

STREAM



Support to Regional Aquatic Resources Management



System Requirement Report for Level 2 – National Management Institutions, for the Bureau of Fisheries and Aquatic Resources in the Philippines

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Level 2 – System Requirement Report – Information needs of the BFAR for the co-management of fisheries and Aquatic Resources in the Philippines

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ACRONYMS

ADB:	Asian Development Bank
BAS:	Bureau of Agricultural Statistics
BFARMC:	Barangay FARMC
CFARMC:	City FARMC
CITES:	Convention of the International Trade in Endangered Species
CMMO:	Coastal Marine Monitoring Office
CRMP:	Coastal Resource Management Project
DA:	Department of Agriculture
DENR:	Department of Environment and Natural Resources
DILG:	Department of the Interior and Local Government
DND:	
FAO:	Fisheries Administrative Order
FARMC:	Fisheries Aquatic Resource Management Council
FIMC:	Fisheries Information Management Center
FRMP:	Fisheries Resource Management Project
IFARMC:	Integrated FARMC
KDACS:	Knowledge based, decision support and adaptive system for coastal resources management and sustainable offshore fisheries development project
LGU:	Local Government Unit
LMP:	League of Municipalities of the Philippines
MCD:	Municipal Coastal Database
MCS:	Monitoring, Control and Surveillance
MFARMC:	Municipal FARMC
NAFC:	National Agricultural and Fisheries Council
NAMRIA:	National Mapping and Resources Information Authority
NGO:	Non Governmental Organisation
OAFIC:	Overseas Agro-Fisheries Consultants Ltd.
PhilFIS:	Philippine Fisheries Information System
PRIMEX:	Pacific Rim Innovation and Management Exponents, Inc.
USAID:	United States of America Development Agency

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Section A- Introduction

Preface

This report presents the findings from a thorough literature review, workshops, and group and individual interviews conducted by STREAM in the Philippines in November and December 2003.

The ambitious scope of the report combined with the limited time frame and funding available to compile it necessitated the extensive use of secondary data, including both published and unpublished material written by staff of the agencies / organisations involved, with very limited editing of material used. All possible efforts were made to generate information in participation with the government institutions responsible for managing the fisheries, and all contributors (as well as many other stakeholders) were provided with multiple opportunities to comment on the report content. The contributors are listed on the front page of the report.

1 Background

1.1 Purpose

The purpose was prescribed by the Letter of Agreement between FAO and NACA, as follows:

- i) Through meetings with stakeholders from national institutions with a responsibility or role in for fisheries management in the Philippines, compile information to enable the writing of a report.
- ii) Prepare a System Requirement Report on national level requirements for data collection and sharing mechanisms for fisheries co-management in the Philippines according to the Guidance Notes for Compiling System Requirements Reports (provided by FAO).

1.2 Report Focus

To provide a broad picture of the following for the national fisheries management level in the Philippines (from Guidance Notes for Compiling System Requirements Reports):

- i) Range of data and information requirements that exists
- ii) Typically available manpower, resources and institutional capacity
- iii) Structure and operations of co-managed fisheries
- iv) Existing and potentially appropriate data collection tools, sources and methods
- v) Existing data storage and processing methods (if any)
- vi) Requirements and opportunities for data and information sharing
- vii) Lessons and experiences of previous or existing attempts to develop data collection and sharing mechanisms

Section B - Methodologies

This document reports the information needs for co-management of the national government institutions responsible for managing the fisheries in the Philippines. In the Philippines, the institutions responsible for the national management of the fishery are the Bureau of Fisheries and Aquatic Resources (BFAR) under the Department of Agriculture (DA) and the Department of Environment and Natural Resources (DENR). The collection and presentation of statistical data about the fishery is the responsibility of the Bureau of Agricultural Statistic (BAS) under the DA. The national headquarters of these agencies are located in Manila, and the majority of the consultation for this survey was therefore carried out in Manila. However, as the responsibility for the management of municipal fisheries has been devolved to the Local Government Units (LGUs), meetings with representatives of local governments were also arranged, including two in Bataan Province, Region III.

The major focus of the investigation was the BFAR as this agency has the overall responsibility for the management of the fisheries in the Philippines. Prior to the start of the survey, legislation and reports were reviewed and a tentative list of management responsibilities of different stakeholders was drawn up, and meetings and workshops were arranged with relevant agencies. On the first day of the study, December 1st, the management responsibilities of the BFAR and the management framework for the Philippine fisheries were derived from legislative documents, reports and discussions with BFAR staff. On December 2nd, the revised management responsibilities were presented to BFAR staff in a workshop, and information needs for the agency to carry out each of its management responsibilities were formulated in group discussion. The synthesised findings from the workshop were presented to participating and other BFAR staff, who provided further comments and thoughts about responsibilities, decision-making methods and information needs.

On December 3rd, the BAS and the Coastal and Marine Management Office of the DENR were visited, and an interview was conducted with a mayor of a municipality from Region VI. On December 4th, the fourth day, two municipalities in Bataan Province, Region III, were visited, and interviews and group discussions were conducted with the municipal officials and representatives from Fisheries and Aquatic Resource Management Councils (FARMCs).

The schedule (including date, venue and persons met) is shown on the following page.

The report was circulated to the BFAR, DENR and the BAS for comments.

Date	Venue	Persons met
1 Dec 03	Manila BFAR	<i>Interviews with:</i> Reuben A. Ganaden, Asst Director for Technical Services, BFAR Jose Paclibare, Technical Asst, Office of the Asst Director, BFAR Marjorie Grutas, Officer-In-Charge, National FARMC Programme Management Centre. BFAR Rogelio D. Amatorio, Regional Fisherfolk Representative of Region VI Jojo Razon, Officer-In-Charge, Fisheries Information Management Center, FRMP, BFAR
2 Dec 03	Manila BFAR	<i>All day workshop. Participants:</i> Bernadette B. Soliven, Aquaculturist II, FRMD, BFAR Carmencita D. Tocino, Senior Aquaculturist, ADO, BFAR Grace V. Lopez, Aquaculturist II, NFRDI, BFAR Jose O. Paclibare, Senior Aquaculturist, Technical Services, BFAR Lilia L. Pelayo, Officer-In-Charge, Post Harvest Fisheries Research Development Division, NFRDI, BFAR Marjurie Grutas, Officer-In-Charge, NFARMC PMC, BFAR Muriel B. Camu, Officer-In-Charge Fisheries Regulatory Officer, FRQD, BFAR Nory, O. Eleserio, Senior Aquaculturist, CFD, BFAR Prescilla P. Regaspi, Supervising Aquaculturist, IFAD, BFAR Reuben A. Ganaden, Assistant Director, Technical Services, ADO, BFAR Rogelio D. Amatoria, Jr., Fisherfolk Sectoral Council Member, NAPC / NFARMC PMC Romeo B. De Sagun, Officer-In-Charge, Assistant Director for Administrative Services, BFAR Rosarie Areza, Aquaculturist II, FPED, BFAR
3 Dec 03	Manila BAS Manila DENR Manila mayor's meeting	<i>Interviews with</i> Romeo Recide, Director, Bureau of Agricultural Statistics Winifredo G. Amandy, Chief of Fisheries Statistics Division, Bureau of Agricultural Statistics Florendo Baragan, Director, Coastal Marine Monitoring Office (CMMO), DENR Felipe Hilan A. Nava, Mayor, Municipality of Jordan, Guimaras Province, Region VI
4 Dec 03	Mariveles Municipality, Bataan Limay Municipality, Bataan	<i>Group discussion with the following participants:</i> Maria Christina B. Canlas, Economic Researcher, LGU, Mariveles Municipality, Bataan Province Villamor Santos, Provincial & Regional Fisherfolk Chairman, Bataan Province & Region III; Miguel R. Bumagat, MFARMC Administrator, Mariveles Municipality, Bataan Province Rex G. Margen, BFAR III Technical staff Rodrigo L. De Vera, Chairman, MFARMC, Mariveles, Bataan Province <i>Interview with</i> Nelson Canlas David, Mayor, Limay Municipality, Bataan Province

Section C - Results

2 Description of DoF and associated stakeholders

The national agency responsible for fisheries in the Philippines is the Bureau of Fisheries and Aquatic Resources (BFAR), a line agency under the Department of Agriculture (DA). BFAR has a national office and regional offices in the sixteen geographic regions of the country. BFAR was integrated into the DA as a staff bureau (an agency providing advisory services on fisheries matters) in 1986. However, the Local Government Code (Republic Act 7160, 1991) brought about devolution of authority over fisheries matters to Local Government Units (LGUs). According to the Local Government Code, the LGU has the exclusive authority to grant fishery privileges (for oyster, mussel and other aquatic beds, milkfish fry areas and the issuance of licenses for fishing vessels of 3 gross tons or less) and impose rentals, fees or charges without the permission from any national agency (Republic Act 7160, 1991).

In 1998 BFAR was reconstituted as a line bureau (an agency implementing fisheries policies and projects) under the DA through the passage of the Philippine Fisheries Code of 1998 (Republic Act 8550, 1998). The Fisheries code proposed some new concepts, including the limitation of access to the fishery based on scientific decision, integrated management consistent with inter-LGU co-operation as articulated in the Local Government Code, and enhanced and institutionalised participation of the community in fisheries management through the establishment of Fisheries and Aquatic Resource Management Councils (FARMCs).

