the LMA; they "may" only "recommend" by-laws to the minister].

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

Section 23: The Minister may declare a marine reserve.

Section 27: The Minister may designate from time to time such persons as he deems fit to be authorized [enforcement] officers for the purpose of this Act

The SKN *Fisheries Act (1984)* was passed a decade before the 1997 draft **Plan for Managing the Marine Fisheries of St. Kitts and Nevis**, yet it contains more provisions for community participation in fisheries management than the FMP. The Act says that the CFO ***shall consult*** with the local fishermen about the plan, not just ***take into account*** their traditional knowledge and interests. Section 19 takes it further and allows local fishers' organizations ***to actually manage*** a local fisheries management area, and Section 20 states that this local fishers' organization ***may recommend by-laws*** regulating the conduct of fishing operations in the designated area. This gives local fishers' organizations real power, and not just the right to be consulted. These provisions are not being acted upon.

The SKN Fisheries Regulations 1984 simply repeats the provision of the Act that the Minister may establish a Fisheries Advisory Committee:

> **FISHERIES ADVISORY COMMITTEE**
>
> 2. The Minister may establish a Fisheries Advisory Committee for the purposes of the Act.

In other OECS jurisdictions, the fisheries regulations determine the composition of the FAC, name its chair, and state some of its functions. The extreme terseness of this regulation (and its redundancy) might lead one to conclude that there is no real interest in establishing an FAC. And indeed none has been formed.

The 1984 Fisheries Act and Regulations are clear that a ***local fishing license*** means a fishing vessel license and not a ***fisherman's license***. There is no mention in the 1984 Fisheries Act or Regulations of any requirement for fishers either to be registered or licensed.

The government of the Federation of SKN has declared neither any fishing priority area nor any marine reserve under the fisheries act.

Other fisheries-related legislation includes:

- *National Conservation and Environmental Protection Act (1987)* - coastal zone management;
- *Maritime Areas Act (1984)* - resources management within EEZ waters.
- *Zoning Ordinance (1991)* - establishment of marine parks in Nevis.

SUPPORTING INSTITUTIONAL ARRANGEMENTS

While the concept of participation has been embraced by the SKN **Fisheries Act (1984)** and **Fisheries Regulations 1984**, its implementation lags far behind. The draft FMP does not reflect the approach of the legislation. The vast majority of SKN fishers are not members of an association, and there is no formal 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 no staff member at the Fisheries Departments trained in the formation and strengthening of fishers' organizations. Although the Act allows the Minister to create "local fisheries management areas", and to designate any fishermen's association as the Local Management Authority for that area, he has not chosen to do so.

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

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

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

The Fisheries Act (1984) and Fisheries Regulations (1984) specify that a Fisheries Advisory Committee (FAC) may be appointed by the Minister. The 1997 draft **Plan for Managing the Marine Fisheries of St. Kitts and Nevis** says this:

> *According to the Act, establishment of an Fisheries Advisory Committee (FAC) is optional and the draft Regulations do not spell out the composition of an FAC. Both Permanent Secretaries recognize the need for a formal advisory mechanism but would prefer separate FACs for St. Kitts and Nevis.*
>
> *Currently, most communications with the fishing industry are channeled through the Fisheries Officers (St. Kitts) and the Fisheries Assistant (Nevis) on an informal basis or at meetings. The four fishing cooperatives (3 in St. Kitts); 1 in Nevis) provide a focus for dealing with fishermen.*

In 1997 there was no thought of establishing a FAC, even though "*Both Permanent Secretaries recognize the need*". The FD will deal with the co-ops individually. This mechanism is going to

put the FD out of touch with the vast majority of fishers, as only a small number of them are members of these organizations. This position remained exactly the same in the 2007 draft FMP:

> *According to the Fishery Act, establishment of a Fisheries Advisory Committee (FAC) is optional and the draft Regulations do not spell out the composition of an FAC. There is recognition of the need for formal advisory mechanisms in both St. Kitts and Nevis.*
>
> *Currently, most communications with the fishing industry are channeled through the Senior Fisheries Officers (St. Kitts) and the Director of Fisheries (Nevis) on an informal basis or at meetings. The four fishing cooperatives (3 in St. Kitts 1 in Nevis) provide a focus for dealing with fishermen.*

The establishment of a FAC is optional in the Act because that is the policy; should the policy change, the Act could be easily amended to change the world from "may" to "shall".

In March 2008 a **National Consultation on The Draft Fisheries Management Plan for the Marine Fisheries of St. Kitts And Nevis** was held in Nevis. According to the participants list, thirty-three (33) persons were present, but only four (4) of them were fishers. In contrast, twenty-five (25) of them were government employees.

Even with this skewed attendance, coming out of the consultation were the following recommendations (listed in the order they appear in the document):

Morning Session:

1. Licensing of fishermen
2. Fishers needs to be better organized to play a larger part in the process
3. There needs to be an improvement in communication with stakeholders
4. Urgency in developing the (FAC) Fisheries Advisory Committee
5. Currently a National Fisher folk Organization is being organized. This organization could form part of the FAC

Afternoon Session:

1. Fisheries Advisory Committee (FAC) should be established as soon as possible
2. Need to establish the FAC
3. Need for better and more appropriate training programs
4. Fishers organizations needs better leadership
5. Fishers organizations needs to be better organized
6. Fisheries laws needs to be updated

In the wrap-up session some of the issues that were prominent were highlighted by participants. Some of these main issues were:

(i) The need to establish a Fisheries Advisory Committee as soon as possible
(ii) The importance of Aquaculture and it should b included in the FMP
(iii) The need for better organized Fishers organizations
(iv) the need to improve dialogue between Fisheries Officials and stake holders.

