

Inception Report

Study on Formulation of Master Plan on Sustainable Use of Fisheries Resources for Coastal Community Development in the Caribbean

IC Net Limited for the Japan International Cooperation Agency

July 1, 2009

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Abbreviations

ACS: Association of Caribbean States
C/P: Counterpart
CARICOM: Caribbean Community
CARIFIS: Caribbean Fisheries Information System
CBCRM: Community Based Coastal Resource Management
CFRAMP: CARICOM Fisheries Resource Assessment and Management Project
CFTDI: Caribbean Fisheries Training and Development Institute
CFU: CARICOM Fisheries Unit
CTA: Technical Centre for Agriculture and Rural Cooperation, ACP/EU
CIDA: Canadian International Development Agency
CRFM: Caribbean Regional Fisheries Mechanism
EEZ: Exclusive Economic Zone
EU: European Union
FAD: Fish Aggregation Device
FAO: Food and Agriculture Organization
GDP: Gross Domestic Product
ICCAT: International Commission on Conservation of Atlantic Tuna
ICOD: International Centre for Ocean Development
ICRAFD: Integrated Caribbean Regional Agriculture and Fisheries Development Program
IDB: Inter-American Development Bank
IEE: Initial Environmental Examination
IMA: Institute of Marine Affairs
JICA: Japan International Cooperation Agency
NFSO: National Fisheries Sector Overview, FAO
OECS: Organization of East Caribbean States
OECS-ESDU: OECS-Environment and Sustainable Development Unit
PCM: Project Cycle Management
PDM: Project Design Matrix
TOT: Training of Trainers
UNEP: United Nations Environment Programme
UNESCO: United Nations Educational, Scientific and Cultural Organization
UNDP: United Nations Development Programme
USAID: United States Agency for International Development
UWI: University of the West Indies
WB: World Bank
WBS: Work Breakdown Structure
WECAFC: Western Central Atlantic Fishery Commission

1. Basic Policy for Project Implementation

1.1. Background of the Project

In most Caribbean countries, the creation and nurturing of new industries is difficult due to the comparatively small population, land area, and economies. Export items and their markets are limited as the Caribbean countries largely depend on countries outside the region for capital and energy. As for the climate, hurricanes and heavy rains often occur in the region. The distribution of wealth in the region is uneven, so too are differences in geographical and natural environments as well as the limited scale of industries. The local fishery industry has helped to diversify economic activities, and provided additional livelihood opportunities for the poor in the region. Thus much is expected of the sustainable development of the fisheries sector. Meanwhile, many commercial coastal fisheries resources are believed to be fully or overexploited.

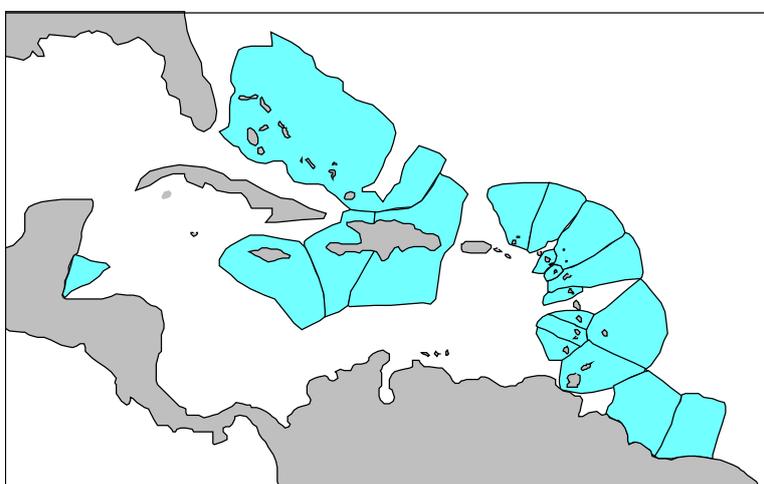


Figure1: EEZ of CARICOM Member Countries

The Caribbean Community (CARICOM) established the Caribbean Regional Fisheries Mechanism (CRFM) in March 2003 as an organization to promote and facilitate the responsible utilization of the Region's fisheries and other aquatic resources for the economic and social benefits of the current and future population of the region. It

encourages cooperation among the member countries for sustainable use of fisheries resources in the region.

Except Guyana and Suriname, the CARICOM member countries face the Caribbean Sea and form continuous island chains. Thus the member countries have exclusive economic zones (EEZ) that are narrow and overlapping, and share an interest in the conservation and management of fisheries resources to achieve sustainable use of them (Figure 1).

Many CARICOM member countries are managing their fisheries resources with the assistance of foreign donors and conduct activities under CRFM initiatives. For successful resource management, cooperation between government and communities is essential, with the provision of an alternative income source to compensate the temporary loss of fish catch due to the restriction of certain fishing activities. Since the fisheries resource management system and budget structure are not optimally developed, an effective fisheries resource management policy has yet to be in place. In addition to each national fishery resource management scheme, a joint management scheme for migratory

pelagic fish species and other shared resources is required among concerned countries in the region. To address this issue, a multinational master plan for fisheries resource management and development is needed.

Under these circumstances, the CRFM in 2002 requested the Government of Japan for two development studies called the Aquaculture Development Plan and the Pelagic Fish and Squid Resource Assessment, and one technical cooperation project called the Establishment of Fisheries Resource Database. In response, the Government of Japan dispatched a project formulation team in September 2003 to understand and analyze the situation and issues in the fisheries sector of the Caribbean region. Based on results of the mission, the team recommended conducting a development study to understand the needs, relevance, and effectiveness of these projects above. As a result, the CRFM requested the Government of Japan to implement the Study on Formulation of Master Plan on Sustainable Use of Fisheries Resources for Coastal Community Development in the Caribbean (hereinafter the “Study”).

1.2. Purpose of the Study

The Study aims to analyze and propose options for a comprehensive resource management approach in the Caribbean region that may include limited entry to coastal fisheries, diversification of the industry, and promotion of the optimal use of fisheries resources with cooperation between government and communities. The specific objectives of the Study are as follows.

- (1) Understand the situation in fishing- and rural village development, the needs of community members, and development potentials and constraints.
- (2) Formulate a master plan for the sustainable use of fisheries resources in the region that includes a coastal resource management scheme with cooperation between government and communities, and recommend practical resource management activities.
- (3) Identify effective schemes for fisheries resources management and sustainable development, and verify the feasibility of those schemes with the implementation of pilot studies.
- (4) Enhance policy making and problem analysis abilities of CRFM Secretariat and Fisheries Department staff as well as fishers’ organization personnel through various studies and the implementation of pilot studies.

1.3. Target Areas

The Study covers 13 out of the 15 CARICOM member states¹. The 13 countries are as follows: (1) Antigua and Barbuda; (2) Barbados; (3) Belize; (4) Dominica; (5) Grenada; (6) Haiti, (7) Jamaica; (8) St. Christopher and Nevis; (9) St. Lucia; (10) St. Vincent and Grenadine; (11) Trinidad and

¹ The Study directly targets CARICOM member countries, except The Bahamas, an ODA graduate country and Montserrat, an overseas territory of the UK both of which would not qualify for Japanese Overseas Development Assistance.

Tobago; (12) Guyana; (13) Suriname.

In each target country, the Study focuses on its EEZ and inland waters. Due to the huge coverage area, a survey will be conducted within limited water bodies that represent different characteristics of the geography and associated fisheries of the target countries.

1.4. Scope of the Study

The Study will be implemented in accordance with the Scope of Work signed by the CRFM and CARICOM secretariats, and JICA on December 15, 2008. The CARICOM secretariat will be the executing agency for the Study while the CRFM Secretariat will be the implementing agency responsible for the technical activities on behalf of the CARICOM Member States. The CRFM secretariat and the study team will cooperate closely in the delivery of the Study, including planning and managing the research components, and supervision of the local organization implementing the baseline survey. The CRFM Secretariat is responsible for coordinating activities with the fisheries department in each country.

1.5. Current Situation, Issues, and Focal Points in the Study

The current situation and issues are as follows.

1.5.1. Current Situation of CARICOM Member Countries

1.5.1.1. Overview of CARICOM Member Countries

Table 1 presents an overview of the general conditions of CARICOM member countries involved in the Study. Member countries vary in geographic and demographic characteristics. Guyana is located in the South American continent and encompasses a land area of 216,000km² while the island state of St. Vincent and Grenadine has 345km², less than 1/600 of Guyana. Haiti has a population of 8.9 million while St. Christopher Nevis has less than 40,000. Barbados has 432km² of land area with 280,000 people, making its population density 600 persons per km², while Guyana and Suriname have less than 5 persons per km².

Per capita GDP (PPP²) also differs from nearly US\$20,000 in Barbados, Antigua and Barbuda, to US\$1,300 in Haiti. These facts mean that we cannot treat these countries in a uniform manner.

² Purchasing power parity (PPP) is a theory which states that exchange rates between currencies are in equilibrium when their purchasing power is the same in each of the two countries. This means that the exchange rate between two countries should equal the ratio of the two countries' price level of a fixed basket of goods and services

Table 1: General Information of Target Countries

	Land Area (Km ²)	Shelf area (km ²)	Coastline (km)	Population (2008)	GDP(PPP) in US\$ Billion (2007)	GDP per Capita (PPP) in US\$ (2007)
Antigua and Barbuda	443	3,568	260	84,522	2	\$18,300
Barbados	432	320	92	281,968	5.317	19,300
Belize	22,966	9,800	457	301,270	2.444	7,900
Dominica	750	900	148	72,514	0.658	9,000
Grenada	347	3,100	121	90,343	1.108	10,500
Guyana	216,000	48,665	459	770,794	2.92	3,800
Haiti	27,000	5,857	1,977	8,924,553	11.14	1,300
Jamaica	10,991	4,170	1,022	2,804,332	20.67	7,700
St. Kitts and Nevis	360	845	135	39,817	0.721	13,900
St. Lucia	616	522	158	159,585	1.794	10,700
St. Vincent and the Grenadines	345	7,800	84	118,432	1.042	9,800
Suriname	163,295	54,550	380	475,996	4.073	7,800
Trinidad and Tobago	5,128	20,400	540	1,047,336	23.79	18,300
Sources	NFSO/CIA	NFSO	NFSO/CIA	CIA	CIA	CIA

Sector Overview, FAO³Central Intelligence Agency, USA⁴

NFSO: National Fisheries

CIA: World Factbook,

1.5.1.2. Characteristics of Fisheries in CARICOM Member Countries

The Table 2 summarizes characteristics of fisheries in the member countries. The portion of fisheries in the national economy is less than 1% in states with relatively large economies such as Barbados, Jamaica, and Trinidad and Tobago. The portion is larger elsewhere: it is 7.2% and 3.0% in Belize and Guyana, respectively. The ratio of fishers in the national population ranges from 1% to 5%.

The average annual per capita consumption of fish in the region is over 15kg. While the figure in Haiti is the least with 2.6kg, the average person in Antigua, Barbados, Grenada, and Guyana consumes over 40kg of fish per year. Most of the member countries import more fish than they export as the domestic supply of fish is insufficient to meet local demand. This indicates a strong need for developing unutilized and underutilized resources and proper management of decreasing coastal resources to realize optimum sustainable yields.

³ Data collected in 2009 from <http://www.fao.org/fishery/countryprofiles/search/en>

⁴ Data collected in 2009 from <https://www.cia.gov/library/publications/the-world-factbook/>

Table 2: Overview of Fisheries in Target Countries

	Rate of Fisheries in GDP	Number of Fishers	Total Number of Fishing Boats	Fisheries Production (ton)	Fish Import (ton)	Fish Export (ton)	Total Human Consumption (ton)	Per Capita Consumption (kg)
Antigua and Barbuda	1.48% (2003)	1,088 (2004)	728 (2004)	2,590 (2003)	2,520 (2003)	580 (2003)	3,530 (2003)	48.3 (2003)
Barbados	0.90% (1990)	2,200 (2000?)	955 (NFSO 2002)	2,500(2003)	8,876 (2003)	272 (2003)	11,090 (2003)	41.1 (2003)
Belize	7.20% (2002)	3,000 -4,000 (2002?)	552 (NFSO2002?)	15,353 (2003)	1,467 (2003)	3,195 (2003)	3,625 (2003)	14.2 (2003)
Dominica	1.77% (1994)	2,338 (NFSO2002)	1100 (NFSO2000)	1,142 (2000)	454.8 (2000)	N/A	1,596.8 (2000)	20.24 (2000)
Grenada	1.83% (1994)	1,240 (-)	N/A	2,544 (2003?)	2,360 (2003?)	738 (2003?)	4172 (2003?)	52.2 (2003?)
Guyana	3.00% (2002)	5,644 (2002?)	>1300 (2004)	60,304 (2003)	1,665 (2003)	27,012 (2003)	34,642 (2003)	45.7 (2003)
Haiti	N/A	50,000 (NFSO2003)	N/A	5,000 (2003)	16,679 (2003)	337 (2003)	21,342 (2003)	2.6 (2003)
Jamaica	0.4% (2001)	15,336 (2004)	4,274 (2004)	8,702 (2003)	38,724 (2003)	928 (2003)	49,465 (2003)	18.7 (2003)
St. Kitts and Nevis	1.42% (1994)	650 (NFSO2004)	N/A	370 (2003)	1,148 (2003)	23 (2003)	1,495 (2003)	35.6 (2003)
St. Lucia	1.50% (2001)	2,059 (NFSO2006)	690-most motorized (NFSO2006)	1,440 (2003)	3,303 (2003)	13 (2003)	4,753 (2003)	31.9 (2003)
St. Vincent and Grenadines	1.93% (2001)	2,500 (NFSO1999)	600-most motorized (NFSO1999)	15,573 (1999)	1,102 (1999)	163 (1999)	1,711 (1999)	15.1 (1999)
Suriname	N/A	5,169 (NFSO2006)	1,150 (NFSO2006)	15,856 (2003)	3,848 (2003)	12,580 (2003)	7,124 (2003)	16.3 (2003)
Trinidad and Tobago	0.3% (1993)	5,100 (NFSO2003)	2,184 (NFSO2003)	9,743	12,993	4,478	18,257	14
Sources	CRFM	CRFM NFSO	CRFM NFSO	NFSO	NFSO	NFSO	NFSO	NFSO

CRFM: Caribbean Regional Fisheries Mechanism⁵
NFSO: National Fisheries Sector Overview, FAO

Categorizing CARICOM Member Countries

The CARICOM member countries can be categorized into the following three types by geographic characteristics, which affect the fundamental conditions of fishing grounds and ultimately the distribution pattern of fisheries resources.