2.1 National and sectoral policy environment

Four major laws have governed fisheries management in the Philippines from the 1930s to the present: Act 4003 (1932), PD 704 (1975), the Local Government Code (Republic Act 7160, 1991), and the Fisheries Code (Republic Act 8550, 1998). These laws show a distinct devolution of management from central government to local levels of government (DENR-BFAR-DILG, 2001). The more recent of these laws are described in some detail below.

The Local Government Code (Republic Act 7160, 1991) provides for genuine devolution of authority to local governments in fisheries management. The Code states that the municipality has the exclusive authority to grant fishery privileges and impose rentals, fees, or charges without approval or permission from any national agency. Such fishing privileges over fish corrals, oyster, mussel and other aquatic beds, milkfish fry, and fry of other species, and fishing with boats of 3 gross tons or less. The Code also states that LGUs 'shall share with the National Government the responsibility in the management and maintenance of ecological balance within their territorial jurisdiction subject to the provisions of this code and national policies'.

The Fisheries Code (Republic Act 8550, 1998) reiterated or improved the provisions of existing fishery laws and proposed new concepts, including: (a) limitation of access using scientifically determined procedures; (b) integrated management consistent with inter-LGU cooperation as articulated in the Local Government Code; and (c) enhanced and institutionalised participation by the community through the various levels of Fisheries and Aquatic Resource Management Councils (FARMCs). The Fisheries Code clarified issues pertaining to the extent of jurisdiction of LGUs in municipal waters and the operation of commercial fishing vessels therein. A key result of the passage of the Fisheries Code was the recognition of active participation of local fisherfolk and coastal communities by stating that the establishment of Municipal FARMCs (MFARMCs) is obligatory 'FARMCs shall be established in the national level and in all municipalities abutting municipal waters (...) The FARMCs shall be formed by fisherfolk organisations / co-operatives and NGOs in the locality and be assisted by the LGUs and other government entities'.

The process of establishing fully functioning community fisheries that operate in an environmentally and socially sustainable manner takes a long time, and the Philippines is still in the process of

establishing and fine-tuning the community management of municipal fisheries, of which the legislation described above forms the first part. Although explicitly stated in the legislation, the exact role of the LGUs, FARMCs and government agencies is still poorly appreciated by many stakeholders. Thus many of the municipal authorities consulted as part of this study expressed surprise that the LGUs were responsible for managing the municipal fishery, as they thought this was the responsibility of the FARMCs or the BFAR (e.g. Maria Canlas, Mariveles LGU Economic Researcher and Nelson David, Municipal Mayor, Limay Municipality). In many locations, the capacity of the FARMCs to act as a vehicle for community fisheries establishment and operation is limited, as organisation of fishers commonly requires the facilitation of an external agent such as an NGO (Felipe Navan, Mayor, Jordan Municipality and Rogelio Amatorio, Regional Fisherfolk Representative of Region VI, pers. comm.). Within the BFAR awareness of the agency's national management responsibilities was high, but the limited capacity to carry out this function (due to lack of funds) was expressed during the staff workshop. However, a multitude of initiatives aiming to increase the capacity of FARMCs are currently being conducted.

2.2 Roles and responsibilities

Legislation providing for the decentralisation of fisheries management responsibilities in the Philippines has long been in existence. The Local Government Code (Republic Act 7160, 1991) and the Fisheries Code (Republic Act 8550, 1998) together form the framework for establishing the responsibilities of various stakeholders in the management of fisheries in the Philippines. However, because enactment of the legislation has been limited by restricted funding, there is still some confusion over exact roles and responsibilities within fisheries management in the Philippines. Thus many BFAR staff believe that the overall management responsibility for the fishery lies with the LGUs, whereas the LGUs tend to state that the FARMCs are responsible for management. From the interviews conducted with LGUs, it is clear that many (if not most) local fisheries currently are not managed, and management only occurs where a strong FARMC is present in a municipality with an LGU interested in prioritising fisheries. Further, very few people interviewed were aware of the formal allocation of the responsibility for management. The responsibilities as stipulated in legal documents are outlined below.

2.2.1 BFAR

The responsibilities of the BFAR relevant to fisheries management are shown below:

- Issue licenses and permits for fishery activities using a principle of Maximum Sustainable Yield as determined by scientific studies or best available evidence. Give preference to resource users in the local communities nearest to the municipal waters by LGUs
- Establish a broad strategy with LGUs, FARMCs, private sector & other agencies to ensure that fisheries and aquatic resources are judiciously and wisely utilised and managed in a sustainable fashion
- Prepare and implement a comprehensive National Fisheries Industry Development Plan
- Issue licenses for the operation of commercial fishing vessels and licensing of gears
- Establish & maintain a comprehensive Fishery Information System
- Co-ordinate implementation efforts relating to fishery production undertaken by the primary fishery producers, LGUs, FARMCs, and fishery organisation / co-operatives
- Co-ordinate with LGUs and other agencies for the establishment of productivity enhancing and market development programmes in fishing communities to enable women to engage in other fisheries / economic activities and contribute significantly to development efforts
- Enforcement of all laws, formulation and enforcement of all rules and regulations governing the conservation and management of fishery resources, except in municipal waters, and to settle conflicts of resource use and allocation in consultation with the National FARMC (NFARMC), LGUs and local FARMCs
- Assist the LGUs in developing technical capacity in development, management, regulation, conservation and protection of fishery resources

- Formulate rules and regulations for conservation & management of straddling & highly migratory fish stocks
- Co-ordinate LGUs in consultation with FARMCs in the development, conservation, protection, utilisation and management of fisheries and aquatic resources
- Co-ordinate the establishment of Monitoring, Control and Surveillance (MCS) system in LGUs in consultation with FARMCs
- Co-ordinate the LGUs in consultation with the FARMCs for the determination of over-fished areas or areas in danger of becoming over-fished or in need of regeneration in municipal waters

2.2.2 DENR

The roles and responsibilities related to fisheries management of the Department of Environment and Natural Resources (DENR) Coastal and Marine Management Office are detailed in DENR Administrative Order No. 2002-08 (DENR, 2002):

- Formulate and oversee the implementation of a national coastal and marine environment management framework
- Provide overall policy guidance to the DENR on matters pertaining to
 - coastal and marine environment management including the review of standards and policies
 - identification and establishment of mechanisms for adoption of best practices for coastal and marine environment management
 - monitoring of compliance to international commitments and local development plans
- Provide technical assistance to other government agencies, LGUs, NGOs and other parties in the implementation of programmes and projects
- Develop and supervise an information management system for coastal and marine environments
- Co-ordinate with the BFAR, other government agencies, NGOs, business / private sectors and the academe on matters pertaining to coastal and marine environments
- Formulate development plans for coastal and marine environments

Further related responsibilities of the DENR are those of the Coastal and Marine Management Division within Regional Environment and Natural Resource Offices, and Coastal and Marine Management Sections in Community Environment and Natural Resources Offices (from DENR, 2002):

- Prepare action programmes and implementation strategies on coastal and marine environmental issues
- Supervise and monitor the progress of all coastal and marine environment programmes and projects
- Assist the LGU in the preparation of coastal and marine environment profile, plans and formulation of local legislation / ordinances

2.2.3 LGUs

The roles and responsibilities of the LGUs related to fisheries management are as follows (Republic Act 7160, 1991; Republic Act 8550, 1998):

- Protection and conservation: establishing closed seasons, fish refuges and sanctuaries
- Regulation: issuing licenses and permits, registry systems, granting of fishery privileges, establishing mechanisms of exclusion, prioritisation, etc.
- Enforcement: setting up patrolling and enforcement mechanism through the Bantay Dagat and other means that involve Barangay officials and communities
- Legislation: formulating and planning ordinances that reflect the needs of the improved coastal resource management
- Extension: technical assistance: providing appropriate technology and research, credit, and production assistance to municipal fishers and communities

2.2.4 FARMCs

The role of the FARMCs in coastal and fisheries management are outlined below (from Grutas, 2003):

- Prepare and recommend policies and plans for integration into local development plans
- Provide guidelines on the development of projects and issuance of permits and licenses to the LGUs and other agencies
- Assist with the enforcement of fishery laws, rules and regulations in municipal waters
- Local fisheries and coastal zone management

2.2.5 Other mentions of roles and responsibilities

The Ginintuang Masaganang Ani For Fisheries Program (2002 – 2004) (BFAR, 2001b) mentions the roles and responsibilities of implementers of projects included in the programme. The document stipulates that the lead role should be taken by the BFAR, which should oversee programme implementation, the co-ordination of programme implementers, and monitor project and activities in co-ordination with the LGUs and other agencies. In addition to the points above, the stipulated LGUs responsibilities include the planning and implementing of fisheries projects and activities at the provincial and municipal levels, and the gathering of data to inform policy. NFARMCs and Municipal / City / Integrated FARMCs (M / C / IFARMCs) are responsible for assisting with the formulation of policies for the protection, sustainable development and management of fishery and aquatic resources, and assist with the preparation of fisheries industry development plans.

In addition, the programme states that the Bureau of Agricultural Statistics (BAS) should be responsible for the co-ordination and monitoring of research activities of the agencies involved in fisheries, and assisting with the formulation of research plans. The responsibilities of the National Agricultural and Fisheries Council (NAFC) include providing a consultative forum for debates on issues relevant to the development and management of the fisheries sector, and those of the Department of Environment and Natural Resources (DENR) include the exploration, assessment, classification and inventory of all natural resources in the Philippines.

The Fisheries Resource Management Project (FRMP) proposed a fisheries resource management work process for the different levels of management (barangay, municipality, provincial, regional and national). The proposed framework for the national level is shown in Figure 1.