These conclusions provide strong support for the programme areas of this JICA-CRFM project.

On July 12 2007 at the conference room of the Sandy Point Fisheries Complex on St. Kitts, a National Consultation was held under the auspices of CRFM to launch a National Fisherfolk Organization in St. Kitts and Nevis. There were twelve participants: the Senior Fisheries Officer (St. Kitts); a Fisheries Officer (Nevis); one fisheries extension officer serving fishers in Nevis and the other serving in St. Kitts; one representative each from three registered fishers' cooperatives of the Federation of SKN, three officers of the Cooperatives Division, including the Cooperatives Commissioner, and two representatives of the CRFM.

The representatives from Nevis expressed some concern about the formation of one NFO for both islands, noting that from past experience both islands tended to be unequally represented. Following on some discussion on this matter, it was agreed that there was strength and greater opportunity in forming one NFO. As, such a national group would be in a position to represent its members at all levels on both islands of the Federation. Unity and solidarity was recognized as being critical to the success of the NFO.

The fishers decided among themselves to form a Steering Committee to take the process forward to the realization of the **National Fishermen's Association** (NFO). They have been meeting, and report significant progress.

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

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

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

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

CHAPTER 3: PELAGIC FISH RESOURCE MANAGEMENT AND DEVELOPMENT COMPONENT

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

There is no **National Fisheries Policy** for SKN. There is a 2007 draft **Plan for Managing the Marine Fisheries of St. Kitts and Nevis.**

Fishery Management Plan (FMP)

The Fisheries Act of 1984 requires the implementation of a Fisheries Management Plan (FMP) for the fisheries of SKN. Accordingly, the Fisheries Department completed a draft FMP for marine fisheries in April 2008. This draft document has been submitted to the Federal Cabinet for Approval (Nevis Annual Report 2008).

According to a recent survey conducted by Headley and Singh-Renton (2009), the most important management objectives of St Kitts and Nevis were:

For the conch fishery:
- To protect juvenile stocks;

For the Lobster fishery:
- To protect juvenile stocks;
- To rebuild stock in depleted areas.

Small coastal pelagic fishery:
- Habitat recovery and conservation;

Large coastal pelagic fishery:
- To protect juvenile stocks;
- To promote sustainable development of fisheries;
- To comply with international obligations.

Management Policy Strategy

Although no information was provided on the level of compliance, the Fisheries Regulations of 1995 prescribed the following measures for:

Coastal pelagics:
- Mesh size limit for beach seines and gillnets.

Lobster fishery:
- Minimum-size limits:
- Carapace length should be greater than 9.5cm;
- Restriction on fishing gears: only catches by hand, loop, pot and trap are permitted;
- Prohibition on taking berried or molting individuals;
- Closed season;

Conch fishery:
- Size restrictions: No take of immature animals, i.e. minimum shell length should be greater than 18 cm;
- Harvesting only flared lip conchs permitted.
- Harvesting only conch whose weight is greater than 225 g (after removal of the digestive glands);
- Closed seasons.

Legislation

The *"St. Kitts and Nevis Fisheries Act No 4 of 1984"* is the major law that addresses the development and management of fisheries, and the regulation of fisheries and fishing related activities in SKN. This Act provides an institutional framework for the management, planning and development of fishery resources in SKN. This Act was amended in 1992 to include provisions of the harmonized OES legislation. This Act generally gives the Minister responsible for Fisheries the authority to create fisheries regulations, and thus provides provisions for:

(1) Creating fisheries management and development plans;
(2) Creating and enforcing fishing regulations;
(3) Licensing of local and foreign fishing vessels;
(4) Regulating the processing of fishing products;
(5) Regulating the exportation of fishing products;
(6) Regulating scientific/research and testing operations;
(7) Preserving marine resources by creating management and priority areas, and by establishing marine reserves;
(8) Appointing a Chief Fisheries Officer and such other Fisheries Officers and Officers;
(9) Creating a Fishery Advisory Committee;
(10) Entering into arrangement/agreements dealing with access or otherwise in regard to fisheries matters.

Under this framework, the *"Fisheries Regulations, 1995"* were created. These regulations address issues dealing with safety equipment; the construction, registration and inspection of local and foreign fishing vessels; registration and licensing of commercial fishermen; registration and licensing of processing establishment; creation of conservation measures regarding the protection of marine species, including lobsters and conchs.

The Fisheries Act of 1984 and its 1992 amendment recommend that the Chief Fisheries Officers "*prepare and keep under review a plan for the management and development of fisheries in the fishery waters*." In 2008 stakeholders in the fishery development met in Nevis at the Red Cross Center to develop a draft Fisheries Management Plan for St Kitts and Nevis. This draft was completed in April 2008 and submitted to the Federal Cabinet for Approval (Nevis Annual Report 2008).

Also, note that fisheries management in SKN is done separately by the fisheries departments of each island. The Federation of St Kitts and Nevis has also enacted other fisheries-related Acts such as:

- The National Conservation and Environment Act of 1997 that addresses coastal zone management;
- The Maritime Act of 1984 that addresses resources management within the EEZ;
- The Zoning Ordinance Act of 1991 that establish marine parks in Nevis.

Enforcement of Regulations

The main agency involved in the enforcement of fisheries regulations in SKN is the Security Forces of St. Kitts and Nevis.

Level of enforcement

- Poor coastal surveillance;
- *Problem*: Inadequate surveillance, monitoring and law enforcement, likely due to limited human and financial resources.

Level of compliance

The level of compliance cannot be assessed because the Fisheries Departments did not return the "Information Request Sheet" for this Baseline Survey.