- a. Countries with wide continental shelves: Continental shelves are well developed with large shallow water area
- b. Countries with large land area and well-developed coral reefs: Relatively large island countries surrounded by well-developed coral reefs.
- c. Countries with small land area: Relatively small island countries surrounded by well-developed coral reefs.

These categories will be utilized for analysis of present status in target countries and selection of the

⁵ http://www.caricom-fisheries.com/main/about_us.asp

pilot projects. Characteristics of fishing methods and the surrounding situations in these categories are as follows.

a. Countries with wide continental shelves

This group includes Suriname, Guyana and Trinidad and Tobago (Trinidad Island only). These countries have a large land area and are rich in water resources with wide continental shelves. The productivity of fisheries resources in these countries is high and small-scale fishers are operating gillnet, hook and line and other fishing gear in nearby coastal areas. Development of offshore pelagic species is not optimized, with the exception of Trinidad.

In these countries, there are also industrial fisheries, using double rigger trawls for penaeid shrimp, which are mostly fully or overexploited. In recent years, many industrial shrimp trawlers have shifted the target species to the sea-bob which could create some conflict with the small-scale operators in the coastal waters. In the industrial fisheries, countries have started to implement resource management measures such as closed seasons and restrictions on the number of fishing boats. However, their law enforcement capacity is limited and they are having difficulty in preventing illegal fishing activities by both local and foreign fishing boats.

b. Countries with large land area and well-developed coral reefs

Jamaica, Haiti, and Belize⁶ belong in this group. They have characteristics of both continental and island countries. However, they do not possess a well developed continental shelf and so have limited shrimp fishery activities. They have coral reefs where lobster, conch and reef-fish fisheries, with or without trap, are quite popular, and now face the threat of overfishing and degradation of the coastal habitats.

Large-scale tilapia and shrimp culture are evidenced in some of these countries.

c. Countries with small land area

This category includes Antigua and Barbuda, St. Christopher and Nevis, St. Lucia, St. Vincent and the Grenadines, Dominica, Grenade, Barbados, Bahamas, and Trinidad and Tobago (only Tobago Island). Coral reefs are well developed in most of these countries and the tourism industry is extremely important. Lobster and conch are important resources but might be fully or overfished, so effective management strategies are needed.

Regarding pelagic fisheries development, longline operations have been introduced to small-scale fishers in some countries to catch large pelagic species. A few countries have developed dolphinfish and other coastal pelagic fisheries. Since some pelagic fish resources are accessible to local fisheries

⁶ Although Belize is in Central America, it has characteristics of an island state such as a well-developed barrier reef.

seasonally, it will be important to identify the location of fishing grounds in each season before considering a development plan.

The existence of diamond back squid resources was confirmed by Japanese experts in Grenada and Trinidad and Tobago (Tobago only) in 2000. Trial fishing has been done to commercialize the resource. Sportfishing and recreational fishing are also important social and economic activities in many CARICOM countries.

1.5.1.3. Relationships with International Organizations

A number of fisheries-related international and regional agencies have offices in the Caribbean region. The Western Central Atlantic Fishery Commission⁷ (WECAFC) of the Food and Agriculture Organization (FAO), the Organization of East Caribbean States⁸- Environment and Sustainable Development Unit (OECS-ESDU), Association of Caribbean States (ACS), United Nations Environment Programme (UNEP), and United Nations Educational, Scientific and Cultural Organisation (UNESCO) mainly provide policy making, technical and information assistance. Although they do not have an office in the CARICOM region, the International Commission on Conservation of Atlantic Tuna (ICCAT) plays an important role in managing tuna and tuna-like pelagic species in the Caribbean Region. United Nations Development Programme (UNDP) with UNESCO's Intergovernmental Oceanographic Commission are currently implementing the project "Sustainable Management of the Shared Living Marine Resources of the Caribbean Large Marine Ecosystem (CLME) and Adjacent Regions"⁹. The Table 3 provides details.

7 The WECAFC covers all the Caribbean countries and overseas territories as well as Bermuda.

8 The OECS member countries and territories are as follows: Anguilla, Antigua and Barbuda, British Virgin Islands, Dominica, Grenade, Montserrat, St. Christopher and Nevis, St. Lucia, St. Vincent and Grenadine.

9 The focus of the Project will be on assisting the Caribbean countries to improve the management of their shared living marine resources, most of which are considered to be fully or over exploited, through an ecosystem level approach. A preliminary Transboundary Diagnostic Analysis (TDA) identified three priority transboundary problems that affect the Caribbean Large Marine Ecosystem (CLME): unsustainable exploitation of fish and other living resources, habitat degradation and community modification, and pollution. The governments participating in this project are; Antigua and Barbuda, Bahamas, Barbados, Belize, Brazil, Colombia, Costa Rica, Dominica, Dominican Republic, Guatemala, Grenada, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, and Trinidad and Tobago. This project officially commenced in May 2009.

Table 3: Fisheries-Related Agencies in the Caribbean Region

Organization Name	Activities
FAO Western Central Atlantic Fishery Commission (WECAFC)	The functions ¹⁰ of the Commission are, among others; to contribute to improved governance through institutional arrangements that encourage cooperation amongst members and to promote, coordinate and, as appropriate, undertake the collection, exchange and dissemination of statistical, biological, environmental and socio-economic data and other marine fishery information as well as its analysis or study
International Commission on Conservation of Atlantic Tuna (ICCAT)	ICCAT is an inter-governmental fishery organization responsible for the conservation of tunas and tuna-like species in the Atlantic Ocean and its adjacent seas. It compiles fishery statistics from its members and from all entities fishing for these species in the Atlantic Ocean, coordinates research, including stock assessment, on behalf of its members, develops scientific-based management advice, provides a mechanism for Contracting Parties to agree on management measures, and produces relevant publications.
Organization of East Caribbean States- Environment and Sustainable Development Unit (OECS- ESDU)	OECS-ESDU assists Member States in all matters pertaining to the sustainable use of natural resources to ensure the sustainability of livelihoods of the peoples of the OECS. Some of the Functional areas are; Biodiversity management and protected areas, Environmental management and planning ¹¹

Regarding bilateral cooperation, Canada, the EU and Japan have been the main donors providing technical assistance to the CARICOM member countries over the years.

The CARICOM Fisheries Resource Assessment and Management Program (CFRAMP) was a sustainable development initiative of 12 Member States of CARICOM. Implementation began in 1991 and ended in 2000, funded jointly by the Canadian Government through the Canadian International Development Agency (CIDA) and the participating CARICOM countries. The goal of the project was to promote sustainable development and conservation of the region's fish stocks to permit sustainable use of these resources by the people in the region; with the objectives being (i) to enhance the basic information and institutional capacity necessary to manage and develop the fisheries in the CARICOM region; and (ii) to establish a regional fisheries mechanism to promote regional cooperation and facilitate regional management of shared stocks.

Integrated Caribbean Regional Agriculture and Fisheries Development (ICRAFD) Programme was funded by the European Union. This six-year project was designed to extend to four other Caribbean ACP countries (the Bahamas, Suriname, Haiti and the Dominican Republic) the benefits which the original 12 CARICOM countries had been obtaining from CFRAMP, and for all 16

¹⁰Complete information is available at <http://www.fao.org/fishery/rfb/wecafc/en>

¹¹Complete information is available at <http://www.oecs.org/esdu/progs.html>

countries to benefit from areas such as fisheries surveillance and enforcement, marketing, processing and training. Within the context of the Integrated Caribbean Regional Agriculture and Fisheries Development (ICRAFD) Programme, the overall objective of this project was the optimal utilization and sustainable management of marine fisheries resources in CARIFORUM countries; with the purpose being to strengthen fisheries planning and management capacity of national fisheries departments in CARIFORUM countries and to enhance the effective participation and support of fishers' communities in the planning and management process of the fishing industries for the sustainable use of the coastal and marine fishery resources.

CRFM/CTA Development of the Caribbean Network of Fisherfolk Organisations was developed and approved in 2005/06, with implementation commencing in September 2006. The overall aim of the project is to contribute to improved income earnings, higher standards of living of fisher folk and the sustainable management of fisheries resources in the Caribbean. It is being done in partnership with the ACP/EU's Technical Centre for Agriculture and Rural Cooperation (CTA).

The project's purpose is to develop institutional capacities of fisher folk organizations at the regional, national and community levels. The expected outputs are: (i) fisher folk and other interested parties well provided with relevant information on regional fisheries issues; and (ii) promotion of the development of a Regional Network of National Fisher Folk Organisations.

JAPAN's technical assistance and grant aid project was an extensive technical cooperation project based in Trinidad and Tobago for 10 years from 1998 to 2008. This project provided technical assistance on fishing technology, fish processing, resource management and other aspects of fisheries in the Caribbean region.

Currently, two Japanese fisheries specialists, based in the region, are assisting six countries in the Eastern Caribbean. Japan has also contributed to the construction of many fishing ports, market facilities, and donated small research vessels to some of the CARICOM countries.

The Governments of Spain, UK, USA and Taiwan and FAO and IDB have contributed to fisheries development and management by supporting undertakings such as seed production and culture of conch and shrimp, cage culture surveys, preparation of coastal area development plans, strengthening of fisherfolk organizations and improving monitoring, control and enforcement capability of various CARICOM Member States.

The Figure 2 summarizes the relationships of the donor countries and organizations above.

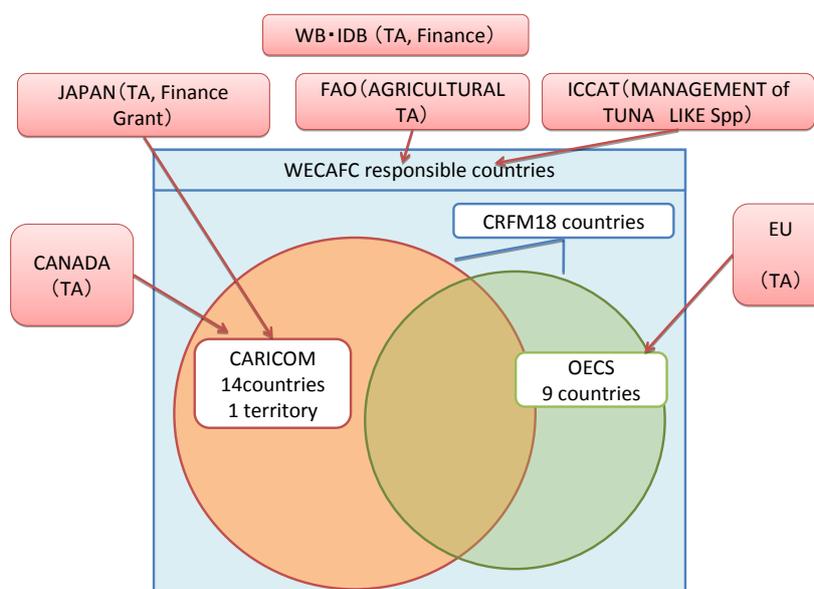


Figure 2: CRFM and Stakeholders

1.5.2. Role of CRFM

Caribbean Regional Fisheries Mechanism (CRFM) is an inter-governmental organization with its mission being to “To promote and facilitate the responsible utilization of the region's fisheries and other aquatic resources for the economic and social benefits of the current and future population of the region”.

The main objectives of the CRFM are:

- The efficient management and sustainable development of marine and other aquatic resources within the jurisdictions of Member States:
- The promotion and establishment of co-operative arrangements among interested States for the efficient management of shared, straddling or highly migratory marine and other aquatic resources;
- The provision of technical advisory and consultative services to fisheries divisions of member States in the development, management and conservation of their marine and other aquatic resources.

1.5.3. Issues in the Fisheries Sector of CARICOM Member Countries

In its project proposal to JICA in 2003, the CRFM pointed out the following eight major issues in the fisheries sector of the CARICOM.