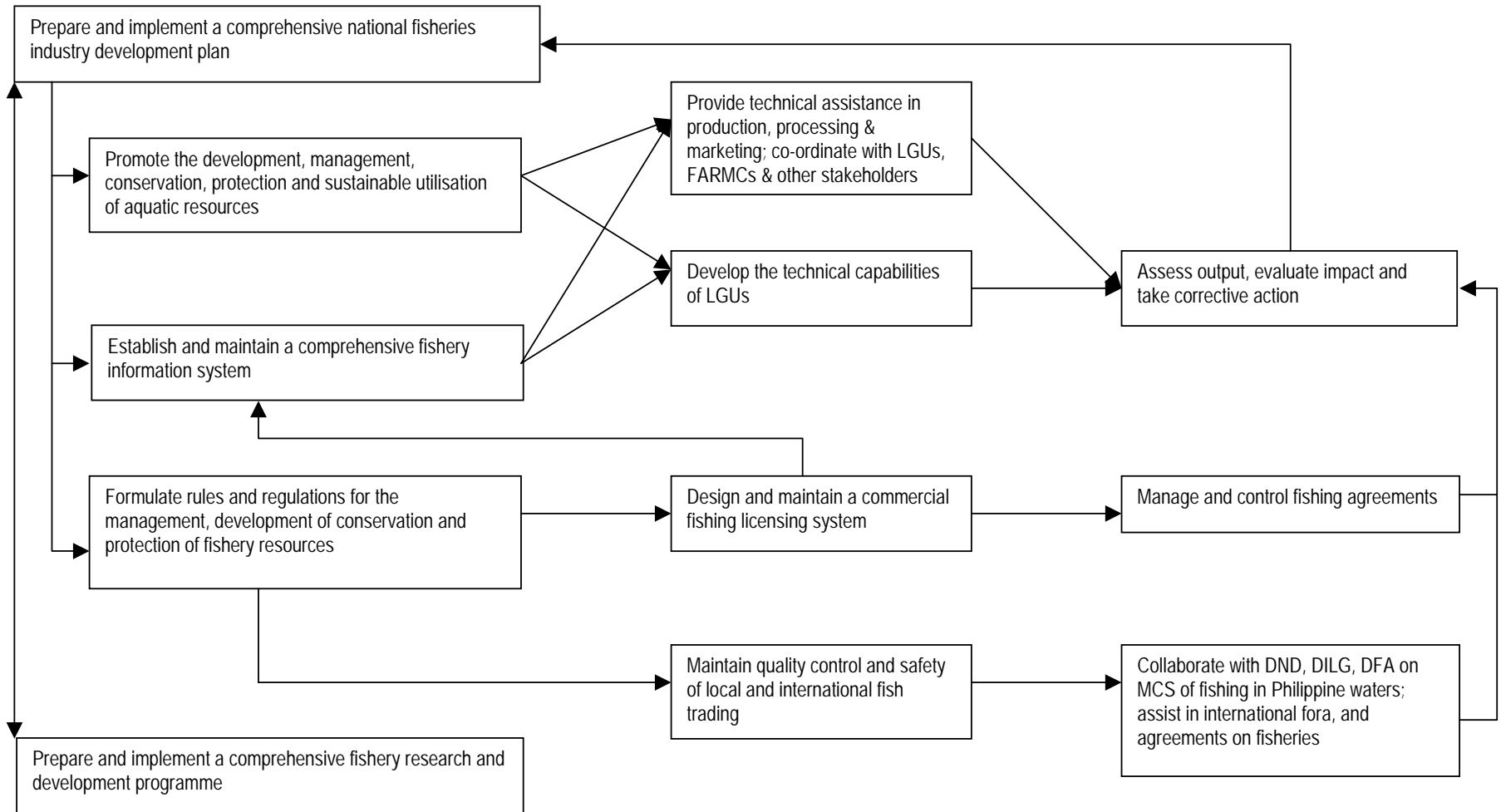
2.3 Institutional capacity and resources including manpower, finances etc.

2.3.1 BFAR

In 2001, an evaluation of the human resources of BFAR was carried out as part of the Fisheries Resource Management Project (FRMP). The study showed that in 2001 the BFAR employed about 1,400 permanent staff, categorised in five major groups (from Agravante, 2001a).

- i) Admin / Finance / Legal (126 staff)
- ii) Technical Services (154 staff)
- iii) National Centers (112 staff)
- iv) Regional Fisheries Technology Centers (126 staff)
- v) Regions (882 staff)

Figure 1: Fisheries resource management work process at national level according to RA 8550. DND: Department of National Defence; DILG: Department of the Interior and Local Government; DFA MCS: Monitoring, Control & Surveillance. From: Agravante (2001b).



In 2001, the average age of permanent personnel was 46 years old, and the median age 44 years old. In the same year, the number of contractual or temporary staff was 800 to 1000, or about 40% of the total workforce. At a mean age of 31 years old, temporary or contractual staff are significantly younger than permanent staff. On average, contractual personnel have worked for BFAR for three years, compared to 23 years of service on average for permanent staff (Agravante, 2001a). Despite the large number of temporary staff, BFAR's human resource development informal policy was found by the FRMP to be that contractual personnel were not employees, and therefore did not partake in updates, orientations and training sessions organised for permanent staff (PRIMEX-OAFIC, 2002).

Permanent personnel were found to have higher levels of training than contractual workers, of whom only 5% had completed graduate or post-graduate studies, compared to 26% of permanent staff. BFAR has got an extensive staff development programme, and all BFAR employees attend frequent updates and orientations, and have opportunities for training in specific technologies and various other topics (Felsing et al., 2003).

Funding is generally scarce within the BFAR. Communication media and computers are available in most BFAR offices, but staff generally has to share access to computers and the internet. The exception is higher-ranking officials who often have access to the internet (but rarely utilise it), and employees within projects such as the FRMP and other projects with international funding agencies, where employees communicate with funding agencies through email (Felsing et al., 2003). The majority of government departments aim to computerise their operations, and so computer and internet access is likely to increase steadily in the near future.

2.3.2 BAS

The Fisheries Division of the Bureau of Agricultural Statistics (BAS), the agency responsible for the official collection of data on the fishery, currently employs 15 staff, whose duties include the planning of surveys and analysis and presentation of data collected. The Statistics Planning Division of the BAS designs the survey; data collection is carried out by contractual staff, and the data processing by the IT Division of the BAS.

2.3.3 DENR

The DENR established the Coastal Environment Program (CEP), which addresses the environmental issues and concerns of coastal communities, in 1993. The Philippine Government funded the program. In 1996, the USAID funded the Coastal Resource Management Project (CRMP) of the DENR, which aimed at ensuring that coastal resource management approaches are adopted at the national level and ensure the sustainability initiatives beyond the life of the project. The project aimed to establish coastal resource management on the national and local agenda and building the institutional competence of the local government to deliver coastal resource management as a basic service. In 2002, the DENR strengthened the CEP through the establishment of the Coastal and Marine Management Office (CMMO) as the national coordinating office for all coastal and marine environment activities. Since 1993, the coastal and marine management activities have been implemented in 87 municipalities all over the country. As per a Department Administrative Order, the CMMO should ideally be staffed with 20 personnel. The Coastal and Marine Management Division at the regional level and the Coastal and Marine Management Section at the community level both employ eight staff. However, at present the CMMO has 13 staff, of which three are detailed from other offices of the DENR, four are casuals and six are contractual. At the regional and community levels, the staffs are likewise detailed from other DENR services/units.

2.4 Links and relationships with other departments, organisations and institutions including local community-based or co-management stakeholders/institutions

At the national and regional level, there is a reasonably close network between BFAR and other government departments, research institutions involved in aquatic research, and NGOs. Apart from conferences and meetings regarding specific technologies, contact is not scheduled formally, and interaction tends to occur as and when needed (Felsing et al., 2003). The Bureau of Agriculture Statistics (BAS) and the BFAR have a close working relationship, and BFAR funds all BAS fishery data collection activities. The BFAR and the Department of Environment and Natural Resources

(DENR) are generally aware of each others activities, but limited collaboration occurs in the formulation of coastal / fisheries management plans, etc. Provincial BFAR offices maintain strong links with LGUs, and are responsible for much of the training of local government extension workers in fisheries and aquaculture techniques, including training local 'fish wardens' how to recognise fish killed by illegal fishing methods such as toxins and explosives.

The activities of the FARMCs are closely co-ordinated with BFAR at all levels. More information about the structure of the FARMCs is provided in Section 2.5. The framework for interaction between various levels of government and FARMCs is shown in Figure 2.

2.5 Description of co-management arrangements and activities (if any)

The Local Government Code (Republic Act No. 7160, 1991) provides for devolution of authority of local governments in fisheries management, and clearly states that the municipality has the exclusive authority to grant fishery privileges and impose fees etc. without approval from any national agency. Such privileges cover fish, corals, shellfish beds, milkfish fry and the issuance of licenses for fishing vessels 3 gross tons or less. The LGUs are also authorised to penalise violations of the fishery law, and to enforce laws and regulations relating to pollution control and the protection of the environment.

The Fisheries and Aquatic Resources Management Councils (FARMCs) form the basis for fisheries co-management in the Philippines. The main laws governing the fisheries management in the Philippines are the Local Government Code (Republic Act No. 7160, 1991), and the Fisheries Code (Republic Act No. 8550, 1998). A major internationally funded project, the Fisheries Resource Management Project (FRMP) is working with the FARMCs and the LGUs to develop the capacity for sustainable community management of the municipal fishery.