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

It is generally considered that coastal pelagics are under-exploited in SKN, so these resources need to be further developed. Assuming healthy stocks, the Fisheries ~~Divisions~~ Department of SKN seek to encourage new participation into the small pelagic fishery, while increasing the use of FADs in the large pelagic fishery (CRFM 2008). However, there has been no true assessment of these marine resources to evaluate their fishable biomass. Therefore, it would be important to develop some pilot surveys to determine the extent to which these fisheries can be further developed.

Because the contribution of fisheries to the economy has been increasing, SKN has achieved some of its development goals, but with much negative impact on the coastal marine environment. Many habitats need to be restored. Further, SKN has to protect the stocks of its most two important fisheries: lobster and conch; these seem to have been over-exploited; plans for their successful recovery should be encouraged and supported. Particularly, research on determining biological and fishing limit reference points for the sustainable exploitation of these fisheries are a good short-term research project to be done in the context of this study.

3.3 Fishery and Market Characteristics

FISHERIES CHARACTERISTICS

Exploited Species

Table 5 summarizes the exploitation and the management status of coastal pelagic fisheries in SKN. Coastal pelagic fishes are mainly harvested by artisanal fishery, although there is a sport/recreational fishery that operates on the large pelagic species based on annual tournaments. Wahoo, dolphinfish, the mackerel are primarily harvested by a trolling fishery from January to June, although small catches are also reported from October to December. The small coastal pelagic fishes such as the Jacks (*Selar sp*.) are primarily caught by beach seines and by gillnets.

The queen conch and the Caribbean spiny lobster fisheries are exploited by the artisanal fishery. These species are the two most commercially valuable fish in St Kitts and Nevis.

Table 5:
Status of the coastal pelagic fisheries of St Kitts and Nevis

Notes

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

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

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

Stock Status

The overall status of coastal pelagic stocks is uncertain because of their regional dynamics. It is generally believed that most stocks are moderately exploited and their local exploitation is usually assumed to be sustainable. Indeed in their 2008 national report to CRFM, the main of objectives of the Fisheries Departments of SKN were to encourage new participants into the small coastal pelagic fishery and to increase the use of FADs in harvesting of the large pelagic fishes (CRFM 2008). However, more formal studies need to be conducted to better understand the dynamics of these populations and to assess their level of abundance.

Furthermore, catch of large pelagic species in the Atlantic are commonly monitored by the International Commission for the Conservation of Atlantic Tunas (ICCAT 2008). In 2004 the CRFM conducted an evaluation of the wahoo stock in the eastern Caribbean. This evaluation of the stock determined that wahoo catches were sustainable in the region (CRFM, 2005).

Regarding the lobster and conch fisheries the main of objective of the Fisheries Divisions of SKN is to promote the recovery of these stocks (CRFM 2008). Thus, it seems that both stocks have been over-exploited, but no background documents were provided on any assessment of these stocks. Hence we cannot further elaborate on their overall status.

MARKET CHARACTERISTICS

Fishery landings are primarily sold fresh at landings sites, directly from boats, except for the main fish markets in Basseterre and in Charlestown. Table 6 shows trends in total market value of wahoo, dolphinfish, jacks, lobster, and conch produced in SKN from 2002 to 2006. Total value of these four group of fishing products has increased over this period of time, averaging EC$1.733,924annually. Lobster and conch were the two most valuable species over this period of time, yielding on average EC$738,329 and EC$594,584 respectively (Table 6).

Table 6:
Market Value (EC$) of Wahoo, Dolphinfish, Jacks, Conch and Lobster St. Kitts and Nevis, 2002-2006

Species	Year				
	2002	2003	20040	2005	2006
Wahoo	99,050.00	83,250.00	121,450.00	157,300.00	90,420.00
Dolphin fish	135,650.00	196,000.00	161,800.00	121,950.00	133,155.00
Jacks (Selar E.)	154,890.00	81,025.00	195,720.00	96,075.00	177,320.00
Conch	581,790.00	664,265.00	463,575.00	390,810.00	872,480.00
Lobster	484,250.00	816,650.00	848,045.00	854,220.00	688,480.00
Total	1,455,630.00	1,841,190.00	1,790,590.00	1,620,355.00	1,961,855.00

Source: Fisheries Department records.

Conch is the primary export species of St. Kitts and Nevis. In 2008, it contributed nearly EC$1,670,783 to the economy of the Federation. Table 7 shows monthly value of 2008 conch and lobster exports to foreign markets. A small quantity of other shellfish were also exported, but with no significant contribution to the economy.

St. Kitts and Nevis remains a major importer of processed fish products. The Federation imports fish products from countries from mostly Caribbean, North America, Europe and Asia. In 2005

and 2006 St. Kitts and Nevis processed fish importation from these regions was value to EC$2,896,650 and EC$3,849,777 respectively.

Table 7:
Value (EC$) of Conch and Lobster Exports, St. Kitts and Nevis, 2008

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total	Value(EC $)
														EC $
Conch	12855	7555	700	7920	375	420	5140	11095	6980	26645	27900	15720	123305	$ 1,670,782.75
Lobster	10	15	30	-	30	15	-	60	210	25	10	25	430	$ 6,450.00
TOTAL	**12865**	**7570**	**730**	**7920**	**405**	**435**	**5140**	**11155**	**7190**	**26670**	**27910**	**15745**	**123735**	**$ 1,677,232.75**

Source: Fisheries Department records.

The Contribution of Fisheries to the Economy of St. Kitts and Nevis

Since 2000, the contribution of Fisheries to total GDP has steadily increased and ranges from 1.29% in 2000 to 1.86% in 2006 (Table 8). In 2005 the Fisheries GDP was estimated to be US$3.8 million, which represented 31.67% of 2005 Agriculture GDP (US$12 million) (FAO 2006).