(1) Insufficient data and information for plan formulation and decision making

In many CARICOM countries, the fishing pressure on high-valued coastal resources such as lobster

and conch is intense. To manage these resources optimally, a proper procedure is required to collect and analyze important pieces of data/information including the landings, the extent and frequency of fishing activities, fish length and weight, and the timing and duration of the spawning seasons.

(2) Insufficient manpower for research in the countries and the region

Most of the countries do not have enough trained staff for continuous data sampling in fishing villages and fishing grounds.

(3) Insufficient scientific and technical skills for sustainable resource management in fisheries departments of the member countries

The member countries do not have sufficient trained personnel to analyze the data collected in fishing villages and fishing grounds appropriately.

(4) Insufficient or inappropriate post-harvest processing and distribution

For quality retention and value adding, post-harvest treatment and fish processing techniques such as keeping freshness, drying and smoking are indispensable. However, extension activities on such techniques are not sufficient due to a shortage of trainers and extension officers.

(5) Weak resource management structure at the regional and national levels

Difficulties in surveillance and law enforcement of illegal fishing activities are an issue in all the member countries. To address this issue, the CRFM has been promoting community-based coastal resource management. Management of the lobster and conch fisheries in Belize and the sea urchin fisheries in Barbados have seen some success in this regard. However, systematic resource management activities are not sufficient in this region as a whole.

(6) High dependence on coastal resources, if unchecked, leads to their depletion.

Fisheries resources, mainly coastal demersal species, are affected not only by the fishing pressure but also by degradation of water quality and reduction of habitats due to destruction of coral reefs, sea grass beds and mangrove areas. It would be necessary to establish an effective stock enhancement measure that will rehabilitate nursery areas and other critical habitats that provide hiding and feeding grounds for fisheries resources.

(7) Member countries need assistance on fishing technologies and knowledge to develop offshore resources such as pelagic fish and squids.

Offshore pelagic fishing is relatively new to some CARICOM member countries. The fishing situations vary depending on the geographic characteristics of the countries. To prevent overfishing

of pelagic species, it is necessary to formulate a development plan based on scientific information.

(8) Neither inland nor marine aquaculture is well developed.

Expectations for aquaculture development are high as fisheries resources are decreasing in the CARICOM countries. However, aquaculture is relatively new to the region, and few long-term development plans to guide regional and country-level aquaculture exist. Furthermore, the extent of basic knowledge and the skills of the fish farmers are not sufficient.

1.6. Basic Strategies for the Study

The following basic strategies for the Study were formulated. They are categorized into technical and operational strategies. Details are as follows.

(1) Technical Strategies;

【Basic Strategy 1】 Resource management and fisheries development management models are recommended and the fields needed for international assistance are revealed in M/P.

To realize the CRFM's goal of using fisheries resources sustainably, resource management measures need to be strengthened. As the fisheries in the Caribbean region are mostly made up of small-scale fishers, development a management strategy without their involvement and support would be unwise and have little chance of being successful. Thus a participatory approach should be used for practical resource management and fishing community development in different environments. In the M/P formulated from the Study, potential resource management activities will be sorted out in accordance with the geographic as well as socio-economic characteristics, taking into consideration of results of pilot projects. Furthermore, problems and solutions obtained from the pilot projects by the communities and government bodies will be arranged for disseminating appropriate resource management and sustainable fishery development models to communities in the region. Based on the results of the pilot projects, the M/P will identify the fields and practical projects needed for international assistance, including Japan's technical assistance, fisheries grant aid, and loan programs.

【Basic Strategy 2】 Focusing on artisanal coastal fishers and local fishing communities

The majority of fisheries in the region are conducted by artisanal fishers and the decline of catch due to decreased coastal resources directly affects their income. Limiting fishing activities to rebuild the resources/stocks may be hard for most coastal small-scale fishers as most of them earn very low

incomes and do not have alternative work. Thus resource management measures leading to deterioration of their economic condition for a long time may not be feasible. For practical and sustainable resource management, it would be necessary to consider improvement of living standards and poverty reduction of small-scale fishers with a view to comprehensive rural development.

The targets of the Study include livelihood improvement and poverty reduction for fishers and members of the fishing communities. The initial investment for a pilot project should be small enough so that communities have a sense of ownership and project duplication is easy. Furthermore, since women in fishing villages have an important role in fisheries activities, it would be vital to include them in the planning and implementation of pilot projects.

【Basic Strategy 3】 Categorizing target countries into three types, i.e., Countries with wide continental shelves, countries with large land area and well-developed coral reefs, countries with small land area, and conducting the Study accordingly

It is difficult to determine the common interests of the fisheries sector in the Caribbean region due to differences in land and marine areas, environment, culture, economic situation, scale of fisheries and fishing methods. As such, it would be difficult to formulate a sustainable development plan and conduct pilot projects in all the target countries due to time and budget constraints. Therefore the baseline survey and pilot study will be conducted efficiently in the three geographic types of countries, i.e., countries with wide continental shelves, countries with large land area and well-developed coral reefs, and countries with small land area. The three categories and placement of the countries within these categories may be reviewed following the analysis of the data/information from the baseline survey.

【Basic Strategy 4】 Focusing on participatory resource management

The Study aims at participatory resource management. A pilot project will be planned and undertaken after collecting information and analyzing the current situation of a targeted area in such aspects as resource management and biological knowledge of species. The pilot project will focus on a participatory resource management measure that may include a closed area, a closed season, and the establishment of a stock enhancement area. It may be paired with economic options that could involve the creation of alternative fishing grounds and/or development of alternative target species through the investigation of various feasible options, for example, use of fish aggregating devices, artificial reefs and set net. Co-management among government bodies, local communities and

research institutes is very effective in conducting those activities. Japan has a rich history in participatory resource management as well as co-management, which will be very useful to the Study

Capacity building of staff of the CRFM and fisheries departments of the member countries as well as local communities, including their fisherfolk organisations will be done through on-the-job training during the pilot projects. Such an undertaking would be aimed at verifying the potential of a comprehensive resource management model shown in the Figure 3.

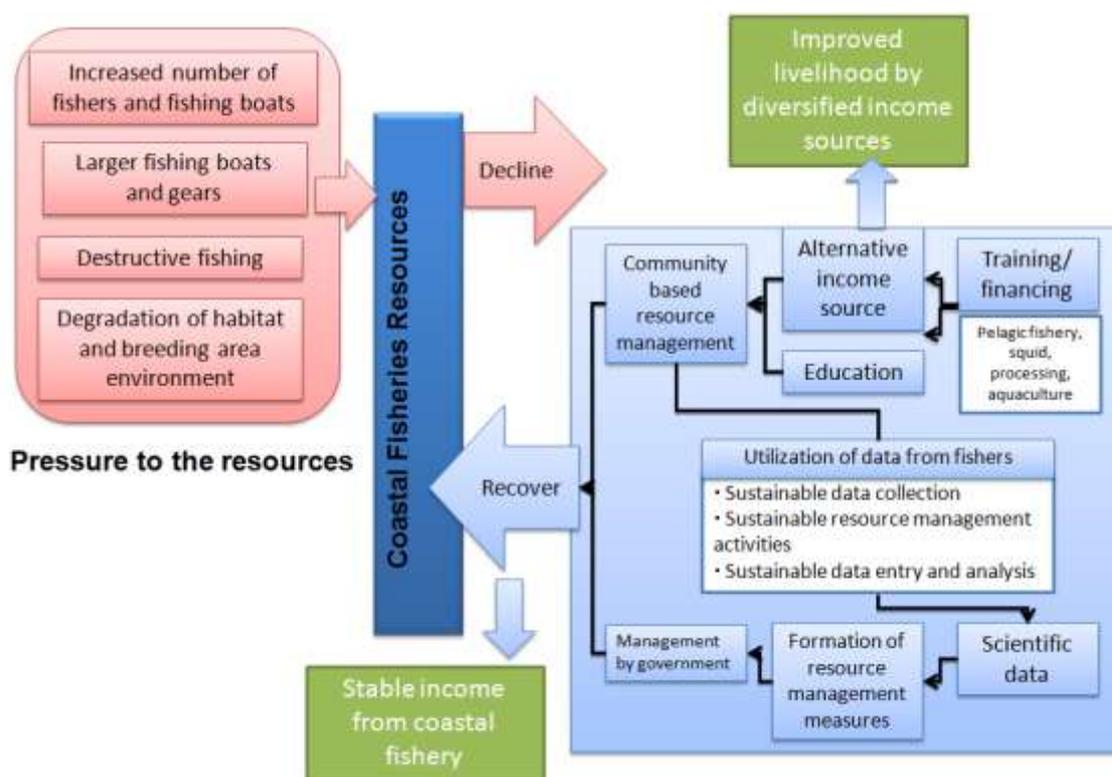


Figure 3: Proposed Resource Management Structure

【Basic Strategy 5】 Including basic components in pilot projects i.e. pelagic fish resource management and sustainable development plan, sustainable aquaculture development plan, community-based resources management plan, and fisheries statistics improvement plan

Pilot projects will verify the relevance of the four components, namely the pelagic fish resource management and sustainable development plan, the sustainable aquaculture development plan, the community-based resource management plan, and the fisheries statistics improvement plan. A pilot project is not an independent project, and the activities of each component in it are connected to those of the other components. However, if some of the components turn out to be unnecessary in the CARICOM member countries during the baseline survey and analysis of the current situation,

such component(s) may be removed from the pilot projects in consultation with the CRFM.

Based on results of the pilot projects, the M/P will include concrete and effective plans to realize improved livelihood and poverty reduction in the fishing communities in the long term. The Figure 4 shows the relationship of the four components of the pilot project and their outputs.

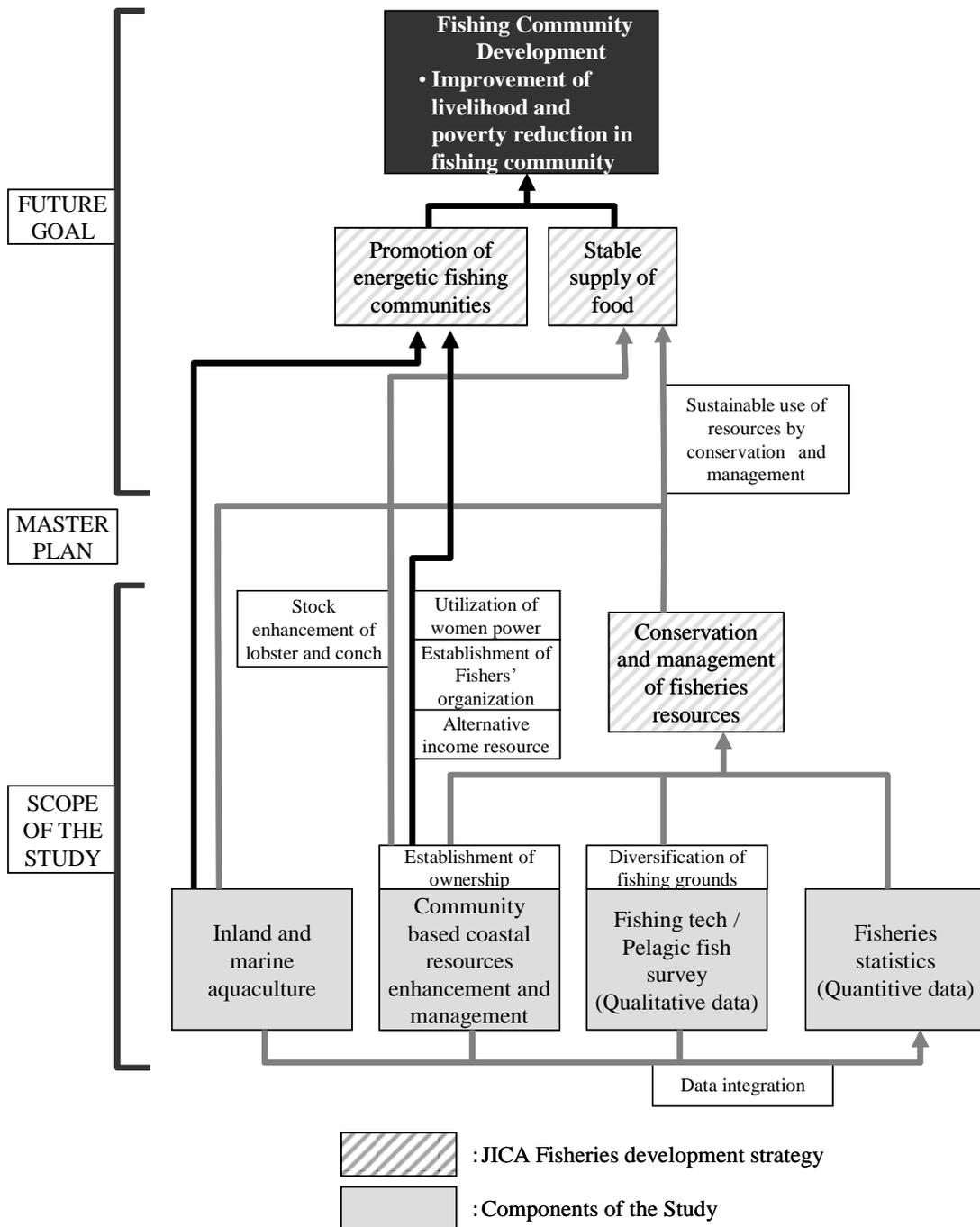


Figure 4: Relationship of Four Components and Outputs

(2) Management Strategies

The followings are details of management strategies.