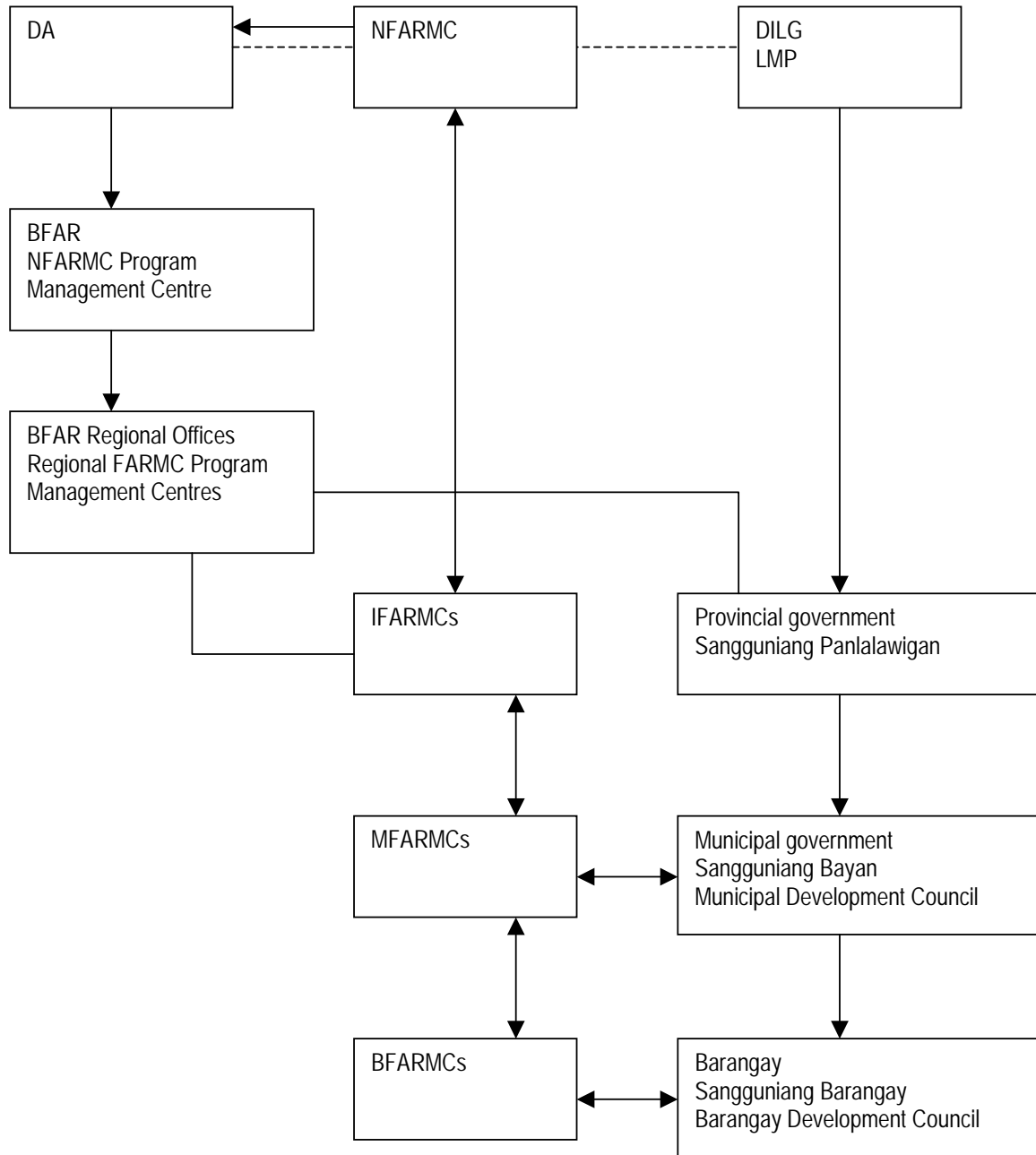
2.5.1 FARMCs

FARMCs provide the framework for the various stakeholders within the fisheries sector in the Philippines to participate in policy formulation and the planning and implementation of fisheries programmes (Grutas, 2003). FARMCs were created in 1995 through Executive Order No. 240 and amended through the Philippine Fisheries Code of 1998 (Republic Act No. 8550, 1998) and Fisheries Administrative Order No. 196 (January 2000). The law mandates the creation of the national and municipal FARMCs to institutionalise the major role of fisher folk and other resource users in the planning and formulation of sustainable development of fisheries resources. FARMCs were established to enable fisher folk to take an active role in the development, management and conservation of local fisheries resources. The council also provides a venue to raise fishery related issues, discuss problems and recommend solutions that could eventually be adapted into legislative agenda (Felsing et al., 2003).

The FARMC is a multi-sectoral body of fisher folk representatives from municipal and commercial fisheries, 'fishworkers' (casual or long term employee in the fishing industry), representatives from NGOs and the private sector, representatives from the LGU (planning and development officer, chairperson of the Agriculture and Fisheries Committee of the Sangguniang Bayan (municipal legislative body) and a representative from the DA / BFAR (Felsing et al., 2003).

At the national level, the National FARMC is an advisory body to the Department of Agriculture in the formulation of national policies for the protection, management and sustainable development of fisheries in the Philippines. Municipal / City / Integrated (for management of contiguous water bodies where more than one municipality is involved in management) FARMCs (M/C/IFARMCs) act as advisory bodies to LGUs, assisting in management of local fisheries resources. Barangay FARMCs (BFARMCs) also exist in some barangays. In 2003, a total of 94% of all coastal municipalities and cities had an M/CFARMC, and 67% of coastal barangays had a BFARMC (Grutas, 2003). However, the number of established FARMCs is not necessarily a reflection of the number operating as intended, and BFAR internal reviews have recently revealed that a great deal of further empowerment and capacity building is needed before FARMCs will function effectively in all areas (Felsing et al., 2003).

Figure 2: Framework for the government – FARMC interface in the Philippines. DA: Department of Agriculture; B / I / M / NFARMC: Barangay / Integrated / National / Municipal Fisheries and Aquatic Resource Management Council; DILG: Department of the Interior and Local Government; BFAR: Bureau of Fisheries and Aquatic Resources; LMP: League of Municipalities of the Philippines



2.5.2 Fisheries Resource Management Project

The Fisheries Resource Management Project (FRMP) is a BFAR led development project funded by two loans: USD 35.2 million from the Asian Development Bank (ADB) and USD 19.3 million from the Japan Bank for International Cooperation. The FRMP is a follow-on project from another ADB funded project, the Fisheries Sector Project, which started in 1990 (BFAR, 2002a). The FRMP started in 1998, and has been implemented in 100 coastal municipalities in 18 bays within ten regions of the country. A third phase is expected to take the project to 2006. The FRMP has three components (PRIMEX-OAFIC, 2002):

- i) Fisheries Resource Management Component: rational resource utilisation and the rehabilitation of damaged fish habitats through data management, coastal resource management, fisheries regulation, community-based law enforcement, and monitoring, control and surveillance
- ii) Income Diversification Component: to provide municipal fisherfolk with supplementary income, reducing their dependence on fishing for their livelihood, including community organising, micro enterprise promotion and support for mariculture development
- iii) Institutional Strengthening Component: building capacity of the executing agency and the implementing agencies in project implementation and fisheries resource management, which includes the design and conduct of training programmes for project implementers and partners, as well as the establishment of management systems at the national, regional and local levels

The aim of FRMP is to facilitate reforms to conserve the country's fishery and coastal resources, and to promote sustainability and ensure food security. The project employs mainly external consultants, from the Pacific Rim Innovation and Management Exponents, Inc. (PRIMEX) and the Overseas Agro-Fisheries Consultants Ltd. (OAFIC), Japan. The FRMP works closely with LGUs and communities to identify alternative livelihood options for community members engaged in destructive fishing, and to draft and implement coastal resource management plans. The main activities include the rehabilitation and management of fish sanctuaries and mangrove reserves, institutionalisation of community based law enforcement (through the provision of training, patrol boats and wireless communication devices), and bay-wide coastal resource management. The project holds workshops with LGU to formulate and implement their resource management plans, and community organisation through contracted NGOs. FRMP also aims to build capability and help reorganise BFAR to enable the Bureau to better assist its customers, in particular the LGU, to implement the measures required for sustainable coastal management.

The structural changes required within BFAR are achieved through human resources and career development programmes, staff training plans and the long term installation of a centralised computer system linking all units and regional offices, as well as the development of management systems to ease administration efforts within BFAR.

2.5.3 Status of co-management

Although the decentralisation and the establishment of FARMCs provide a mechanism for co-management, in reality the decentralisation was only one step towards the sustainable management of the fishery. The final draft report of the Fisheries Resource Management Project (FRMP) (PRIMEX-OAFIC, 2002) concludes that the decentralisation of the responsibility for fisheries management to the municipalities has resulted in a situation where there are more than 800 autonomous entities in charge of managing the fishery. The municipalities lack the experience, expertise and funding to adequately carry out fisheries management. The report mentions that BFAR could have overseen the devolution of management and done so effectively, but asserts that because the decentralisation was coupled with the uncertain status of the BFAR, the agency did not have the capacity, funding, and long-term policy directions and plans to do so.