Table 8:
Contribution (%)* of the Fisheries Sector to the GDP of St Kitts and Nevis

Year	2000	2001	2002	2003	2004	2005	2006
% GDP	1.29	1.43	1.55	1.4	1.73	1.86	1.86

Source: *CRFM (2008)

3.4 Catch and Effort

Landing Sites

There are eight (8) landing sites in St Kitts: Basseterre East, Basterre West, Sandy Point, Old Road and Dieppe Bay, Boyds, Conarre, and Frigate Bay. There are seven landing sites in Nevis. Charlestown is the major landing site, harboring most boats (41) and receiving 90% of the conch catch.

Effort Data

Five hundred seventy six (576) fishermen are involved in the St Kitts fisheries, but only 190 are full time workers; 351 boats operate on this island, from which 110 were involved in catching pelagic fishes (Table 9).

One hundred and twelve (112) boats land their catches on Nevis. Most of these boats land their catch in Charlestown.

Table 9:
Number of boat by fishery type of St Kitts

Fishery Type	# Boats
Coastal pelagics	10
Conch	7
Coral Reef	223
Reef/offshore pelagics	101
Total	341

The trolling fishery operates mostly offshore, up to 50 nm. The crew usually comprises two (2) people, who use 16-40 ft-long vessels powered by two outboard engines (40-250 hp). Fishing trips typically start after dawn and may last until the late afternoon, depending on distance travelled, weather conditions, and catch level. Trolling lines are usually 80-100lb test with a single hook. Mustard #4, and-#8 are used frequently. Artificial lures are commonly used to fish for tunas and mackerel. However, in the case of dolphinfish fishermen usually favor the use of flyingfish or ballyhoo as bait (Heyliger 2009). Also, note that since the 1980's several Fish Aggregating Devices (FAD) have been employed in St. Kitts and Nevis waters to enhance the productivity of the pelagic fishery (Heyliger 2009).

The main gear used for fishing small coastal pelagic is the beach seine, which may measure 100 to 300 fathoms in length and 3 to 6 fathoms in depth. Seines are constructed with nylon twine, and have a mesh size of 1 inch diagonal stretched. Fishing trips usually begins before dawn and end at midday. Fishing operations are usually conducted with a crew of five (5) fishers, using 23-30 ft boats powered by one or two outboard engines. However, sometimes groups as large as fifty (50) fishers may be involved in hauling the nets ashore. Gillnets are also used in shallow and rocky areas. Gillnets are made of filaments, and have 2.5 to 4 inch mesh diagonal stretched. These nets may range from 100 to 300 feet, with a depth of 10 to 15 feet.

The conch fishery involves vessels ranging from 16 to 20 feet and powered by 40 to 65 hp engines. The fishery is exploited by divers that use SCUBA in deep water areas, whereas free divers exploit lobster in the shallow water areas

Catch Data

Table 10 shows the temporal trends in landings for the most important coastal pelagic fish caught by the artisanal fishery from 2002 to 2008 in SKN. Dolphin fish are the top pelagic species landed during this period, averaging 24,341.43 lbs per landing. The scads are the second highest species landed, with an average of 21,089.28 lbs. Landings of wahoo, the third most landed pelagic species, ranged from 8,220 lbs to 19600 lbs from 2002 to 2007. However, in 2008 the total catch of wahoo increased by more than 3-fold compared to the maximum value landed during the 2002-2007 period (Table 10).

Landings of queen conch and spiny lobsters have increased steadily from 2002 and 2008. In terms of fishery production, conch and lobster are the most important species in SKN, with average annual landing of 157,650 lbs and 105,715 lbs respectively (Table 10).

Table 10:
Estimated Landings (lbs) for Wahoo, Dolphinfish, Jacks, Conch, Lobster St. Kitts and Nevis, 2002-2008

Species	Year						
	2002	2003	20040	2005	2006	2007	2008
Wahoo	9905	8325	12145	15730	8220	9690	64015
Dolphin fish	13565	19600	16180	12195	12105	11550	85195
Jacks (Selar E)	25815	11575	27960	13725	22165	16275	30110
Conch	96965	94895	66225	55830	109060	128800	551775
Lobster	48425	81665	77095	71185	52960	38675	370005

Source: Fisheries Department records.

<u>Technology Improvement & Extension Programs</u>

A major objective of the Fisheries Departments of SKN is to increase use of FADs in the large pelagic fishery. Hence, they intend to continue its development program started in the 1980s.

Rationale: it is generally considered that the large pelagic fishery resource is under-exploited; the 1980s program has started to bear fruit because a number of fishers are now deploying FADs, and thus have made large investments. However, recent tropical storms have caused the destruction of many FADs, and fishermen are often unable to replace them.

Strategy: Efforts should be made to source more financial support to continue the investment in FAD development; and to get better technology and increase knowledge on techniques of mooring to limit future loss due to bad weather conditions;

Technical and scientific assistances in the following areas:

- Extension of methodology of fisheries;
- Stock assessment of pelagic fishes;
- Management and governance of pelagic fisheries;
- Socio-economic survey on the pelagic fishery.

Financial assistance needed:

- To support development of more FADs;
- To support training and extension program on methodology of fisheries;
- To support socio-economic studies;

Technical and Research Capabilities of the Fisheries Departments

An assessment of the technical and research capability of the Fisheries Department cannot be made because the country liaison officer did not fill out and return the "Information Request Sheet"; and we did not have the opportunity to visit this Department personally.

However, based on the survey conducted by Hadley and Sing-Renton (2009), the highest priority identified by the Senior Fisheries Officer regarding the conch fishery was to determine: "how efficient are marine reserves in enhancing the spawning stock biomass." We believe this research question is relevant and has not yet been yet clearly answered in other parts of the world, particularly regarding the management of pelagic fish. Thus, in the context of this survey, it would be worthwhile to commit funds to develop preliminary and long-term research on this topic.