【Basic Strategy 6】 Assigning the Study team members efficiently to implement complex and diverse activities

It is complex to conduct the four components of the Study and pilot projects in the target countries with a regional organization as a counterpart. The Caribbean region has many countries, and regional and international organizations involved in fisheries development and resource management. Coordination with these partners is essential for the success of the Study.

To manage this complex task smoothly, a deputy manager has been assigned to coordinate the Study in the field office for a long period. He has rich experience in regional cooperation and fisheries development and will be able to respond to day-to-day issues quickly and appropriately with close communication with the Study team manager. In addition, working groups and a steering committee will be established to determine the course of implementation.

The working groups are task-oriented teams consisting of the CRFM Secretariat and Japanese experts in each component of the Study. The working groups will formulate activity plans, implement and monitor the progress of the baseline surveys and other technical activities, and address issues as necessary to ensure smooth and effective delivery of the Study and achievement of the results.

The steering committee is an approval and decision-making mechanism for the Study. The Committee which will comprise the Chief Fisheries Officers/Directors of Fisheries or Fisheries Administrator of the participating CARICOM Member States and senior staff of the CRFM Secretariat, who will be responsible for coordinating the Study and providing guidance and advice to the Working Groups and the Study Team. Issues regarding the Study will be discussed during the steering committee meeting. The Figure 5 shows the proposed management structure.

To avoid duplication of existing projects and conduct the Study efficiently, cooperation and information exchanges with counterparts in each member country, i.e. staff members of the fisheries departments, are essential.

To cover the wide target area and countries efficiently with a limited time and budget, the Study team will be divided into plural teams which will undertake the survey and share the results with other team members. For the preparatory survey, the Study team will be divided into three teams and visit 12 countries to prepare and coordinate the upcoming baseline survey. A general baseline survey will be conducted by local consultants in the target countries. After the general baseline survey, the Japanese team, divided into four groups this time, will visit potential countries for the pilot projects and conduct detailed fishing community surveys. The results of the baseline survey (including the

detailed community survey) will be used to select countries where the pilot projects will be located. During the pilot projects, the Japanese team will again be divided into three or four teams depending on the nature of the projects or countries. Each team will take charge of implementation and monitoring of the projects. The grouping of the Japanese team will be done considering the important issues of each country and the assignment of the team members who have specialties for such needs. The grouping is flexible and members will be changed if necessary. The number of groups in the Japanese team is increased to four as the detailed baseline survey is a participatory and time-consuming one.

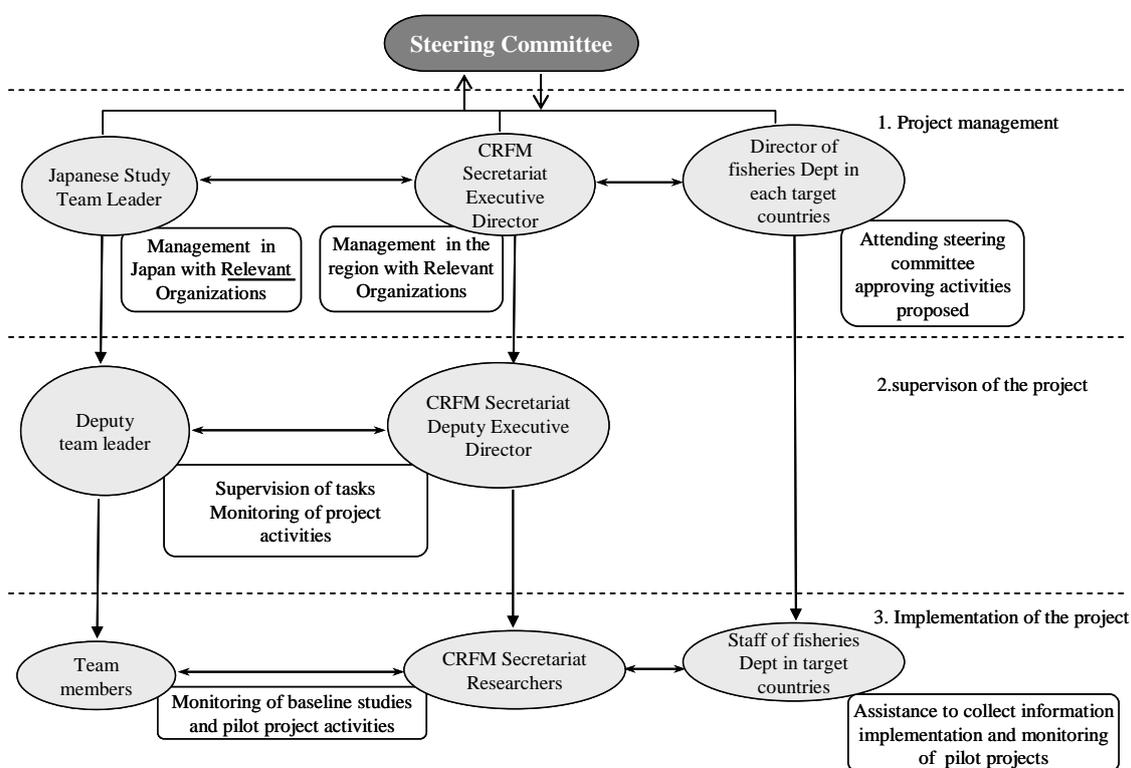
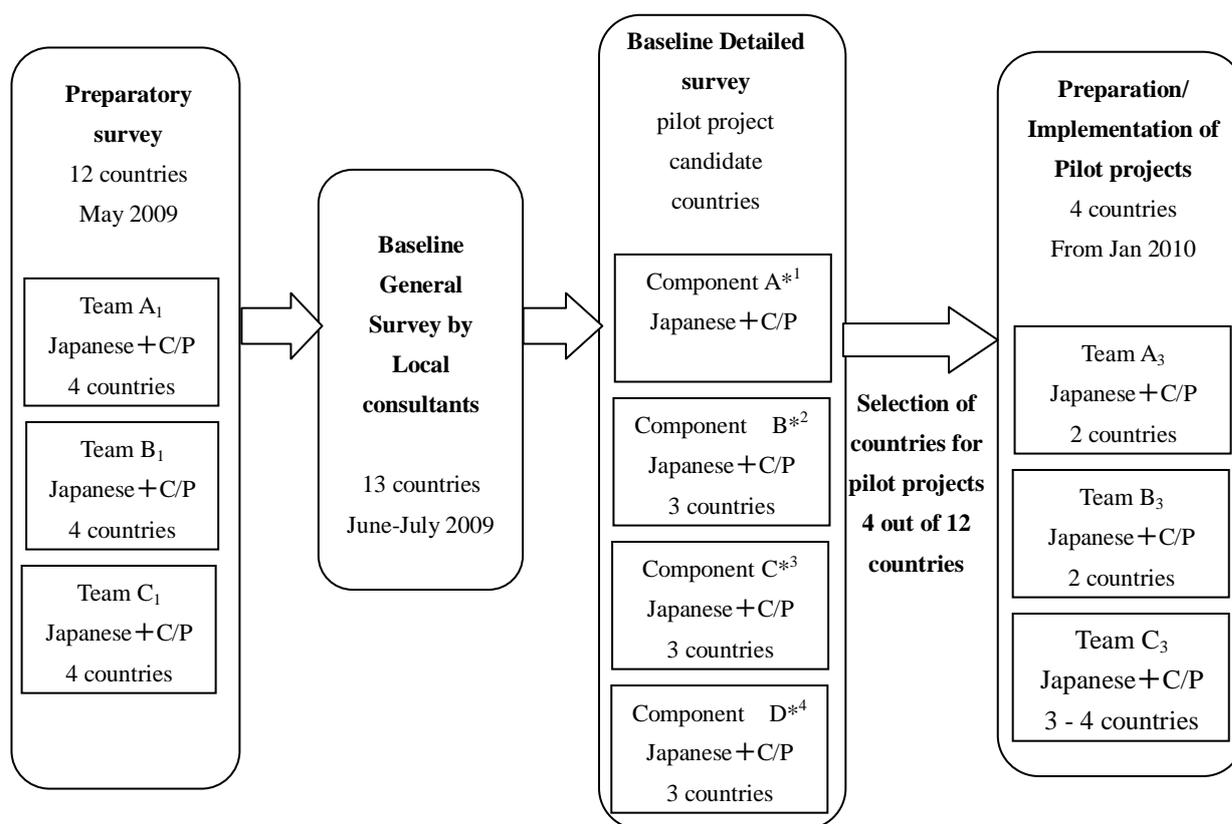


Figure 5: Proposed Project Management Structure



- *1: pelagic fish resource management and development
- *2: aquaculture development
- *3: community-based resources management
- *4: fisheries statistics improvement plan

Figure 6: Proposed Formations of the Field Survey Teams composed of Japanese study team member, CRFM Secretariat and national counterparts.

【Basic Strategy 7】 Cooperating with international organizations and other donors

The Study team will actively communicate with relevant organizations with an interest in fisheries in the Caribbean and invite them to workshops held under the Study so that the information produced and activities recommended in the M/P will be shared and taken into consideration by these organizations as well as by other donors such as the WB and the IDB. The purpose of the Study, the results of the baseline survey, and the progress of pilot projects will be publicized and shared with many stakeholders. Such constant communication will avoid duplication and conflicts in activities with these organizations.

The Study team will also be in close contact with JICA experts in the region. Their knowledge and information will be fully utilized when deciding pilot project sites and create synergy effects with

their tasks. Results of the baseline survey and the contents of the M/P will be discussed with the experts and their concrete ideas and a list of favorable projects may be included in the M/P.

【Basic Strategy 8】 Liaising with relevant parties and responding appropriately to them by promptly sharing the Study information

As the Study activities will spread over a vast area, the Japanese team members, counterparts, and local consultants may not be able to meet often due to time and budget constraints. However, it is very important to communicate with each other for discussing and analyzing the four components of the Study. Although the pilot projects will be implemented in different countries, a regular team meeting will be held using Skype, Instant Messenger and other online meeting tools as appropriate to share the progress and plan of activities among the team members. Beside the online meetings, the Study team will utilize a group website to keep important e-mail communication records and files for future reference.

Contents of various reports and the M/P will be shared with the CARICOM member countries through seminars and workshops during CRFM regular meetings. The Study team will utilize the annual regular CRFM Forum (usually held around April-May) and the special meeting around October, both of which are the occasions on which all the Directors of the CRFM member countries gather, to provide these updates. Regarding the drafting of the M/P 1 in the 1st year of the Study, we will report the progress of the baseline survey at the special meeting and form a consensus on the direction of the Study. The CRFM and the proposed Working Group will describe the draft M/P at the beginning of the 2nd year. A presentation seminar of the Draft Final Master Plan in the 3rd year is an important occasion to publicize and prepare for future actions based on the Plan. All the member countries and relevant international organizations should be invited to the seminar. Such an arrangement will be discussed with the CRFM so that the seminar could be held in line with the special meeting in October. The Table 4 shows an approximate schedule of such meetings.

Table 4: Regular Meetings of CRFM

Meeting	Participants	Timing	Purpose
Forum	Directors of Fisheries from member countries	April - May	Regular general assembly
Special Meeting	Directors of Fisheries from member countries	Around October	To discuss important issues on fisheries, if necessary.
Executive Committee Meeting	Directors of Fisheries of seven board member countries	Around December	To discuss activities of CRFM secretariat
		Around April	
Ministerial Meeting	Minister-level officials	Around May - June	To discuss issues on fisheries

2. Methods of Implementation

2.1. Flow of Project Implementation

The Figure 7 below shows the flow of the activities throughout the project period.