3 The Fisheries

3.1 Resource and Environment

3.1.1 Stocks/fisheries and area of operation

The area of municipal waters is 15 km from the shoreline, but the exact definition of this in areas with islands is still hotly debated and a court case is happening in December 2003 (commercial fisheries suing for more rights in places with islands).

Table 1 shows the top fisheries producing provinces.

Table 1: Top fisheries producing provinces by sector in the Philippines from 1997 to 2001. MT: metric tons. Source: BAS (2002).

Sector / province	Average annual production (MT)	Percent
COMMERCIAL:	939,392	100
Navotas (PFDA)	165,188	17.6
South Cotabato	111,611	11.9
Szamboanga City	109,239	11.6
Quezon	88,172	9.1
Iloilo	65,374	7.0
Cebu	48,719	5.2
Sulu	36,413	3.9
Negros Occidental	36,181	3.9
Zamboanga del Sur	27,770	3.0
Zamboanga del Norte	23,009	2.5
Other provinces	229,716	24.5
MARINE MUNICIPAL:	783,247	100
Palawan	75,486	9.6
Zamboanga del Norte	57,872	7.4
Iloilo	52,834	6.8
Negros Occidental	52,789	6.7
Surigao del Norte	43,691	5.6
Zamboanga del Sur	39,271	5.0
Quezon	35,360	4.5
Masbate	24,883	3.2
Cebu	19,771	2.5
Batangas	18,962	2.4
Other provinces	362,328	46.3
INLAND MUNICIPAL:	148,239	100
Rizal	81,990	55.3
Laguna	21,346	14.4
Sultan Kudarat	10,617	7.2
Maguindanao	9025	6.1
Lanao del Sur	6223	4.2
Cagayan	2506	1.7
Pampanga	2236	1.5
Surigao del Norte	1401	1.0
Negros Occidental	1399	0.9
Batangas	1358	0.9
Other provinces	10,140	6.8

The biggest commercial fish producing areas in 2002 was Region IX (close to 200,000 metric tons); NCR (at just over 160,000 metric tons, and region XII (close to 144,000 metric tons). For municipal fisheries, Region IV B topped at close to 131,000 metric tons, closely followed by Region VI at 127,000 metric tons, Region IV A at about 121,000 metric tons, and Region IX at just over 120,000 metric tons.

The estimated fish production by sector and region for commercial and municipal fisheries is shown in Table 2.

Table 2: Fish production by sector and region for commercial and municipal fisheries in the Philippines in 2002. Values in metric tons. CAR: Cordillera Administrative Region. Source: BFAR (2003b).

Region	Commercial	Municipal	
		Marine	Inland
NCR	160,551	2,767	
CAR	0	0	1,090
I	3,470	25,338	1,557
II	16,151	16,002	5,599
III	11,506	11,925	6,277
IV-A	92,631	45,254	75,817
IV-B	36,149	130,085	681
V	35,520	90,839	1,394
VI	117,924	125,913	1493
VII	59,918	51,563	110
VIII	37,668	41,708	811
IX	196,313	120,043	397
X	37,397	27,412	1,207
XI	12,472	28,114	248
XII	143,708	23,917	13,228
XIII	4,669	58,436	3,472
ARMM	76,146	57,978	18,263
Total	1,042,193	857,294	131,644

3.1.2 Information on the environment

The Philippines consists of about 7,100 islands, with an estimated coastline area of 17,460 km. The country's territorial waters cover an estimated 2.2 million km² (BFAR, 2001b). Inland water resources are estimated to include 338,000 ha of swamplands, 253,000 ha fresh and brackish fish ponds and 250,000 ha of other inland water bodies such as lakes, rivers and reservoirs (BFAR, 2001b). The major lakes of the Philippines are Laguna de Bay (area: 90,000 ha), Lake Lanao (34,700 ha and Lake Taal (23,400 ha).

3.2 The Fishery

The Philippine fishery can be divided into municipal and commercial fisheries. According to the Fisheries Code (Republic Act 8550, 1998) (BFAR, 1998) municipal fishing refers to fishing within municipal waters using fishing vessels of 3 gross tons or less, or fishing not requiring the use of fishing vessels. The same source identifies municipal waters to include streams, lakes, inland bodies of water and tidal waters within the municipality which are not included within protected areas defined under Republic Act No. 7586, public forest, timber lands, forest reserves or fishery reserves, and also marine waters within 15 km of the coastline. Despite an abundance of guidelines published on the issue (BFAR, 1998; DENR, 2001), the exact delineation of the 15 km in areas where multiple islands

dot the coastline is contentious and this year commercial fishers are suing municipal fishers for entering what they perceive to be their waters (Grutas, pers. comm.).

Commercial fishing is further classified according to the following (from BFAR, 1998):

- i) Small scale commercial fishing – fishing with passive or active gear utilising fishing vessels of 3.1 gross tons up to 20 gross tons
- ii) Medium scale commercial fishing – fishing utilising active gears and vessels of 20.1 gross tons to 150 gross tons
- iii) Large scale commercial fishing – fishing utilising active gears and vessels of more than 150 gross tons

3.2.1 Status and trends

The Philippine fishery is dominated by the marine sub-sector, but a substantial inland fishery exists (Coates, 2002).

The total fish production in the Philippines in 2002 was estimated at 3.4 million metric tons, a 6.4% increase from the 2001 production. From 1992 to 2001, the average annual growth rate of the Philippine fisheries was about 2%, with the aquaculture sector showing the highest growth rate. In 2002 about 40% of the total fish production came from the aquaculture sector, with 31% and 29% from the commercial and municipal sector, respectively (BFAR, 2003a).

Figures 3 and 4 show the trends in fish landings (weight and value) over the last ten years.

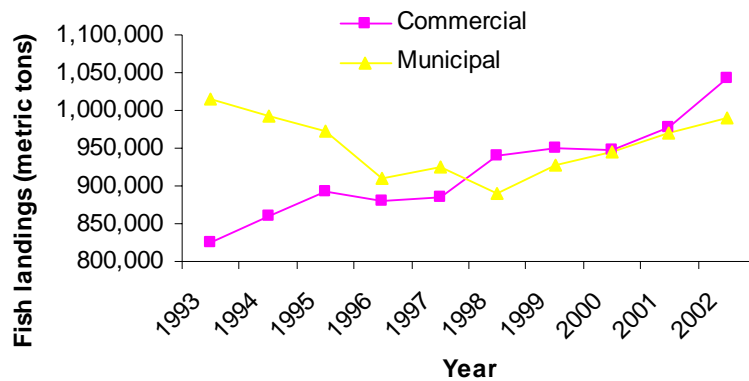


Figure 3: Fish landings from 1993 to 2002. Source: BFAR (2003b).

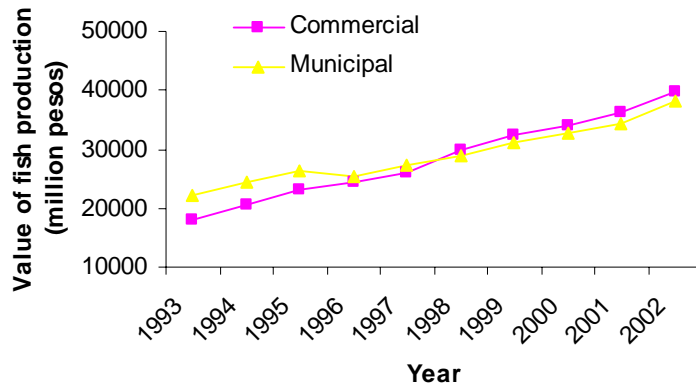


Figure 4: Value of fish landings from 1993 to 2002. Source: BFAR (2003b).

However, although total catches are increasing, the DENR-BFAR-DILG (2001) report that catch per unit effort has declined dramatically from 1984 to the present, and that the total catch of small pelagic fish has remained much the same since 1975 despite a large increase in effort. The report attributes the decreasing catch per unit effort to over fishing, which the authors attribute to:

- Continued increases in commercial and municipal fishing effort due to population growth, migration to coastal areas, and use of more efficient gear
- Generally slow economic development in coastal areas thus providing few viable other sources of income to municipal fisher families and communities
- Continued use of habitat – and fishery – destructive fishing practices
- Commercial fishing in municipal waters
- Open access to fishery resources with few practical limits to entry in place
- Degradation of coastal habitats from various causes, including pollution
- Loss of naturally productive mangrove habitat to aquaculture and other land use
- An overall lack of effective integrated coastal management programmes at the local and national levels that address issues across sectors and for broad areas and that place fisheries management in the context of ‘coastal resource management’

Major species caught in municipal fisheries are shown in Table 3.

Table 3: Major species of caught in commercial and municipal fisheries in the Philippines in 2002. - indicates no information available. Source: BFAR (2003b).