CHAPTER 4: AQ UACULTURE DEVELOPMENT COMPONENT[2]

4.1 Policy, Supporting Legislation, Development Plans

Policy and Supporting Legislation

There is no **National Fisheries Policy** for SKN. There is a 2007 draft **Plan for Managing the Marine Fisheries of St. Kitts and Nevis.** There is no **Aquaculture Policy** for SKN.

The Department of Fisheries has been mandated by the Ministry of Agriculture to develop projects for aquaculture. The process is still in its infancy.

The Fisheries Act (1984) was amended in 1992 to incorporate provisions of the OECS harmonized legislation. The Minister responsible for fisheries is given the authority to create new regulations for the management of fisheries as and when necessary. Outside of this, there is no Policy or legislation specific to the Aquaculture sector.

Other fisheries-related legislation:

- National Conservation and Environmental Protection Act (1987), addressing coastal zone management.
- Maritime Areas Act (1984), for resources management within EEZ waters.
- Zoning Ordinance (1991), establishing marine parks in Nevis.

Institutional Support for Aquaculture in-St.Kitts and Nevis

There can be no comment here as thee was no response to requests for information.

4.2 Aquaculture Development Status regarding Stated Policy Goals and Development Objectives

The Chief Fisheries Officer has the responsibility to formulate a development plan. It would appear that lack of natural resources, the small size of local market, and the adequacy of the marine catch to support seafood requirements, places aquaculture on the back burner.

4.3 Aquaculture and Market Characteristics

The fact that tilapia are caught from local dams and ponds suggests that there is a local palate for same.(Nevis only)

4.4 Current Levels of Aquaculture Production by Species

The Aquaculture Subsector

Over the last two decades aquaculture has been thought of as a supplemental provider of fresh fish for the country. A number of attempts have been made at developing viable systems in both islands.

[2] Please note that there was no response to Request for Information or to follow up phone calls to CFO; hence the Country Profile is based on Desk Top study only.

Fresh Water

On Nevis, attempts were made with assistance from the OAS to develop a tilapia project. However, this venture encountered a number of challenges, both financial and technical. In spite of the challenges, one of the project's main objectives was achieved. This was the awareness in the local population of the potential for aquaculture. This was evident as a number of persons expressed their interest in starting their own backyard production. One of those persons was the former Premier of Nevis. Today concerns are being raised by the Fisheries Department, since a number of ponds/water catchments that were stocked with tilapia are being harvested indiscriminately by locals.

Aquaculture still does not make any contribution to the national statistics of fish production.

Marine Aquaculture

Currently there is only one aquaculture project. This project is privately owned and the owner is experimenting with the growing of tilapia in ponds near the ocean, using seawater.

In Saint Kitts, a marine shrimp farm was attempted using a natural salt pond. This encountered a number of technical problems and the venture was later abandoned. The farm produced a small amount of the shrimp that was marketed locally.

4.5 Knowledge on Aquaculture Issues by Category

High cost of production and limited natural resources are real and insurmountable issues.

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

The aquaculture technology available in SKN is tilapia culture, which is in private hands.

4.7 Technical and Research Capabilities of Fisheries

There is no aquaculture unit or staffing dedicated to same, and technical and institutional capacity are weak if not absent.

CHAPTER 5: REGIONAL FISHERIES DATABASE DEVELOPMENT COMPONENT

5.1 Policy and Data Management Documents

According to the Draft Plan for Managing the Marine Fisheries of St. Kitts and Nevis (2007), the major objectives for fisheries management are:

- *To ensure that the fisheries sector is integrated into the policy and decision making process concerning fisheries and coastal zone management.*
- *To maximize the development of the fishery sector through efficient, well coordinated and cost effective management, thereby creating viable employment and stable sources of income for the fishers and the communities involved in fisheries related economic activities.*
- *To maximize the amount of fish protein available for domestic consumption consistent with sound resource management practices.*
- *To develop the fishing industry in terms of modernisation of fisheries infrastructure and use of appropriate fishing vessels, gear and methods.*
- *To maximize the value to the economy of St. Kitts and Nevis of the limited fisheries resources exploited sustainably through cost effective harvesting, value added processing and expansion and diversification of markets.*
- *To take into account traditional knowledge and interests of local communities and small scale artisanal fishers in development and management programmes.*
- *To maintain or restore populations of marine species at levels that can produce the optimal sustainable yield as qualified by relevant environmental and economic factors, taking into consideration the relationships among species.*
- *To protect and restore any endangered or threatened marine species.*
- *To preserve rare or fragile ecosystems, as well as habitats and other ecologically sensitive areas, especially, seagrass beds, reefs and other spawning and nursery areas.*
- *To promote scientific research with respect to fisheries resource management and development.*
- *To ensure effective monitoring and enforcement with respect to fishing activities.*
- *To cooperate with other nations in the management of shared or highly migratory stocks.*
- *To strengthen the capabilities of the governmental and related institutions to manage the fisheries and to provide the policies and investment incentives to achieve the above mentioned objectives.*

The objectives for the management of fisheries comprise "*...scientific research with respect to fisheries resource management and development*". Though not explicit, the requirement for an effective and comprehensive fisheries information system would be integral in meeting this objective.

This document also states that:

> "*The departments of Fisheries in both islands use the same method of data collection and analysis which is based upon the Caricom region data systems CARIFIS"*

Though the intent of the FDs is as stated above, the reality is that the FIS is not at the standard to become the regional data system.