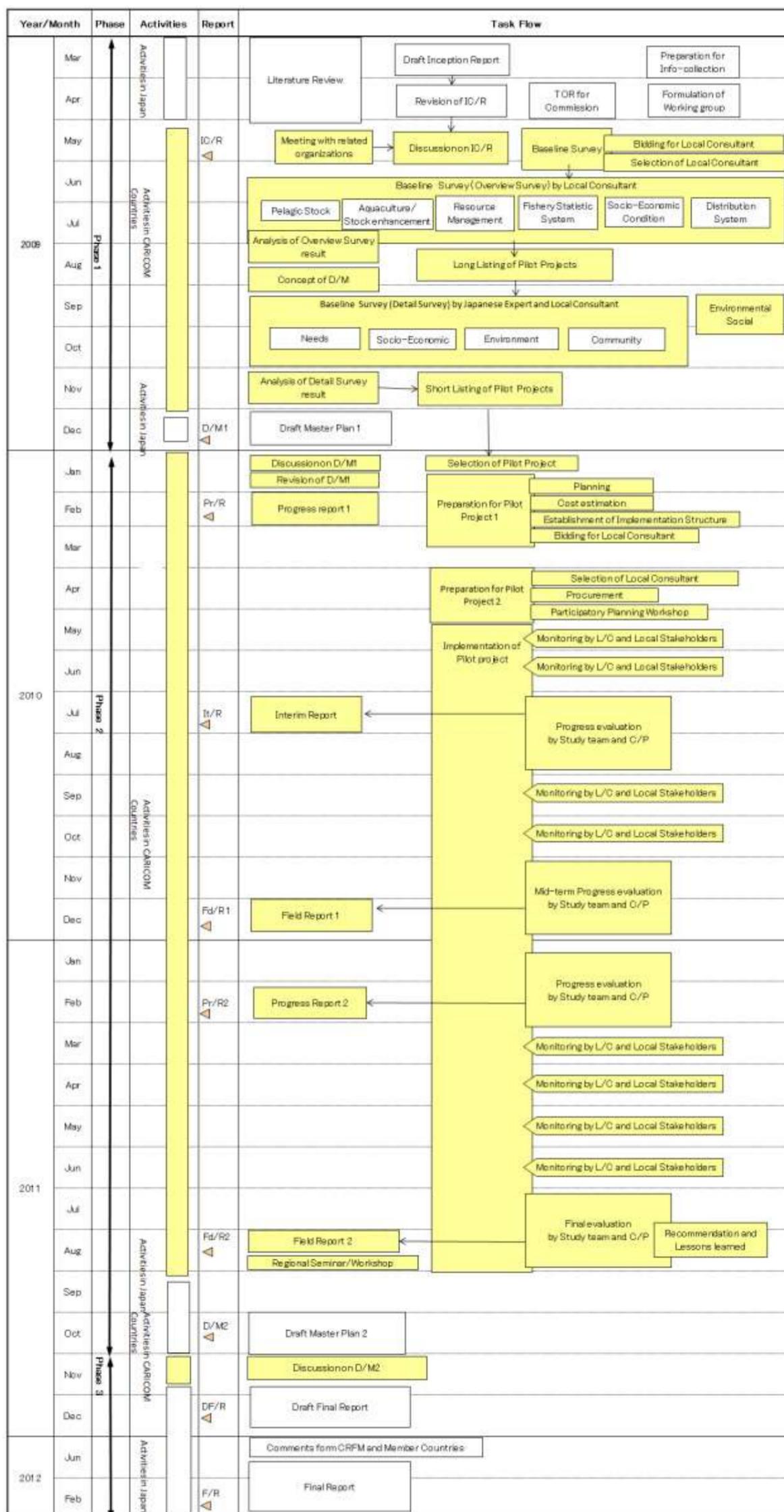


Figure 7: Workflow of the Study

The following are the detailed contents of the Study.

【Phase 1】

2.1.1. Activities in Japan

2.1.1.1. Collection and Analysis of Available Data and Information

Available information and data are to be collected and reviewed in Japan before the baseline survey in the target countries. The information includes reports in the relevant fields, laws and pacts in the region, activities of other donors, and biological information of commercially valued fishery resources such as growth curve and ovipositing behavior. Statistical data and reports on social economic status and market systems in the region gathered through an internet search are also to be examined. The experiences and lessons learned of the past activities in the region are to be reflected in the Study by reviewing the reports such as Japanese experts' reports on the fisheries sector in the region, the feasibility and basic design survey reports of Japanese grant assistance, the CRFM annual report, other donors' reports, and Journals of fisheries and biology. Other necessary information and data which are not available in Japan shall be listed and collected in the field survey.

2.1.1.2. Field Survey Preparation and Formulation of Working Groups

A Japanese Study Team member will be dispatched to the region prior to the first field survey. He will start the necessary tasks for the survey such as collection of contact information on stakeholders and information which is not available in Japan. He will also report the progress of activities in Japan to the CRFM Secretariat and other stakeholders.

Preparation for formulation of working groups is also to be done in this period. These working groups would be composed of CRFM secretariat staff and Japanese Study team members who are assigned responsibility for the different components of the study. The Working groups are expected to manage the Study activities by such means as process control of the baseline survey, formulation of recommendations based on the result of the study, serving as focal point for coordination and discussion with the Japanese experts, and other necessary tasks to facilitate the Study. The envisaged chairman is the CRFM deputy director. Other CRFM secretariat staffs in charge of Statistics and Information, Research & Resource Assessment, and Fisheries Management & Development are expected to compose the group.

2.1.2. Activities in CARICOM Member Countries

2.1.2.1. Presentation of the Draft Inception Report

The Japanese experts will describe the contents of the Draft Inception Report to the CRFM chairman and the working group members. The result of the discussion will be shared with the partner countries of the Study. In addition, the Japanese experts will visit the countries and discuss needs and

issues they face, which will be utilized to formulate the baseline survey framework. Then the inception report will be revised and finalized in cooperation with the working group.

During the country visits, the Japanese experts will propose the establishment of a Steering Committee of the Study. The Committee which will comprise the Chief Fisheries Officers/Directors of Fisheries or Fisheries Administrator of the participating CARICOM Member States, will be responsible for coordinating the Study and providing guidance and advice to the Working Groups. The Steering Committee is expected to meet at least once a year in line with the regular annual Meetings of the CRFM FORUM to facilitate the CRFM members' participation. The period of CRFM Forum meeting may be a good opportunity to hold a steering committee. Important issues regarding the study will become an agenda item at the Forum meeting. Other scheduled meetings may be used to address on going issues as a supplement. The Table 5 shows the envisaged members.

Table 5: Proposed Composition of the Steering Committee

Chairman	Representative of CRFM member countries (On a rotational basis)
Coordinator	Deputy Executive Director of CRFM
Members	Director of Departments of Fisheries of participating CRFM Member States Team leader of the Japanese Study Team

2.1.2.2. Discussion and Exchange of Views with Other Donors and Partners

Exchange of views on the Study is to be done with stakeholders of the fisheries sector in the region. The views of those organizations are also to be taken into consideration in implementing the Study. If necessary, a multi-donor meeting to coordinate donors' strategies and activities in the fisheries sector would be held upon approval of JICA.

2.1.2.3. Baseline Survey

The baseline survey is divided into two phases. The first phase aims to form an overview of the region. Necessary information is to be collected through questionnaire and interview surveys with persons in charge of the fisheries sector in respective countries. The survey results and other information collected in the preliminary phase are to be organized and analyzed in order to clarify issues to be dealt with. The entire baseline survey shall be commissioned and implemented by local organizations such as local consulting firms or research institutes.

The second phase aims to collect more detailed information through visits to fisheries villages that represent artisanal fisheries of each country. In this part, sustainable use of fisheries resources is to be the primary consideration. The Table 6 shows the survey items and corresponding survey components, and the Figure 8 shows the workflow of the baseline survey.

Table 6: Items and Corresponding Components of Baseline Survey

Baseline survey items	Corresponding component of the survey
a. Distribution system of target species in CRFM and surrounding countries	All the components
b. Status of pelagic fish resource utilization and needs of communities in the target region	Pelagic fish resource management and development plans
c. Status of fisheries resources utilized by aquaculture and stock enhancement and needs of communities in the target region	Aquaculture development plan, community-based resources management plan
d. Policy and status of fisheries resource management in CRFM	Community-based resource management plan
e. Status of the fishery statistics systems and capability of CRFM countries in marine fishery statistics	Fisheries statistics improvement plan
f. Socioeconomic status of rural communities (e.g., population, number of households and fishing boats, fishing gear)	All the components

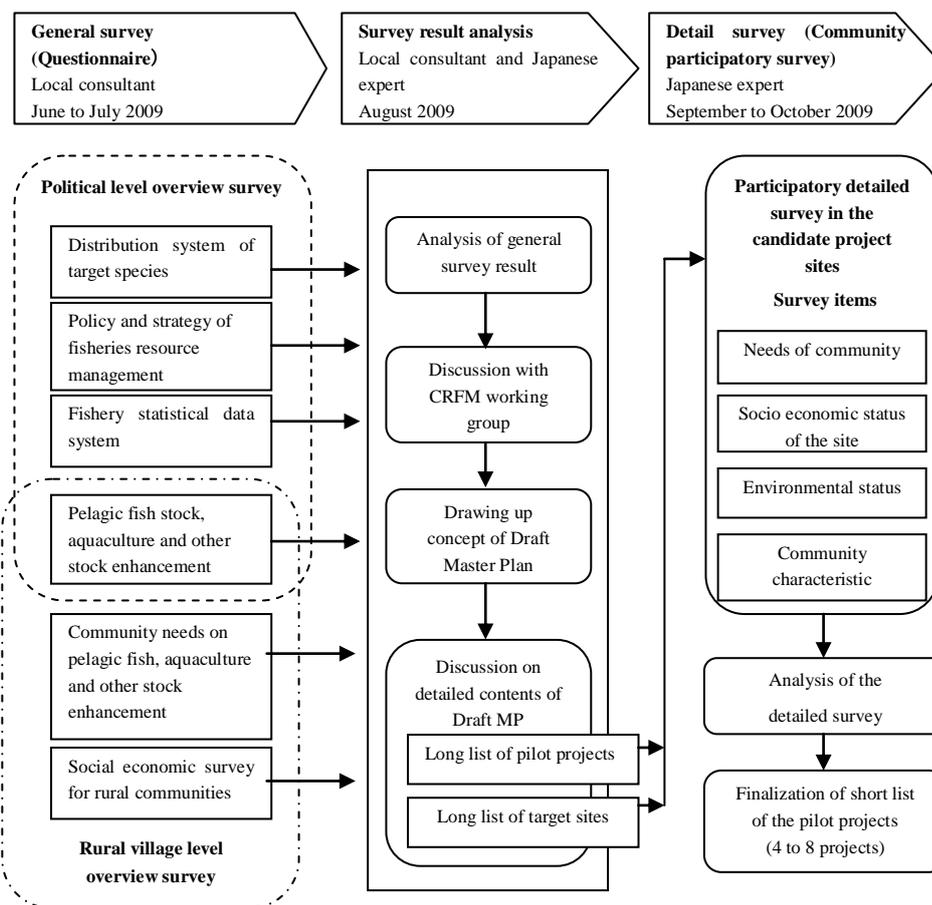


Figure 8: Framework of Baseline Survey

a. Fish distribution survey on target species in CRFM and surrounding countries

To properly understand the current situation of fish and fish product distribution in the Caribbean region, basic statistics on local fish production, imports and exports will be collected. An interview survey with fish product traders will be done with a questionnaire containing items in the Table 7. As it is difficult to understand the domestic, regional and international distribution situations of all captured and cultured fresh fish and processed products in a limited time, captured and cultured fish and processed fish products will be roughly classified into three categories: (1) fresh fish distributed and consumed in the domestic market, including restaurants and hotels; (2) processed fish products consumed in the domestic market including restaurants and hotels; and (3) high value fresh fish and processed fish products exported to regional and international markets. Then, according to the categories above, local consultants assigned to the field study will analyze distribution routes and price formation in the region and each country. Some important fish species and processed fish products in the region, such as lobster, conch, shrimp, flying fish, dolphinfish and salted dried-fish, will be selected, and their distribution situation will be intensively studied. Since many countries in the Caribbean region also import fisheries products from Canada and other countries, the status of import of these products such as salted dried-fish will be examined.

Table 7: Survey Items for Fish Distribution (Tentative)

Study items	Contents
Distribution infrastructure	Number, location and capacities of distribution facilities, such as fishing ports, cold storages, ice plants and cold storage trucks
<u>Distribution routes</u>	Distribution routes of fresh fish for domestic consumption (e.g., Fishers, farmers => Middlemen => Retailers => Consumers) Distribution routes of processed products for domestic consumption (e.g., Fishers, farmers => Processers => Middlemen => Retailers => Consumers) Distribution routes of fresh fish for export (e.g., Fishers, farmers => Middlemen => Exporters => Markets abroad)
<u>Price formation</u>	Price formation of important fish species including conch and lobster (Fisher and farmer prices => Wholesale prices => Retail prices) Price formation of important processed products (Fisher and farmer prices => Processer prices => Wholesale prices => Retail prices)

b. Survey on general situations of pelagic fish resource utilization and needs of communities

Biological and ecological information such as spawning seasons, migration routes, growth curves and fishing practices of selected pelagic species¹² is to be collected from available sources such as the CRFM, UWI in Barbados, WECAFC, IMA in Trinidad and Tobago, OECS and the fisheries division in respective countries. A questionnaire survey is also to be implemented to collect information on pelagic species utilized in the region, which are shown in the Table 8. The survey will target persons in charge of pelagic fish resources in respective fisheries divisions.

After analyzing the results of the questionnaire survey, detailed surveys will be conducted in fishery communities practicing pelagic fishing. Those communities will be selected considering the results of the questionnaire survey and recommendations of respective fisheries divisions. In the detailed surveys, information such as important species, amounts of catch, fishing grounds, fishing seasons, and fishing gear and methods in the targeted areas are collected through questionnaires and interviews. The results of these surveys shall become references for selection of target species and pilot project sites.