Species	Total caught in commercial fishery (metric tons)	% of total catch in commercial fishery	Total caught in municipal fishery (metric tons)	% of total catch in municipal fishery
Roundscad (<i>Decapterus macrosoma</i> , <i>D. maruadsi</i>)	234,230	22.5	43,273	5
Indian sardines (<i>Sardinella lemuru</i> , <i>S. gibbosa</i>)	145,879	14	30,547	3.6
Frigate tuna (<i>Auxis thazard thazard</i>)	100,958	9.7	62,174	7.3
Skipjack (<i>Katsuwonus pelamis</i>)	83,385	8		-
Yellowfin (<i>Thunnus albacares</i>) & big-eyed tuna (<i>Thunnus obesus</i>)	63,051	6	36,743	4.3
Big-eyed scad (<i>Selar crumenophthalmus</i>)	38,889	3.7	61,897	7.2
Slipmouth (ponyfish; <i>Leiognathus</i> spp., <i>Secutor</i> spp., <i>Gazza</i> spp.)	37,768	3.6		-
Fimbriated sardines (<i>Sardinella fimbriata</i>)	35,110	3.4		-
Anchovies (<i>Stolephorus indicus</i> , <i>S. commersonii</i>)	33,706	3	40,389	4.7
Indian mackerel (<i>Rastrelliger kanagurta</i>)	30,846	3	39,433	4.6
Threadfin bream (<i>Nemipterus hexodon</i>)		-	36,423	4.2
Squid (<i>Loligo</i> spp.)		-	33,996	4
Blue crab (<i>Portunus pelagicus</i>)		-	31,503	3.7
Others	238,371	22.9	857,294	51.4

Table 4 shows the major species caught in the inland fishery.

3.2.2 Numbers of fishers

The fisheries sector provided direct and indirect employment to more than one million people in 2001 (BFAR, 2001b), and provide livelihood to almost 2 million people in the Philippines (Green et al., 2003).

3.2.3 Gear types

Fishing gear in the Philippines are categorised into a number of different categories:

Active fishing gear – fishing device characterised by gear movements, and / or the pursuit of the target species by towing, lifting, and pushing the gears, surrounding, covering, dredging, pumping and scaring the target species to impoundments; such as, but not limited to, trawl, purse seines, Danish seines, bag nets, push nets, cast nets, harvesting machineries, beach seines, pa-aling, drift gill net and tuna longlines (DA, 1996).

Passive fishing gear – characterised by absence of gear movement and / or the pursuit of the target species; such as, but not limited to, hook and line, fish pots, traps and gill nets across the path of the fish. It is illegal to use active fishing gears in municipal waters and in all bays, as well as in other fishery management areas.

Destructive fishing gear has been classified into three levels, as shown in Table 5. In addition to the gear mentioned under level 3 in the table, LGUs can enact ordinances that ban other types of fishing gear that are not mentioned in national laws. To do so, an LGU must prove, through the proper legislative process, that the gear is destructive and threatening to 'ecological balance' (DENR-BFAR-DILG, 2001).

Table 4: Inland municipal fish production by species in the Philippines, 2001. Source: BAS (2002).

Species	Catch in 2001 (metric tons)
FISH:	62,163
Milkfish	201
Tilapia	28,881
Carp	5,562
Ayungin (therapon; <i>Therapon jarbua</i> , <i>T. puta</i>)	3,070
Biya (goby; <i>Glossogobius giurus</i>)	4,280
Kanduli (spotted catfish; <i>Arius</i> spp.)	3,868
Dalag (mudfish)	6,696
Hito (catfish; <i>Clarias</i> sp.)	2,366
Gourami (<i>Gourami</i> sp.)	3,536
Martiniko (climbing perch; <i>Anabas testudineus</i>)	1,970
Kapak (sea bream; <i>Acanthopagrus berda</i> , <i>Mylioberda</i> spp.)	667
Dulong	246
Tawillis (freshwater sardinella; <i>Sardinella tawilis</i>)	431
Igat (eel; <i>Anguilla</i> spp.)	201
Ludong (blue spot mullet; <i>Valamugil seheli</i>)	17
Kitang (spotted scad; <i>Scatophagus argus</i>)	55
Buan-buan (tarpon; <i>Megalops cyprinoides</i>)	22
Other species	92
CRUSTACEANS:	5,226
Hipon (prawn, <i>Penaeus monodon</i> , <i>Acetes</i> sp.)	3,967
Ulang (freshwater prawn; <i>Macrobrachium rosenbergii</i>)	262
Hipon puti (shrimp; <i>Penaeus merguensis</i> , <i>P. indicus</i>)	328
Suahe (shrimp; <i>Metapenaeus</i> spp.)	174
Talangka (crab; <i>Varuna litterata</i>)	270
Alimango (mud / mangrove crab; <i>Scylla serrata</i>)	150
Alimasag (blue crab; <i>Portunus pelagicus</i>)	67
Other species	8
MOLLUSCS:	68,958
Tulya (clam)	251
Kabibi (<i>Pinctada margarifera</i>)	53
Kuhol (golden apple snail, miracle snail; <i>Pomecea</i> spp.)	102
Suso (snail; <i>Cerithideopsisilla cingulata</i>)	68,552

Table 5: Levels of classification destructive fishing gear (from DENR-BFAR-DILG, 2001).

Levels:	Description
Level 1: Prohibited in all waters of the Philippines	<ul style="list-style-type: none"> • Fishing using electricity, explosives, noxious or poisonous substances (such as sodium cyanide) in the Philippine fishery areas, unless specifically allowed by the Department for research etc., purposes • <i>Muro-ami</i>, or drive-in net, defined as a Japanese fishing method used in reef fishing which consists of a movable bag and two detachable wings affecting the capture of fish by spreading the net in arc form around reefs and shoals. With the aid of weighted scare lines, fishers drive the fish from the reefs toward the bag portion of the whole net. • <i>Kayakas</i>, a local version of the <i>muro-ami</i> but smaller in size, uses bamboo or wood as scare devices aside from coconut or other leaves or materials as scarelines to drive fish out of the corals • Fine-mesh net, with a mesh size less than 3 cm measured between two opposite knots of a full mesh when stretched, except when used for catching rabbitfish fry, milkfish fry, shrimp fry, mullet fry, glass eels and elvers, and gobies, marine aquarium / ornamental fishes, and other species which by their nature are small but already mature. The prohibition does not apply to purse seines, ring nets, and bagnets for which the minimum mesh size limit is 1.9 cm.
Level 2: Prohibited in some waters of the Philippines or in association with peripheral fishing devices	<ul style="list-style-type: none"> • <i>Pantukos</i>, defined as a tuck seine operated from two boats during moonless nights for catching siliniasi (fry or young fish belonging to the family Clupeidae, sardines, and herring) whereby schools of fish are driven into the net by a group of driver boats. The prohibition is specifically for the operation of <i>pantukos</i> with the use of lighted torch (<i>waswas</i>) and / or the use of kerosene, crude oil, gasoline, or any flammable substance poured on any water area and ignited to scare or drive the fish towards the gear. • <i>Hulbot-hulbot</i>, a fishing gear consisting of a conical shaped net with a pair of wings, the ends of which are connected to two ropes with buri, plastic strips or any similar materials which with hauling ropes passing through a metallic ring permanently attached to a tom weight, serve as scaring or herding device when hauled into a fishing boat. The prohibition is limited to the use of such gear with fine mesh less than 3 cm within a distance of 7 km and using fishing boats more than 3 gross tons from the shoreline of all coastal provinces • Tuna purse seine nets with mesh size less than 3.5 cm • <i>Pa-aling</i>, a fishing gear consisting of a set net at coral or shoal reef areas whereby fish are driven towards the net by means of air bubbles produced by compressors. Commercial <i>pa-aling</i> operations are prohibited in waters under the jurisdiction of the Palawan Council for Sustainable Development, the waters east of 199°30', south of 13°00, and north of 10°30; and fish sanctuaries, protected areas, and marine parks and reserves
Level 3: Prohibited in municipal waters	<ul style="list-style-type: none"> • <i>Pa-aling</i> • Superlights in excess of 20 kW and 36 kW for small and medium commercial vessels, respectively • Active gear

The number of motorised and non-motorised vessels used in the municipal fishery is shown in Figure 5.

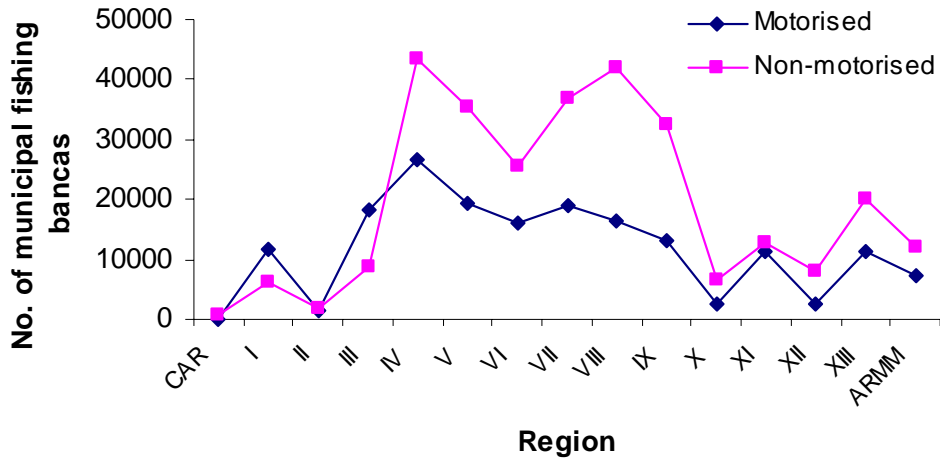


Figure 5: Motorised and non-motorised municipal fishing bancas in different regions of the Philippines in 2002. CAR: Cordillera Administrative Region. Source: BFAR (2003b).

3.2.5 Seasonality

Fisheries statistics are gathered every quarter by the BAS (for details on methods see Section 5) and reported to the government, but the published statistics show only annual catches.

3.2.6 Fishing locations

The major fishing grounds in the Philippines are shown in Table 6.

3.2.7 Landing locations

The number of commercial fishing vessels by region is shown in Table 7.