There is currently no policy or documented data management plan that is used to guide the Fisheries *Information System (FIS). There are some general understandings of the process but it does leave room for misinterpretations and subjectivity, which may lead to inconsistencies.*

Access to data by persons and agencies other than the FDs is at the discretion of the Chief Fisheries Officers of St Kitts and Nevis, but there are no formal set of criteria to evaluate the request for information.

5.2 Data Collection – Current Situation

The marine capture fisheries of SKN are artisanal, and comprise a Coastal Pelagics Fishery, an Offshore Pelagic Fishery, the Reef and Bank/ Deep Slope Fishery, a Lobster Fishery and a Conch Fishery. There Marine Turtle Fishery, but on a very small scale.

There are five (5) major landing sites in St. Kitts and three (3) major landing sites in Nevis. Data is collected from all these sites, in addition to four (4) smaller landing sites in Nevis. CPUE data exists only for the period 1995-present, and there are no significant temporal data gaps.

In St. Kitts, data is collected by two (2) Fisheries Assistants, three (3) days per week. Frequency of sampling is based on the activity of the fishermen. These persons also validate their own data sheets and input this data into the system. A third Fisheries Assistant would check the data once it is in the system, and a further check is done by the Senior Fisheries Officer at the point where the quarterly summary statistics are produced. In the case of Nevis, one Fisheries Assistant collects the data and inputs this data into the system. Therefore, the system of validation of data for both islands is not adequate. It was reported that data is inputted into the system within one week of collection.

In Nevis, there are two (2) data collectors on staff, one of whom is a fisheries assistant. No validation of the data occurs at data entry or post-entry.

Very rarely, biological data is collected and this has been project-based in the past. In Nevis, biological data on conch as well as recreational data are captured on an ad-hoc basis.

5.3 Data Management – Current Situation

The Department of Fisheries, Ministry of Agriculture, Fisheries and Cooperatives is the sole agency responsible for the fisheries database. In St. Kitts, there is one (1) dedicated desktop computer for the FIS, and data is inputted from time to time on other computers and transferred to this machine. There is an external hard drive that is used for periodic back-up which is kept at the same workstation though this is not recommended. There are no off-site back-ups of the data. In Nevis, there is one (1) desktop computer which is not dedicated to the FIS. There is no back-up system.

Microsoft Excel® is used for data input and storage. CARIFIS is not being used to enter and store data due to lack of skills among the officers. They are more comfortable with Microsoft Excel®. Some data is updated periodically in CARIFIS, but this is a small subset of the data. The information in CARIFIS is also not contiguous as data during the registration process is not collected in its entirety. Reluctance of fishers to provide information during the registration process was cited as the main reason.

A need for a census for all fishers has been acknowledged in order to rationalize and update the fisher and vessel dataset.

Summary statistics are performed on the data in-house, and periodically, data is taken to CRFM Scientific Meetings for stock assessments to be undertaken.

5.4 Information Dissemination

Quarterly Summaries and Annual Reports are done currently on the data gathered. The agencies who request information on a regular basis are: the FAO, ICCAT (very little data), the Statistics Department in the Ministry of Sustainable Development, the Central Bank, Customs and Coast Guard, Maritime Affairs Department and the Ministry of Information.

The link between the fisheries data and the management objectives is not present. Currently, the information is not used to guide quotas, licenses etc.

Stakeholder involvement has been recognized as vital to fisheries management, however it is not done. This needs to be improved, and would assist greatly in improving the cooperation of fishers to provide meaningful information.

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

1. Human Resources

The number of staff members in the SKN Fisheries Department is reasonably adequate to effectively collect and manage the national fisheries data. Due to the political situation between Nevis and St. Kitts, it is not advisable to combine some of the duties. Currently, there are two separate FDs. The table below summaries the current situation, and recommends the optimal staff complement.

Position	Current Staff Complement	Recommended Staff Complement	Gap	Training Required**
Data Manager-Administrator	0	2 (one for St. Kitts and one for Nevis)	2	Yes
Data Collectors*	4	4 (2 for St. Kitts and 2 for Nevis)	0	Yes
Data Input Clerks	0	2 (2 for St. Kitts and 2 for Nevis)	2	Yes
Fisheries Statistician	0	1 (to serve both St. Kitts and Nevis)	1	Yes
Total	**4**	**9**	**5**	

** 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. As a result, this will have implications for safety of data as well as access to the data. The system requires the minimum technology listed below:

St. Kitts:

- One (1) dedicated Desktop Workstation 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

Nevis:

- One (1) dedicated Desktop Workstation 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 the Workshop with the Staff of the Fishery Division

Brief Overview of the Workshop

The workshop was held at the conference room of the Division of Fisheries on the 22nd of September 2009, in which the Chief Fisheries Officer and five 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?"

Three tools, Environmental Scan, IOM (Integrated Organization Model) and SOR (Strategic Orientation) were used for the analysis.

Problem Analysis

No significant problem emerged. This indicates that the income level of fishers is relatively high or adequate for survival at least, because the resource level of major target species is currently sufficient enough to support fishers' income level. However, most of the coastal resources seem to be in decline. It is thus essential to maintain the resource level of major target species to sustain this income level.

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, "how fisheries division can improve sustainable management and development of fisheries sector" for the Fisheries Division. Ten opportunities and 13 threats were identified; whereupon the following five external factors were selected as the key factors by the participants.

The potential for targeting underutilized species
Collaboration with international and external agencies (FAO, JICA)
A good working relationship with SKNCG, Customs
The import of fish and fish products and underselling local fish
The over exploitation of certain species of fish (e.g., parrotfish)

In the same way, 8 strengths and 13 weaknesses were identified in the internal factors and then the following 5 strengths and 5 weaknesses were respectively selected as the key internal factors by the participant.