Table 8: Survey Items for Pelagic Fish Resources Utilization and Community Needs (Tentative)

Survey Items	Contents
Biological Features	Spawning season and area; growth curve; migration route
Status of Pelagic Fisheries	Important species; amounts of catch; fishing grounds; fishing seasons; fishing methods; cost-benefit analysis of each type of pelagic fishing
Status of Communities	Geographical characteristics; population; number of households; number of fishing boats
Surrounding Condition	Infrastructures; markets

c. Survey of fisheries resources utilized in aquaculture and stock enhancement as well as community needs of those resources

In this survey, the information on target species in aquaculture¹³ and stock enhancement is to be collected from relevant research institutes and fisheries agencies in the same manner as the survey “b.” The Table 9 shows information to be collected through questionnaires and interview surveys. The survey will identify issues and lessons learned in the past as well as the current projects from technical, economic, and community points of view. In addition, projects are categorized into inland, brackish, and sea culture along with their productions. A detailed survey will be incorporated later

¹² Selected pelagic species for the study may include the following: wahoo (*Acanthocybium solandri*), dolphin fish (*Coryphaena hippurus*), blackfin tuna (*Thunnus atlanticus*), king mackerel (*Scomberomorus cavalla*), jack mackerel (*Trachurus* spp.), flying fish (*Hirundichthys* spp.), sardines (*Sardinella aurita*), and herrings (*Harengula jaguana* or *Opisthonema oglinum*). The ICCAT-managed fish such as tuna and related species are excluded from the study. Although it is not a pelagic species, diamond back squid (*Thysanoteuthis rhombus*) is also included in the selected species.

¹³ The aquaculture target species are tilapia, shrimp, freshwater shrimp, conch, oysters, and seaweeds.

with the baseline survey in the fishing villages selected by the fisheries agency in each country.

Table 9: Survey Items for Aquaculture and Stock Enhancement (Tentative)

Survey Item	Contents
Biological Features	Spawning season and area; growth curve; migrant route
Status of Stock Enhancement	Site characteristics; related projects (past and ongoing); issues and concerns; lessons learned (cause and impact of failed and successful projects)
Status of Aquaculture	Site characteristics; related projects (past and ongoing); production size of projects; issues and concerns; lessons learned (cause and impact of failed and successful projects)
Economic Status	Average income; source of income; social characteristics of community

d. Survey on policy and strategy of fisheries resource management in CRFM countries

In line with the result of the Surveys “a”, “b” and “c,” this survey aims to collect related laws and regulations as well as resource management cases in the region such as fishing gear regulations, closing season and site, and catch size restrictions through questionnaire and interview surveys with fisheries officers of each country. Both successful and failed cases are to be examined from technical, economic and community points of view for the target species. The survey is also to focus on traditional resource management cases and resource recovery cases through stock enhancement projects such as artificial reef. The Table 10 below shows tentative survey items.

Table 10: Survey Items for Policy and Strategy of Fisheries Resource Management (Tentative)

Survey Items	Contents
Management Structure	Related laws and regulations; punitive clause; responsible authorities; surveillance system; community participation
Resource Management Cases	Traditional coastal resource management; target species; fishing gear restriction; closing season and site; catch size restriction
Issues Faced	Technical issues; economic issues; community issues

e. Survey on fisheries statistical systems and capabilities of CRFM member countries in terms of fishery statistics

According to the CRFM annual report in 2007, a questionnaire to assess the fisheries statistical system in CRFM member countries was delivered to the fisheries department in each CRFM country. These results from the questionnaire will be utilized in understanding the actual situation. In order to obtain additional information to more accurately understand the fisheries situation in the countries and develop a regional policy framework on data and information for fisheries management and development, including the establishment of a regional fisheries database, a study will be conducted to examine all existing documents and to conduct a rapid survey within the CRFM countries. Table 11 provides further information on some of the items to be considered during the survey.

Table 11: Survey Items for the Fishery Statistics Survey (Tentative)

Survey Items	Contents
Collection of Data	Target species; collection frequency and methods; items to be collected
Existing Statistics	Target species; items to be gathered; survey period
Existing Fisheries Statistical Systems	Usage of CARIFIS program; database alternative to CARIFIS; statistical analysis software; number, duties and technical capability of staff and available resources for the data collection

After the survey, the CRFM member countries will be classified into groups by the following criteria: 1) quantity and quality in the collection of statistical data; and 2) level of compilation and utilization of this data. The Table 12 shows an example of the classification.

Table 12: Classification of Countries by Level of Fisheries Statistics

		1) Level of collecting fishery statistics data			
		Level High	Level Middle	Level Low	No Data Collection
2) Level of compilation and utilization of fishery statistics data	Level High	CRFM Country A CRFM Country B	CRFM Country C CRFM Country D		
	Level Middle	CRFM Country E	CRFM Country F CRFM Country G	CRFM Country H	
	Level Low		CRFM Country I CRFM Country J	CRFM Country K CRFM Country L	CRFM Country M

One of the CRFM countries will be selected from each group in this classification table, and further study using focus group discussions and interviews with stakeholders will be conducted.

Pilot projects will be conducted to test the feasibility of selected key components of the proposed policy framework drafted in the MP1.

f. Socio-economic survey of rural communities

To understand the socio-economic situation in rural communities in each target country, a review of available reports on the socio-economic situation of the countries and a questionnaire survey using items in the Table 13 will be conducted. Three different questionnaires for the following three purposes will be prepared: (1) to assess the general condition of fishing communities in each country; (2) to clarify the socio-economic condition in representative communities; and (3) to understand the livelihood condition of fishing households in respective communities. Local consultants or research institutes will be assigned to implement the field survey. Through discussion

with Japanese team members, the survey contents such as study areas and number of samples may be arranged in accordance with the condition of survey areas and the actual implementation process of the field survey. If necessary, the detailed methods for analysis and summarization of study results will be advised to the local organizations. This study will also communicate with, and take into consideration the recently initiated CARICOM/CRFM/Kingdom of Spain project on diagnosing poverty levels in selected CARICOM Member States.

Table 13: Study Items for Socio-Economic Study (Tentative)

Survey Items	Target Group	Contents
General information of fishing communities in each target country	Fisheries ministry or department of each target country	Number of fishers; number of fishing boats by fishing methods; types of fishing methods
Current condition of representative fishing communities	Representative fishing communities (3 to 5 communities or villages in each country)	Population of community; condition of social infrastructures (e.g., school, health clinic, water supply, electricity); fishing activities (e.g., number of fishing boats, types of fishing method, sale and processing of captured fish); other income sources beside fishing; association/group activities
Current livelihood in fishing households	Fishing households / villages above-mentioned (3 to 5 households)	Revenue composition (fishing, agriculture, forestry); expenditure composition (food, education, medication); debt and repayment; work sharing of men and women

TOR for the baseline survey

The baseline survey shall be commissioned to local consultants. The conditions of the commissioned survey and candidates for local consultants are as shown in Table 14.

Table 14: Draft TOR of Baseline Survey

Survey period: July to August 2009. Expected man-months (MM) of the work: 10MM.

Survey Items	Resource	Contents	Methodology
Distribution system of target species in CRFM and surrounding countries	Fisheries officers in respective countries	<ul style="list-style-type: none"> • Status of market infrastructure • Transaction amount of fisheries products in terms of quantity and price • Price formation process of fisheries products • Transaction amount of import fisheries products and processed products in terms of quantity and price 	Literature review; questionnaire; interviews with fisheries offices
Status of pelagic fish resource utilization and needs of communities in the target region	Fisheries officers in respective countries	Case study <ul style="list-style-type: none"> • Technical issues • Economic issues • Community issues • Lessons learned: causes of success and failure Needs <ul style="list-style-type: none"> • Techniques • Equipment and infrastructure 	Literature review; questionnaire, interviews with fisheries offices; site visit

Status of fisheries resources utilized by aquaculture and stock enhancement and needs of community in the target region	Fisheries officers in respective countries	<p>Case study</p> <ul style="list-style-type: none"> • Technical issues • Economic issues • Community issues • Lessons learned: causes of success and failure <p>Needs</p> <ul style="list-style-type: none"> • Techniques • Equipment and infrastructure 	Literature review; questionnaire, interviews with fisheries offices; site visit Analysis thorough categorization: inland, blackish and sea culture as well as its production scale
Survey Items	Resource	Contents	Methodology
Policy and status of fisheries resource management in CRFM	<p>Fisheries officers in respective countries</p> <p>Community people in fishing villages</p>	<p>To figure out the status of fishing villages in the region, the following items are surveyed.</p> <p>Status of fisheries</p> <ul style="list-style-type: none"> • Number of fishing vessels • Target species • Fishing gear and techniques • Local market system • Fisheries product process • Amount of catch • Fishing ground and season <p>Status of community</p> <ul style="list-style-type: none"> • Geographical characteristics • Population and number of households • Average income and its resource • Community activities (e.g., cooperative) <p>Status of social economic infrastructure</p> <ul style="list-style-type: none"> • Fishing port and landing site • Fishing market • School • Clinic and hospital • Utilities (water and electricity) 	Literature review; questionnaire; interviews with fisheries offices; site visit Fishing villages in the region are to be categorized based on geographical characteristics and target fishes. Four villages from each category are to be selected and questionnaire and interview surveys shall be done in those villages.
Socio-economic status of rural communities (e.g., population, numbers of households, fishing boats, fishing gear)	Community people in fishing villages	<p>Management structure</p> <ul style="list-style-type: none"> • Related laws and regulations • Punitive clause • Responsible authorities • Surveillance system • Community participation <p>Case study</p> <ul style="list-style-type: none"> • Technical issues • Economic issues • Community issues • Lessons learned: causes of success and failure 	Literature review; questionnaire; interviews; site visit
Status of the fishery statistics systems and capability of CRFM countries in fishery statistics	Fisheries officers in respective countries	<ul style="list-style-type: none"> • Frequency and methods of collecting fishery statistics data, existing reports on fishery statistics • Status of the use of CARIFIS and other database system and statistical analysis software • Number and duties of responsibilities of people in charge of the fishery statistics systems • Required basic technical skill to handle the fishery statistic systems • Problems encountered upon installing CARIFIS and find out how to extend CARIFIS in the CRFM countries 	Literature review; questionnaire; interviews; site visit

Potential candidates of regional/local consultants for the work mentioned above are listed in Appendix A. Other entities such as consulting firm in a specific field may also be commissioned.

2.1.2.4. Selection of Pilot Projects

Based on the analysis of the data and information collected during the Baseline Survey, the concept of the M/P and potential pilot projects shall be outlined and discussed with the CRFM working group. Cost estimation for each candidate project will be done. The selection of the long- list of pilot projects will be done using the basic criteria set out below.

Criteria of long listing

- Outcome must be expected in the study period, i.e., within one and half years.
- Target species must have commercial value.
- Projects have an economic impact and contribute to poverty reduction.
- Projects can be generally applied to the region.
- Projects have positive impacts on social, technical, organizational development.
- Community ownership can be enhanced through projects.
- Project concepts are in line with the fisheries policies and strategies of the countries in the region.
- Coastal resources in the target site have been decreasing and community awareness on the issue is high.
- The initial cost of the project should be small so that the project can be duplicated in other communities.
- The running cost of the project should be kept small so that the target community can sustain the project on its own.

Japanese experts, in collaboration with the CRFM Secretariats and local fisheries officers will visit the long-listed sites and conduct detailed surveys such as needs survey, social economic survey, environment survey and participatory coastal resource assessment. The survey items are shown in Table 15. The sites will be narrowed down to a short list of four to eight projects based on the detailed survey. The criteria of the short listing are as follows.