3.2.8 Socio-economic categories of fisherman

Fishers in the Philippines are divided into those engaged in commercial fishing and municipal fishers. No further national statistic is currently available on socio-economic sub-categories of fishers within these two categories.

Green et al. (2003) note that the socio-economic situation of small-scale fishers in the Philippines has deteriorated over recent years, and the income of fishing households is low relative to the national income. These authors quote a 2002 study carried out in 6 provinces which found that up to 80% of fishing households were living below the poverty threshold.

Table 6: Location of major fishing grounds in the Philippines. Source: BAS (2002).

Fishing ground	Location
SEAS: West Sulu Sea South Sulu Sea East Sulu Sea Sibuyan Sea Bohol Sea Samar Sea Visayan Sea Camotes Sea	Palawan Xamboanga del Sur / Sulu / Tawi-Tawi Zamboanga del Norte / Negros Aklan / Masbate / Romblon Bohol Samar / Masbate / Leyte Panay / Negros / Cebu / Masbate Cebu / Leyte / Bohol
BAYS: Lemon Bay Tayabas Bay Illana Bay Manila Bay Sibugay Bay Illigan Bay Imuruan Bay San Miguel Bay Tawi-Tawi Bay Butuan Bay	Quazon / Camarines Norte Quezon Lanao del Sur / Maguindanao Manila / Bataan / Cavite Zamboanga del Sur Misamis Occidental / Lanao del Norte Palawan Camarines Sur Tawi-Tawi Agusan del Norte
GULFS: Moro Gulf Davao Gulf Ragay Gulf Leyte Gulf Panay Gulf Lingayen Gulf Lagonoy Gulf Asid Gulf Albay Gulf	Zamboanga del Sur / Maguindanao / Sultan Kudarat Davao del Sur / Davao del Norte / Davao Oriental Camarines Sur / Quezon Leyte Island / Samar Island Iloilo / Negros Occidental Pangasinan Albay / Camarines Sur / Catanduanes Masbate Albay
CHANNELS: Babuyan Channel Jintotolo Channel Maqueda Channel	Cagayan / Babuyan Island Capiz / Masbate Camarines Sur / Catanduanes
STRAITS: Tablas Strait Mindoro Strait Tañon Strait Cebu Strait Iloilo Strait	Tablas Island / Mindoro Oriental Palawan / Mindoro Occidental Cebu / Negros Cebu / Bohol Iloilo / Guimaras
PASSAGES: Burias Passage Ticao Passage	Burias Island / Camarines Sur Ticao Island / Sorsogon

Table 7: Number of commercial fishing vessels by region in 1999 (catcher and accessory boats). Source: BFAR (2003b).

Region	Number	Gross tonnage
NCR	1,351	158,510
I	113	1,833
II	64	718
III	40	1,081
IV	221	3,857
V	160	4386
VI	404	25,674
VII	94	2,054
VIII	124	1740
IX	392	22,759
X	43	1215
XI	555	45,894
XII	7	85
XIII	26	294
ARMM	7	182
Total	3,601	270,281

3.2.9 Socio-economic value of fisheries

The fisheries sector contributed P 90.1 billion, or 2.2%, to the country's Gross Domestic Product in 2002, and fisheries product exports in the same year amounted to 182,000 metric tons of a value of USD 506 million (BFAR, 2003b). Major export products are canned and fresh tuna, seaweeds, fresh and frozen prawns and processed octopus. Other export products include ornamental fish, *lapu-lapu* and pearls. Most fisheries products are exported to Japan, the US, Hong Kong, and Taiwan, but countries such as Korea, Canada, Singapore, Germany, UK and Denmark also import large quantities of Philippine fisheries products.

The per capita consumption of fish and fishery products has been steadily declining from 29 kg per capita per year in 1995 to 27 kg per capita per year in 2000. The BFAR attributes this decline to high population growth rates unmatched by increased fishery production (BFAR, 2001b).

Although the Philippines is one of the world's 40 largest fish producing nations, it is also among the top 10 low-income, food-deficit countries of the world. This is attributed largely to lack of enforcement of the pro-small-scale fisher policies that are in existence, and the fierce competition between the municipal and commercial fisheries, where intrusion of commercial fishers into municipal waters is commonplace (Green et al., 2003).

3.3 The fishers and other stakeholders

Fishers are classified into commercial and municipal fishers. The majority of municipal fishing takes place in coastal areas, and coastal communities are amongst the poorest and most marginal in the Philippines. Women are very active in reef gleaning, net-making, fish processing, and fish marketing, whereas men carry out most of the fishing activities using boats and fishing gears. Many coastal fishers do not rely exclusively on fishing for their livelihood, but are involved in other income generating activities as well (MADECOR-AIJC, 2002).

3.4 Management control measures and existing monitoring (data collection) and control (regulatory) systems implemented at the national level for each fishery

For a list of restricted gear and regulations pertaining to the classification of commercial and municipal fishing, see Section 3.2. For a description of existing monitoring practised, see Section 5.1.

According to the Fisheries Code (Republic Act 8550, 1998), closed seasons may be established in municipal waters by an LGU in consultation with the FARMC for conservation and ecological purposes. The FARMC may also recommend the establishment of closed seasons in municipal waters, fisheries management areas, and other areas reserved for the use of the municipal fisher (DENR-BFAR-DILG, 2001). BFAR may also declare closed seasons outside municipal waters following consultation with the concerned LGU and FARMC. Legislation pertaining to closed seasons for certain areas, gear, and fish species is shown in Table 8.

Licensing systems currently in use in the Philippines include (Source: DENR-BFAR-DILG, 2001):

- Registration of fishers: The Fisheries Code of 1998 requires that all eligible fishers be registered. Lists of registered fishers are compiled at barangay level and endorsed by the FARMC and the Barangay Captain. However, despite the legal requirements, the responsibility for enforcing actual registration of municipal fishers lies with the LGUs, many of which currently do not have the capacity or will to do so (pers. comm. from Felipe Nava, Municipal Mayor, Jordan, Guimaras; Maria Canlas, Economic Researcher, Mariveles Municipality, Bataan).
- Issuance of license and permits to fishers and fish workers: Licensing is based on the fishers registry. To obtain a license, a fisher must first be registered as required by the Fisheries Code. Data included in the license form are personal data, license category, name of home port, port of landing, fishing zone, license fee amount, receipt number, date issued, expiry date, etc. Companies may also apply for licenses, permitting the company to take part in various fishery related business activities, but does not permit the use of unlicensed individuals to take part in fishing operations. For vessels, the owner of a vessel need not be licensed, but the operator must be. This form is only operational in FRMP sites.
- Issuance of license and permits to vessels: Information included in the fishing vessel licensing form includes vessel name, proprietorship, name of owner, personal data of the owner, home port, port of landing, fishing zone, gross registered tonnage, net registered tonnage, license category, etc. This form is only operational in FRMP sites.
- Taxation, lease, or rental fees: The LGUs can determine license fees of fishery activities in municipal waters in consultation with the FARMCs and the FARMCs may also recommend the appropriate license fee that will be imposed. However, to date the experience with license fees for small-scale fishers in municipal waters of the Philippines is very limited, and often times fees have been arbitrary (DENR-BFAR-DILG, 2001)..

Total Allowable Catch (TAC) stipulated in the Fisheries Code is the maximum harvest which does not exceed the Maximum Sustainable Yield (MSY). However, according to DENR-BFAR-DILG (2001) this is not practised in the Philippines because the MSY has not been established for many species in the country and the monitoring of the TAC or MSY requires good catch statistics and knowledge about individual fishers catch, information which is not currently available. The cost of implementing a comprehensive and accurate monitoring system is estimated to be higher than the funds available for fisheries management.

The LGUs have the powers to enforce all fishery laws, rules and regulations, as well as valid fishery ordinances. In addition, national law enforcement agencies such as the Philippine National Police Marine Group and the Philippine Coast Guard also have jurisdiction over the enforcement of fishery and environmental laws within municipal waters. The Philippine National Police Marine Group are responsible for all police functions 'over Philippine territorial waters and rivers, coastal areas from the shoreline to 1 mile inland to include ports and harbours and small islands of 2 miles in length or diameter with less than 1,000 population' (Republic Act 6975). The Philippine Coast Guard is primarily responsible for the promotion of safety of life at sea and the protection of the marine environment (DENR-BFAR-DILG, 2001).

Table 8: Administrative orders establishing closed seasons for certain areas, gear, and fish species in the Philippines. Source: DENR-BFAR-DILG (2001).