(Strengths)
Existing fisheries management plan
Some dedicated staff
Collaboration in research with Ross University of veterinary medicine
BFC providing fresh fish daily to consumers
A fairly well developed data collection and analysis system

(Weaknesses)
Inadequate law enforcement ability
Insufficient personnel engaged in fisheries extension
Insufficient qualified staff
The need for a formal system to interact with stakeholders
Lack of funds for maintenance of facilities

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

Collaboration with international and external agencies (FAO, JICA)
The potential for targeting underutilized species
The over exploitation of certain species of fish (e.g., parrotfish)

Most of the important strengths can be utilized to realize the strategic options. However most of the important weaknesses can also be obstacles to realizing the strategy as well. Such weaknesses would be overcome, if the Department of Fisheries were to act with the CRMF/JICA project.

6.2. Output from Workshop with Local Fishers

Brief Overview of the Workshop

The workshop was held at 5 fishing communities as shown in Table 11.The characteristics of communities held at were shown in Table 12.

Table 11: Locations and dates of the workshop

Name of Fishing community	Date of Workshop and/or Interview
Basseterre	21st September 2009
Old Road Bay	22nd September 2009
Dieppe Bay	23rd September 2009
Sandy Point	23rd September 2009
Conaree Beach	23rd September 2009

Table 12: Summary of the Community

Name of Fishing Community	Location of the Community	Number of Fishing Boats
Basseterre	S of St. Kitts	30 boats
Old Road Bay	SW of St. Kitts	10 boats
Dieppe Bay	NW of St. Kitts	28 boats
Sandy Point	W of St. Kitts	7 boats
Conaree Beach	SE of St. Kitts	Aquaculture site

Present Status of Local Fishery

Most fishers are engaged in coastal fishing through the use of pot, seine net, and diving. The economic status of the coastal fishers is relatively stable due to strong demand from the tourism sector, although the resource level of coastal species has been gradually decreasing.

Several fishers are engaged in offshore pelagic fishing and some deploy FADs by themselves. Their catch is larger than with coastal fishing, and thus has the potential to shift part of the fishing effort from coastal resources to offshore pelagic resources.

Needs of Local Fishers

Fishers engaged in offshore pelagic fishing are determined to introduce FADs, because those fishers who already utilize FADs have shown them the effectiveness of offshore pelagic fishing. However, they lack the proper techniques to assemble and deploy them. It is necessary to provide them for the purpose of easing the fishing effort on coastal resources.

6.3. Key issues in coastal fishery identified in the Workshops

In workshops with the staff of the Fisheries Department and with local fishers, four ideas were identified as key fishery-related issues namely, "Pelagic fish resource management and sustainable development"; "Community-based resource management"; and "Sustainable aquaculture development".

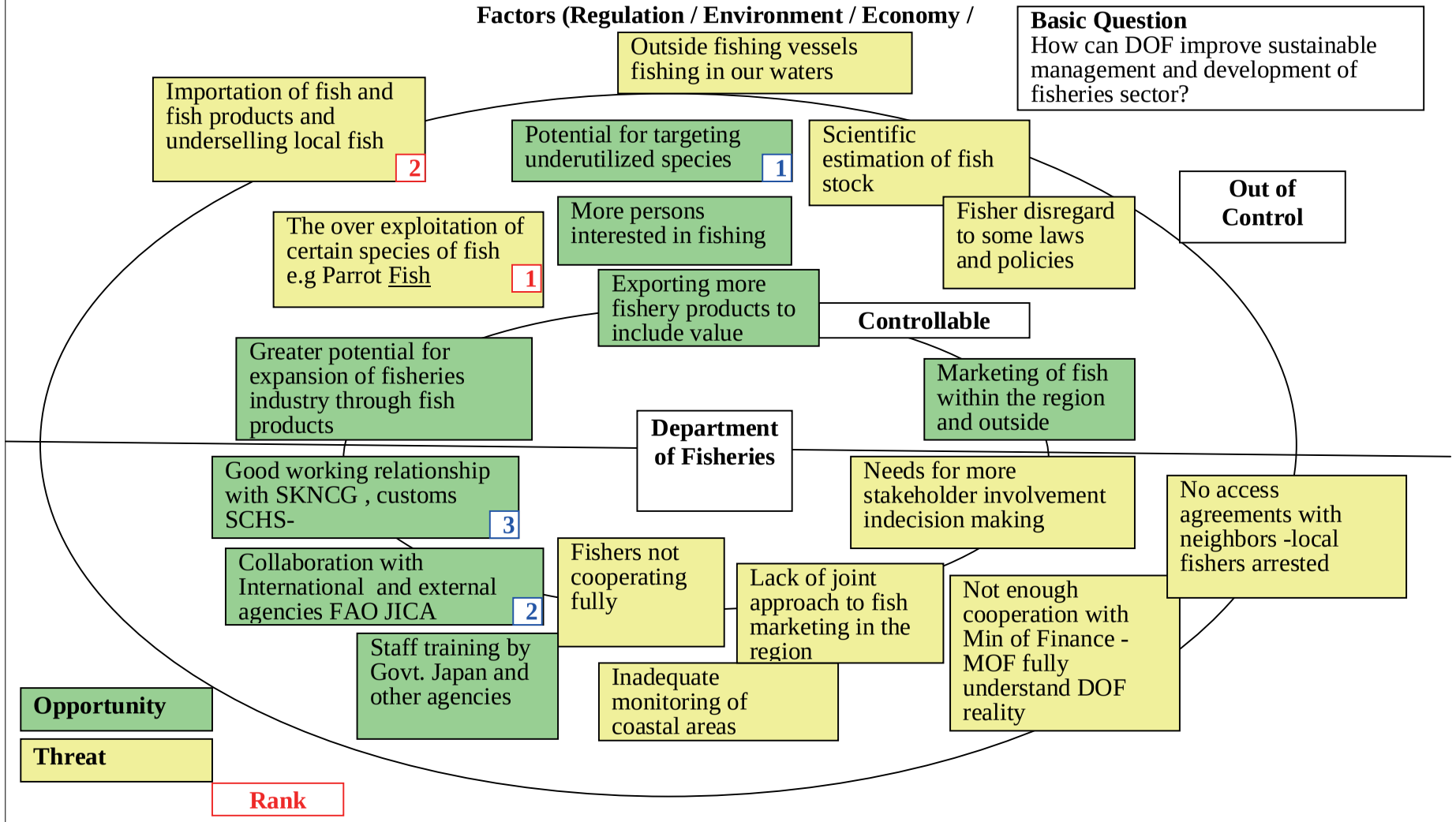
The development of offshore pelagic resources is important for the purpose of reducing the fishing effort on coastal resources. Dolphin fish was identified as one of the key resources to be maintained for this purpose, for which enhancing the departmental research activities is vital.