Criteria of short listing

- Leaders of the target community approve the project.
- Projects contribute to enhance relationships among the fisheries community.
- Projects have no negative environmental impacts.
- Geographical balance and fairness in the region

- Capability of fisheries agencies and research institutes in the target country such as existence of a survey vessel, assignment of a counterpart, and a working office for Japanese experts
- Existence of other projects related to the Study

Table15: Survey Items for Detailed Survey in Pilot Candidate Sites

Items	Contents	Methodology
Needs of community	Needs of fishers and women’s group (not limited to fisheries needs)	Focus group discussion
Distribution	Marketing route; price at landing site and local market	Interview; workshop; site visit
Fishing calender (Figure 9)	Fishing target species (fishing season, catch fluctuation); fishing gear and vessel	Interview; workshop; site visit
Fishing map	Fishing ground based on season, species and fishing gear	Interview; workshop; site visit
Fisheries groups and cooperatives	Cadidate community organization in charge of the pilot project and its capability	Interview; workshop; site visit
Household income	Income sturcture and seasonal fractuation	Interview; workshop; site visit
Enviroment	Depth of the target sites; substrate; seasonal sea condition	Interview; workshop; collection of the existing data such as nautical chart
Case study of resource management	Case study of resource management and its result	Interview; workshop
Authorities in charge of resource management	Existence of proper authorities for pilot project management and its capability	Interview

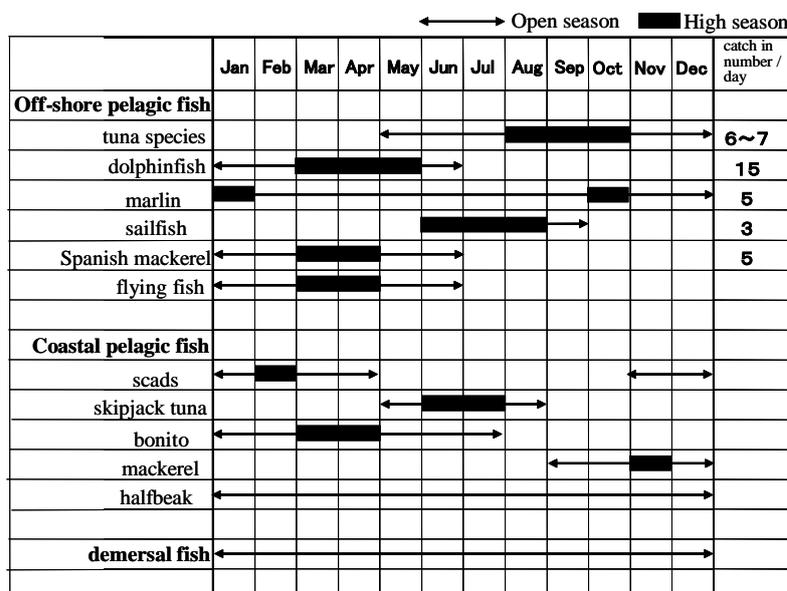


Figure 9: Fishing Calendar

2.1.2.5. Survey Related to Environmental and Social Considerations

After the completion of the short list of pilot projects, the impacts of these projects on the local natural environment will be assessed based on the JICA Guidelines for Environmental and Social Considerations. The initial environmental examination (IEE) is to be conducted by the CRFM secretariat under the supervision of the Japanese experts, then a consensus among the target community and local governments is to be reached. If such consensus is not formed, an alternative plan will be prepared through consultations with other study team members and proposed to the CRFM and the member countries. Moreover, a monitoring plan for environmental and social considerations will be made after the commencement of the pilot projects.

2.1.2.6. Final Selection of Contents, Target Site and Community of Pilot Projects for Fisheries Resource Management

Four to eight pilot projects will be selected through discussions with the CRFM working group. During the selection, community awareness, budget size and technical level should be investigated. Possibility of outcome realization within the specified time period is to be considered as well.

Since the pilot projects cannot be implemented in all the countries in the region, the condition should be carefully explained to respective fisheries authorities in all the countries. The pilot project sites and communities should be selected in accordance with the study components with those fisheries authorities to maximize the output of the project. CRFM prioritization and criteria are to be taken into consideration as well.

The following are examples of the pilot project concepts.

Pelagic fish resource management: A plan for sustainable use of pelagic fish stock with FAD which can be utilized for fixed-point oceanographic and biological survey on pelagic resources including diamondback squid.

Community resource management and stock enhancement: A community-based resource management project for sustainable use of coastal resource utilization by such means as artificial nursery reef for lobster settlement and squid egg laying, seed (egg mass) release of queen conch and bivalve culture such as artificial reef for oyster. Such a project aims at a developing resource management in target communities while improving living conditions of local fishers.

Aquaculture: The pilot projects can be small-scale inland aquaculture and sea-culture plan in a target country.

Fisheries statistic survey: The result of the baseline survey is to be examined and reflected in the formulation of a pilot project. Then a pilot project is to be implemented for fisheries data consolidation covering species names, data collection, and measurement methods. The data collection method should be formulated in accordance with other pilot projects such as pelagic stock

management and community-based resource management. Possibilities for integration of social economic data are to be considered as well. Then, the draft policy framework is to be refined for establishing a regional fisheries database and a master plan is to be formulated for the improvement of national and regional fisheries information systems.

Some examples of pilot projects are described in the following pages.

[Example of Pilot Project (2)]

Stock Enhancement of Lobster through Artificial Nursery Reef for Juvenile Lobster Recruitment

Background: Lobster, which has high commercial value, is one of the most important fisheries products in the Caribbean region. However, precisely because of the high commercial value, lobster has been always under strong fishing pressure. Thus resource management of lobster is needed in the region, which would realize stable and sustainable catch of the species.

As lobster has a long drifting period in its larval stage, it is economically impractical to conduct aquaculture including seed production. It is more feasible and effective to provide secure habitats for juvenile lobsters. Such project has been done around the world. There are pilot projects even in Japan using concrete blocks and secondhand fish nets. In Southeast Asia, lobster larvae are collected by natural devices such as holed stone and wood. In Mexico and Cuba, "Casita", "Pesqueros," or artificial reef made from fibers of coconuts and mangrove trees, is traditionally utilized for lobster stock enhancement.

Objective: This project aims to assess effectiveness of a lobster artificial reef adopting experiences and techniques of other countries as well as to establish a resource management system through a community participatory approach. Those artificial reefs would be a comprehensive resource management tool as they may attract not only lobster but also other juvenile fishes and demersal fishes as their habitat.

Methodology: Small lobster artificial nursery reefs are made and installed in cooperation with local fishers in a site where lobster fishing is popular. Impacts of the reef such as aggregation of lobster and fishes are monitored and assessed.

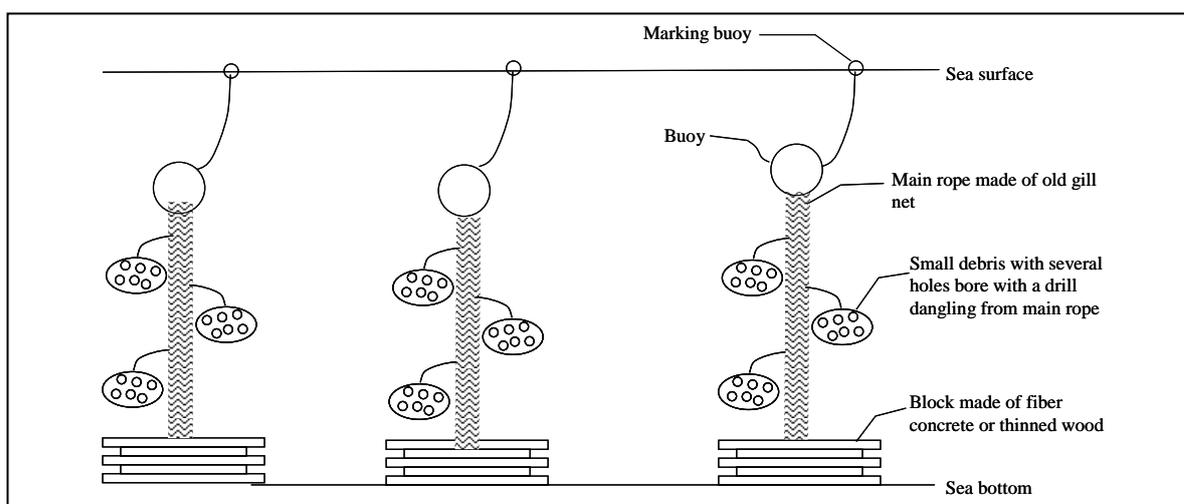


Figure 11: Concept Design of Lobster Artificial Reef

[Example of Pilot Project (3)]

Introduction of Small-scale Set Net Fishing for Coastal Small Pelagic Fisheries Development and Management

Background: In the Eastern Caribbean region, coastal small pelagic fish, such as Jack and Joshua, which are migrating in coastal areas, have been mainly caught by traditional beach seine fishing method. Although most of the landed products are consumed within the community, they can also be utilized as bait for fishing. Regarding set net fishing in the region, a JICA project in Trinidad and Tobago from 2001 to 2006 had conducted experimental operations. According to the report of the project, set net fishing could bring more stable, diversified, and fresher catch with a higher amount than traditional beach seines. Small-scale set net fishing should utilize under-utilized coastal small pelagic stocks and enhance participatory resource management in fishing communities.

Objective: Potential of set net fishing for sustainable resource utilization and management is to be examined in the target site. A fishers' organization for set net management is to be established and assessed as well. Profitability, or cost-benefit performance in the long run, will be well examined during the implementation. To assess those factors, biological, socio-economic, and environmental data are to be collected. Legal matters are also to be cleared before installation as a set net requires an exclusive area in the target site.

Methodology: Firstly, a baseline survey shall be conducted to find suitable fishing grounds in terms of environment and community participation. After the site selection, workshops are to be held in the selected fishing community to secure cooperation of the community. Regarding practical aspects, CFTDI instructors with knowledge and skills on the set net will provide instructions of setting and operation. A community-managed operation system is to be established for sustainable use of the net. The set net can also be utilized to collect biological, environmental and socio-economic data as it is stationary in a bay. Linkages with other fields such as fisheries statistics, community organization development, socio-economic and marketing, and environmental surveys are indispensable for analyzing respective data.



Figure 12: Concept Design and Photo of Set Net

[Example of Pilot Project (4)]

Fishery Statistical Systems

Background: The CRFM aims to develop fisheries statistics systems to manage fisheries resources in the Caribbean region. The Caribbean Fisheries Information System (CARIFIS) was developed in cooperation with Canadian technical assistance. However, an effective fisheries information system has not been established yet, as the circumstances and environment of fisheries in the CRFM countries diversified. Generally speaking, it is extremely difficult to develop a regional fisheries statistical system for all the CRFM countries due to the following reasons.

- 1) Different levels of information and communication technology among the countries
- 2) Differences in fisheries statistical policies among the countries
- 3) Cost-effectiveness in managing the system is very low, since the countries are distant from one another and names of species and measurement units vary.

Countries in the Caribbean sometimes have different names for the same fish species. Moreover, fishers often use their own local terms in markets, making it difficult to integrate a fisheries statistical database among all the CRFM countries.

Objectives: To provide a system to convert the local fish name to the scientific one

Methodology:

1. Classify fisheries information of main species in each CRFM country using existing documents, and list local names of the main fish species.
2. Create a local named database grouped by country.
3. Develop a simplified fish name converter module that has the following functions.
 - a. To provide an input interface for country name, fish-landing place and time, fish name with local terms and catch of fish.
 - b. To convert, through the interface, the entered local name to the scientific one.
 - c. To provide an output interface such as ones shown below.



Figure 13: Example of Output Interfaces in Fish Name Converter Module

4. Install the fish name converter module and local name database in some local offices to enter fisheries information in pilot areas.
5. Monitor the usage of the fish name converter system and provide technical support if necessary.
6. Check the compiled fisheries statistical data and evaluate the fish name converter system in cooperation with Counterparts to ensure that the system meets all the requirements for the objectives.
7. Provide technical assistance for C/P during the process above, and then develop manuals and support tools for Training of Trainers (TOT) to be conducted by Counterparts.

[Example of Pilot Project (5)]

Introduction of Integrated Tilapia Culture

Background: The introduction of tilapia fish began in the Caribbean region in the 1980s. At present, tilapia culture is popular in Belize, Jamaica, Trinidad and Tobago, and Guyana. However, about 90% of tilapia culture production in the region is in Jamaica, and the production in other countries is very little. Since tilapia culture in Jamaica has been developed with large industrial farms, most of cultured tilapia is processed into filets and exported to the United States. Because local-made compound feed is used for tilapia culture, fish farmers risk a higher cost of production due to an escalation of raw material costs. Since the Caribbean countries experience decreasing fisheries resources in coastal areas, an interest in aquaculture to generate alternative cash income and employment opportunities in rural communities is high. However, basic skills and knowledge of fish culture are not disseminated widely and an interest in them among artisanal fishers and farmers is low. An intensive culture method used in commercial enterprises is available, but less expensive methods for artisanal fishers and farmers have neither been defined nor tested in the region.

Objective: The effectiveness of extensive tilapia pond culture which requires less capital and less cost for artisanal fishers and farmers is to be evaluated. Generally in the aquaculture business, the feed cost is more than a half of the total production expenditure. To reduce this feed cost, tilapia culture with integration of pig, poultry, and vegetable farming will be introduced.

Method: To integrate small scale farming with fish production, sheds for livestock are set on or beside the fish ponds. Livestock such as pigs, chickens and ducks are reared in the sheds. Compound feed and grasses are fed to the livestock, and later collected manure and leftovers are put into fish ponds. This will enrich the nutrition in the pond water generating phytoplankton as well as zooplankton as natural feed for tilapia fish. After harvesting the fish ponds, the mud from the bottom of the pond is utilized as fertilizer in vegetable farming.

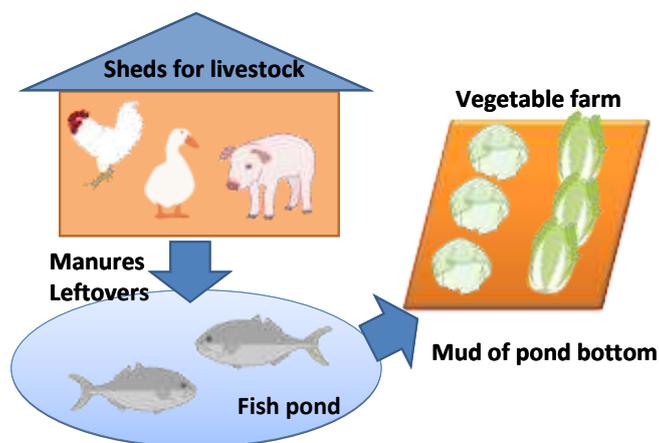


Figure 14: Concept of Integrated Tilapia Culture

2.1.3. Work in Japan Phase 1

2.1.3.1. Formulation of Draft Master Plan 1

A draft master plan is to be drawn up based on the result of the 1st field survey, which will clarify issues and concerns facing the region and include possible solution for them. The Figure 15 is an example of chapter headings of the draft M/P1.