Coastal resources like lobster, conch and reef fish are decreasing and must be maintained by introducing community-based resource management activities, including value-added marketing by strengthening the linkage with tourism. Stock enhancement activities for lobster and conch must also be additionally considered.

There is some potential for small-scale tilapia pond culture in Conaree Beach, because the SAPPER project can produce juveniles. Filamentous green algae, which is a suitable natural food for tilapia, was found in the small pond of the site. There is also some potential to develop an area of Conaree Beach as a fish pond.

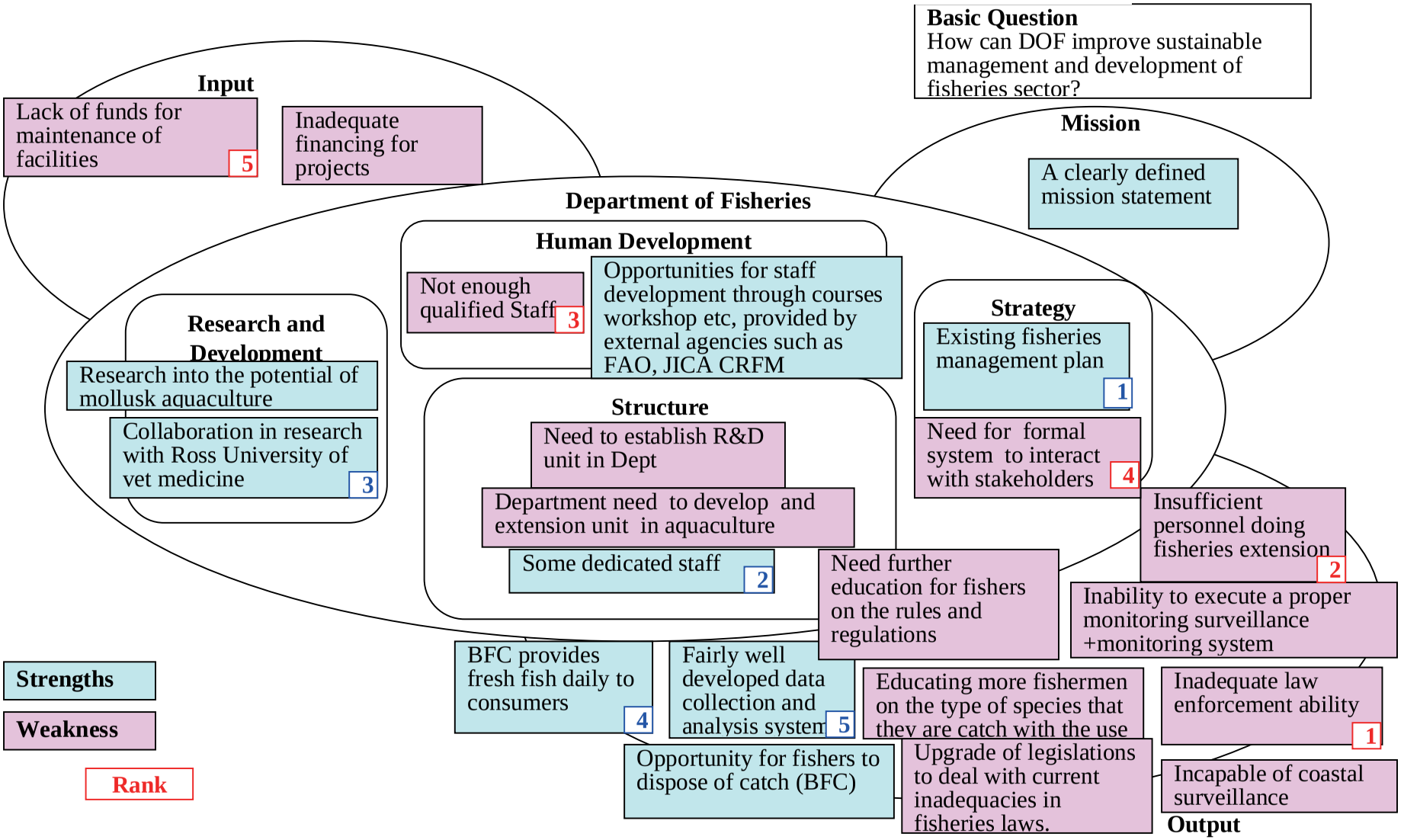
RESULT OF THE ID/OS WORKSHOP (External Factor Analysis)

External Factor Analysis in Department of Fisheries, St. Kitts (Sep. 22, 2009)



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

Internal Factor Analysis in Department of Fisheries, St. Kitts (Sep. 22, 2009)



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