2.1.3.2. Preparation of Pilot Project

Detailed plans and cost estimates of the shortlisted projects are to be made.

[Phase 2]

2.1.4. Field Survey Phase 2

2.1.4.1. Discussion on Draft Master Plan 1

The Draft Master Plan 1 made in Phase 1 shall be explained to and discussed with the CRFM Secretariat and fisheries authorities of the member countries. A consensus on the contents of the Draft Master Plan and the pilot project framework are to be made reflecting opinions of the counterparts.

2.1.4.2. Preparation of Pilot Project

The contents of the pilot project such as objective and expected outputs are to be explained to community and fisheries officers in the target sites so that local counterparts can well understand the pilot project beforehand. Necessary materials and equipment, then, are to be procured. In the course of the pilot project, community participation should be maximized in every step. Feasibility of the project should be well examined in terms of economics and marketing. The projects should be implemented in collaboration with each study component as much as possible. Photos and videos of the projects are to be recorded as references for future project implementation.

2.1.4.3. Monitoring and Evaluation of Pilot Project

The projects are to be monitored based on the participatory planning mentioned below and evaluated annually.

- | |
|---|
| <ol style="list-style-type: none"> 1. Status of fisheries sector of CARICOM countries <ol style="list-style-type: none"> 1.1. Organization structure of CARICOM and CRFM 1.2. Fisheries policy and strategy of CRFM 2. Basic status of the target countries <ol style="list-style-type: none"> 2.1 Social economic status 2.2 Fisheries status 2.3 National development plan 3. Socio-economic status of artisanal fishers' villages <ol style="list-style-type: none"> 3.1 Social structure 3.2 Economic status 4. Production of artisanal fisheries <ol style="list-style-type: none"> 4.1 Status and features of coastal artisanal fisheries 4.2 Issues of coastal artisanal fisheries 4.3 Status and issues of fishers training 5. Fisheries development plan <ol style="list-style-type: none"> 5.1 Development and management of pelagic fisheries stock 5.2 Development of aquaculture and stock enhancement 5.3 Community-based resource management 5.4 Fishery statistics system |
|---|

Figure 15: Contents of Draft M/P1

a. Participatory planning

A planning workshop using the PCM method is to be held with community and local stakeholders in each site selected. In the workshop, an action plan is to be made to clarify responsibilities and time framework with bar chart using PDM¹⁴ and WBS¹⁵.

b. Monitoring

The pilot projects are to be monitored from the following two perspectives.

- With a view to transferring techniques to local counterparts, monitoring activities are to be done mainly by fishers and local authorities under supervision of the Japanese experts. The experts support and advise the local counterparts on their periodic reporting.
- With regard to monitoring on stock enhancement impact, responsibilities are to be divided: fishers and local authorities collect fish catch information, and biological information such as amount of aggregated species is to be surveyed periodically by a local research institute under the Japanese experts' supervision and training.

As shown in the Figure 16, the monitoring structure should be organic integration of three parties, namely, local fishers, research institutes and government agencies. The ideal monitoring flow is as follows: 1) fishers monitor the project in the field, 2) a local research institute supports the project from the scientific point of view, and 3) government agencies establish effective policy and structure based on the information and data provided by fishers and the research institute.



Figure 16: Collaborative Relationships

c. Process control and evaluation

Process control and evaluation are to be done with the action plan using PDM and WBS made in the planning stage as well as with data on catch amount and biological survey.

2.1.4.4. Submission and Discussion of Progress Report 1

The progress of the Study and the Study policy for the next phase is to be summarized in a progress report one year after starting the study. The contents of the report are to be explained to and

¹⁴ Project Design Matrix

¹⁵ Work Breakdown Structure

discussed with stakeholders such as JICA, the CRFM Secretariat and fisheries authorities of the member countries. Opinions from the counterparts are to be taken into consideration to improve the Study implementation.

2.1.4.5. Submission and Discussion of Interim Report

Issues and concerns facing the Study and the pilot project implementation are to be summarized into an interim report at the middle point of the Study. Those issues and the solutions toward them are to be discussed with JICA, the CRFM and fisheries authorities of the member countries to facilitate the Study implementation.

2.1.4.6. Submission and Discussion of Field Report 1

A field report is to be submitted in the middle point of Phase 2, covering the progress and issues of the pilot projects. The contents are to be explained to JICA, the CRFM and fisheries authorities of the member countries. A seminar is to be held as an explanatory meeting of the report. Opinions from stakeholders are to be reflected in the Study implementation.

2.1.4.7. Submission and Discussion of Progress Report 2

The progress of the Study is to be summarized in the progress report two years after the beginning of the Study. The contents of the report are to be explained to and discussed with stakeholders such as JICA, the CRFM and fisheries authorities of the member countries. Opinions from the counterparts are to be taken into consideration to improve the Study implementation.

2.1.4.8. Submission and Discussion of Field Report 2

Outputs and lessons learned of the pilot projects are to be summarized in this report. The contents are to be explained to JICA, the CRFM, and fisheries authorities of the member countries. To collect opinions from a variety of stakeholders, a seminar will be held as an explanatory meeting of the report at the same time as the CRFM annual meeting. International organizations are to be invited so that the outputs of the Study are shared and utilized by them in the near future. The Study results, covering outputs and lessons learned of each study component and possibility of the networking activities among the components, are to be presented. Visual aids such as photos and videos are to be used in the presentation.

2.1.5. Work in Japan Phase 2

2.1.5.1. Formulation of Draft Master Plan 2

The Study results of the phase 2 are to be integrated into the draft master plan. It may contain the conceptual process of resource management such as a figure 17.

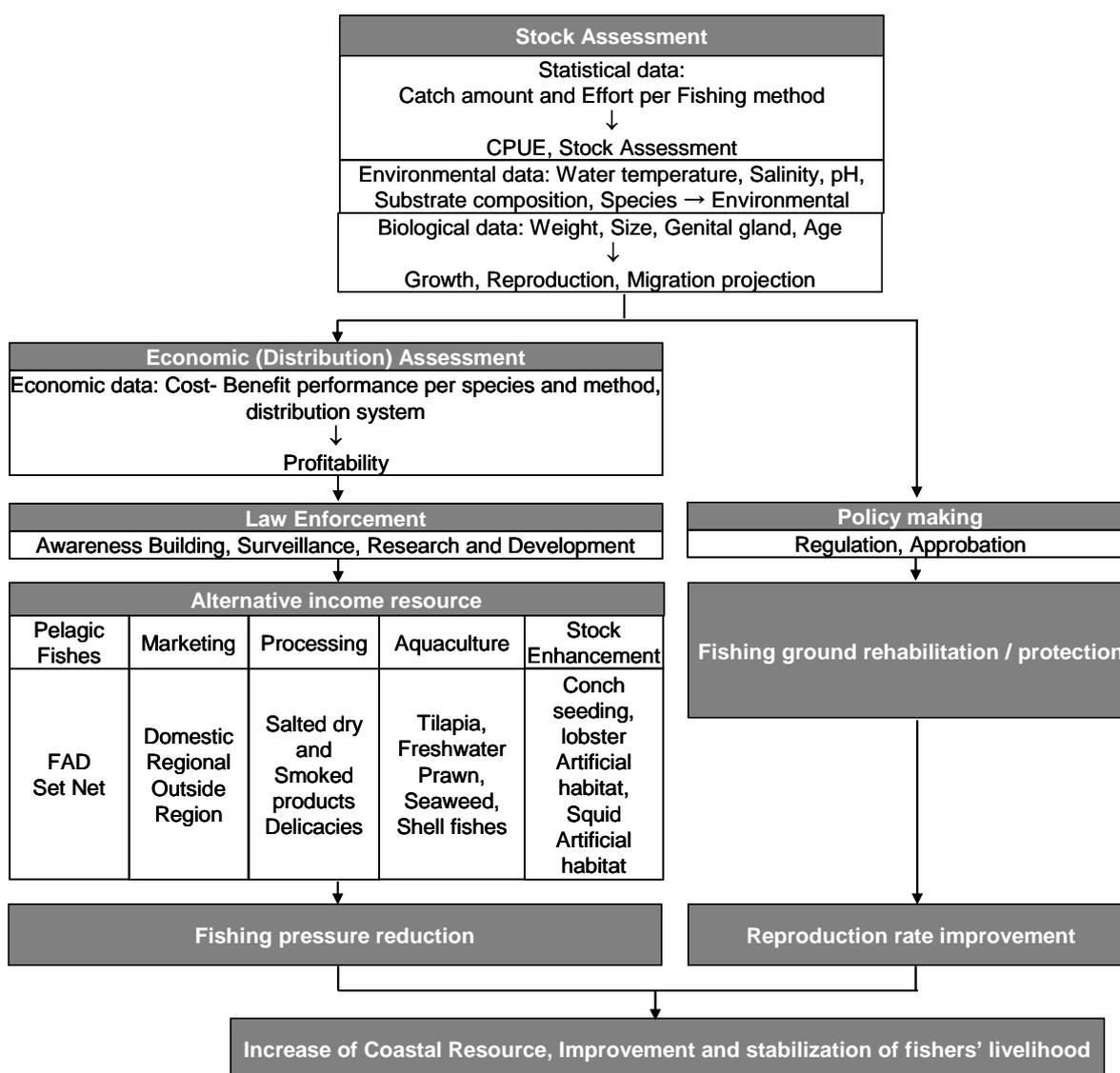


Figure17: Schematic Diagram of conceptual process of resource management

The contents are to be discussed with JICA and the result of the discussion is to be shared with the CRFM Secretariat and fisheries authorities of the member countries. The master plan is to be finalized reflecting comments from those stakeholders. Detailed resource management projects are to be proposed in the report, which are based on lessons learned of the pilot projects. The following points are to be focused on in lessons learned of the Study.

- Issues on participatory community-based management
- Issues on administrative management
- Impact of stock enhancement and challenges for the future
- Economic impact of the pilot projects and challenges for the future

【Phase 3】

2.1.6. Field Survey Phase 3

2.1.6.1. Submission and Discussion of Draft Master Plan 2

The final draft of the master plan is to be presented and discussed with JICA, the CRFM Secretariat and fisheries authorities of the member countries. The final draft should reflect lessons learned of the Phase 2 results and be a feasible one.

2.1.7. Work in Japan Phase 3

2.1.7.1. Submission and Discussion of Draft Final Report

A draft final report describing the outputs of the Study is to be submitted to JICA, the CRFM Secretariat and fisheries authorities of the member countries. Comments from them, expected in about a month, are to be reflected into the report.

2.1.7.2. Submission of Final Report

The final report is to be submitted to JICA as the final output of the Study.

【Contents of the reports】

The Study team is to submit a variety of reports, namely, inception report, interim report, progress report, field report, and final report. To avoid duplication of the report contents, objectives and items shall be clarified as shown in the Table 16. The progress report aims to present progress of the whole Study and output of technical transfer to counterparts. The field report focuses on progress and output of the pilot projects. The interim report summarizes the whole Study progress and lessons learned at the middle point of the Study. The table of the contents of the final report will be almost the same as that of the interim report.

Table 16: Contents of Each Report

Report	Date of Submission	Contents
Progress Report 1	February 2010 Two months after the second field survey's start	<ul style="list-style-type: none"> ● Progress of the entire study including summary of the baseline survey and draft master plan ● Progress of technical transfer
Interim Report	July 2010 Seven months after the second field survey's start	<ul style="list-style-type: none"> ● Progress of the entire study ● Result of the baseline survey ● Draft master plan ● Progress of technical transfer ● Progress of pilot project selection ● Lessons learned
Field Report 1	December 2010 Upon completion of the second field survey	<ul style="list-style-type: none"> ● Progress of pilot projects ● Issues and lessons learned of pilot projects
Progress Report 2	February 2011 Two months after the third field survey's start	<ul style="list-style-type: none"> ● Progress of the entire study ● Progress of technical transfer
Field Report 2	October 2011 Upon the end of the Phase 2 of the study	<ul style="list-style-type: none"> ● Progress of pilot projects ● Issues and lessons learned of pilot projects
Final Report	Upon completion of the study	<ul style="list-style-type: none"> ● Summary of the study result; draft master plan ● Lessons learned of pilot projects ● Output and lessons learned of technical transfer ● Progress of pilot project selection ● Final Master Plan ● Lessons learned of the entire study

Appendix A Potential Consulting firms

Some names of regional consultanting firms in the CARICOM member countries

1. **Caribbean Ecosystems Limited, Jamaica**
2. **Hamilton and Associates, Jamaica**
3. **Meridian Environmental Consulting Agency, Barbados**
4. **Environmental Solutions LTD, Jamaica**
5. **Belize Environmental Technologies, Belize**
6. **UWI Consulting, Jamaica**
7. **Caribbean Natural Resources Institute, Trinidad and Tobago**
8. **Institute of Marine Affairs, Trinidad and Tobago**