Administrative Order No.	Title
FGAO 12, s1939 (Effective 1 October 1939)	Establishing a closed season for five years in certain waters of Rizal, Laguna, Batangas and Mindoro for the conservation of aquatic resources
FAO 12-1, s1947	Re-establishing closed season for five years in certain waters of Rizal, Laguna, Batangas and Mindoro for the conservation of aquatic resources
FAO 12-2, s1951	To amend FGAO 12 establishing closed season for the conservation of sardines and herring
FGAO 13, s1939	Regulations establishing closed season for the conservation of sardines and herrings
FAO 13-1, s1946 (Effective 1 November 1946)	Amending Section 2 of FGAO 13 of 1 July 1939
FAO 13-2, s1954	Amending Section 2 of FGAO 13 of 1 July 1939
FAO 13 Revised	Establishing a closed season for the conservation of sardines, herrings, and mackerels in the Visayan Sea, and revising FGAO 13, as amended for other purposes
FAO 18, s1940	Establishing a closed season of five years in the San Miguel Islands comprising the Manucmanucan, Banosuan, and Bancoran Islets
FAO 20, s1940	Establishing a closed season for the conservation of <i>abo, arakan, pagotpot, kiskisan, ponicon, tabangongo</i> and <i>pasayan</i>
FAO 20-1, s1964	Reviving or extending and enforcing the provisions of FAO 20 dated 3 August 1940
FAO 21, s1941	Establishing a closed season for five years in certain waters of Batangas for the conservation of aquatic resources
FAO 104, s1971	Declaring the seawaters of Bohol within a radius of 3 nautical miles from the nearest shoreline from the mainland of Bohol and / or its islands as fisheries breeding ground and prohibiting therein the operation of fishing by means of trawl for a period of 1 year
FAO 111, s1973	Establishing a closed season of 5 years in Malampaya Sound for the conservation of certain species of fish
FAO 111-1, s1974	Amending Section 4 of FAO 111 re: establishing a closed season for 5 years in Malampaya Sound
FAO 130, s1981	Establishing a closed season of 5 years for the operation of trawl and purse seine in the waters of Bohol
FAO 131, s1981	Establishing a closed season of 5 years for the operation of trawl and purse seine in the waters of Cebu
FAO 132, s1981	Establishing a closed season of 5 years for the operation of trawl and purse seine in the waters of Negros Oriental
FAO 133, s1981	Establishing a closed season of 5 years in Sanguil bay for the operation of all kinds of fishing gear, particularly filter net (<i>sanggab</i>), except those provided herein
FAO 134, s1981	Establishing a closed season of 5 years in the operation of commercial trawl and purse seine in the waters of Quezon Province
FAO 136, s1982	Establishing a closed season of 5 years for the operation of commercial fishing boats in San Miguel Bay
FAO 137, s1982	Establishing a closed season of 5 years for the operation of trawl and purse seine in the waters of Palawan
FAO 139, s1982	Establishing a closed season of 5 years to catch or take, sell, possess, and transport mullet (<i>banak</i> or <i>lodong</i>) in all the inland waters of the Philippines
FAO 142, s19683	Establishing a closed season of 5 years for the operation of trawl and purse seine in the waters of Batangas
FAO 150, s1984	Establishing a closed season of 5 years for the operation of ring net (<i>licum-licum, sincero, cubcub</i>) within 7 km from the shoreline of Camiguin Island
FAO 154, s1986	Establishing a closed season of 5 years in Malampaya Sound, Taytay, Palawan on the operation of any fishing gear except those provided herein
FAO 167, s1989	Establishing a closed season for the conservation of sardines and herrings and mackerels in the Visayan Sea
FAO 171, s1990	Establishing a closed season of 5 years for the operation of commercial fishing boats within the water portion of Macalajar Bay, Cagayan de Oro City

Table 8 continued.

Administrative Order No.	Title
FAO 172, s1990	Establishing a closed season of 5 years for the operation of commercial fishing boats and the employment of <i>hulbot-hulbot</i> both by commercial and municipal fishing boats in Polillo Strait and portion of Lamon Bay, Quezon Province
FAO 174, s1991	Establishing a closed season of 5 years for the operation of ringnets using fishing boats more than 3 gross tons within 7 km from the shoreline of Camiguin Province
FAO 175, s1991	Establishing a closed season of 5 years for the operation of commercial or municipal fishing boats using trawl, modified Danish Seine or motorised push net in Manila Bay

Municipal mayors, barangay officials and officers from fishers' associations can also act as fish wardens, as can other government officials and employees, barangay captains and officers and members of fisherfolk associations who have undergone training on law enforcement, including FARMC and Bantay Dagat members (DENR-BFAR-DILG, 2001).

Law enforcement within the fishery is a huge problem in the Philippines, where illegal fishing is recognised to be one of the biggest problems facing the fishery, including the intrusion of commercial fishers into municipal waters (DENR-BFAR-DILG, 2001; Green et al., 2003).

3.5 Fish disposal

Information detailed enough to produce a fish disposition diagram is currently not available for the Philippine fishery.

4 Identification of data and information requirements

4.1 Details of any management plans for each fishery

According to the 1998 Fisheries Code, the BFAR is obliged to produce a 'Comprehensive National Fisheries Industry Development Plan', but is finding it difficult to do so without external funding support. The Bureau has been applying for funding from the FAO to formulate a plan, but have not received support. Individual management plans should exist for each MFARMC, and sometimes for BFARMCs, but in areas where the FARMCs are not well established the management plans are not used for implementation.

Although no national management plan exists, the broader directions of management envisaged by BFAR can perhaps be gathered from different sources. The Ginintuang Masaganang Ani For Fisheries Program (2002 – 2004) (BFAR, 2001b) provides 'national directions and framework to develop and manage the country's fisheries resources for food security and (...) socio-economic upliftment of subsistence fisherfolk'. This framework prioritises the expansion of productivity programmes and the provision of support activities to the fisheries sector, as well as conservation and sustainable management. Specifically, the framework recommends that 'development and management interventions of the government should address the following' (from BFAR, 2001b):

- i) Resource management and environmental issues and concerns
 - a. Resource depletion in coastal and inland waters
 - b. Overfishing / destructive fishing
 - c. Siltation / pollution / mine tailings / agricultural wastes
- ii) Socio-economic issues and concerns
 - a. Poverty among municipal fisherfolk
- iii) Policy issues and concerns
 - a. Need for strong fisheries law enforcers
 - b. Need for useful and timely fisheries information
 - c. Revision of lease and licensing fees

- iv) Institutional issues and concerns
 - a. Need for institutional strengthening
 - b. Need for human resources development
 - c. Access to credit
- v) Industry issues and concerns
 - a. Post-harvest
 - b. Aquaculture productivity
 - c. Fishery inspection and quarantine

In addition to BFAR's activities, the Coastal and Marine Management Office (CMMO) of the Department of Environment and Natural Resources (DENR) is currently preparing a National Coastal Resource Management Policy Framework. The drafting of such a management framework has been on-going within the DENR for a long time, and the plan was recently expanded to include areas such as maritime security, navigation, offshore pollution, etc. The framework (tentatively named the 'Philippine Sustainable Archipelagic Development Framework', or ArcDev) is in the final stages of preparation, and includes a vision for integrated sustainable management of all coastal and marine resources according to precautionary principles (Baragan, pers. comm.). No final copy was available for inclusion into the current study.

4.2 Management objectives for each fishery or as a whole

No specific national level management plans currently exists for any fishery in the Philippines. However, goals quoted within the Ginintuang Masaganang Ani For Fisheries Program (2002 – 2004) (BFAR, 2001b) are listed below.

- Contribute to national food security at all times
- Ensure the rational and sustainable development, management and conservation of fishery and aquatic resources in Philippine waters, including the EEZ and adjacent high seas
- Reduce poverty incidence in coastal areas
- Enhance people empowerment in the fisheries sector

And, more specifically to:

- Improve aquaculture productivity within ecological limits
- Optimise utilisation of offshore fisheries and deep-sea resources
- Improve product quality and reduce post-harvest losses
- Provide a favourable policy environment conducive to increased investment and global competitiveness and peoples participation
- Conserve, protect and sustain management of the country's fishery and aquatic resources
- Alleviate poverty among municipal fisherfolks and provide supplementary livelihoods to these

4.3 Decision-making methods for each management objective

As no national level management plan has yet been formulated for any fishery, and no management objectives are currently finalised, the decision-making mechanisms for such objectives are unclear. The Ginintuang Masaganang Ani For Fisheries Program (2002 – 2004) (BFAR, 2001b) framework provides only few guidelines as to how decisions should be made, but does include descriptions of a project aiming to generate reliable statistics about the fishery, with the BAS acting as the lead agency. In another section, the importance of research for the development, management, conservation and protection of fisheries and aquatic resources is mentioned.

4.4 Data and information requirements to control and regulate the fishery

During the workshop and follow-up activities conducted with BFAR staff as part of this study, the following information needs were identified to allow national BFAR to control and regulate the fishery:

- Extent of illegal fishing activities in area (from Fishers' Associations and fishers)
- Exact location of illegal activities in area
- Number of apprehensions for fishery law violations
- Nature of violations
- Number of cases filed in court, and the status of the case thereafter (convictions)
- Number of municipalities whose boundaries have islands / islets where the demarcation of the municipal fishing grounds may be in dispute
- Number of law enforcers (fish wardens) trained in latest law enforcement techniques, including procedural aspects of apprehension and prosecution
- Status of law enforcers' knowledge about how to recognise fish caught using explosives or cyanide, and skill level in fish identification
- Use of manuals (with procedural aspects, how to gather apprehension evidence and bring it to court) for law enforcement officers, where are they used, by whom

Of the information required, some is currently collected as part of the FRMP, and some forms part of the data contained within the Municipal Coastal Database (MCD) of the Coastal Resource Management Project (CRMP) implemented by the DENR. However, it should be stressed that these projects do not provide national coverage, and that they are externally funded and the data collection efforts may not continue beyond the project timeframes.

4.5 Data and information requirements for policy and development planning

During and following the workshops conducted as part of the current study, BFAR staff identified the following national BFAR information needs for policy and development planning. Overriding information needs identified for policy and development planning which cannot be placed into the categories outlined in Sections 4.5.1 to 5.4.3 are shown below

- Guidelines on how to carry out policy and development planning
- Information about what kind of policy and development planning activities can be funded by external agencies / organisations

4.5.1 Resource and fishery related

- Catch data (number; weight; species) for commercial and municipal fisheries
- Effort of commercial fishing fleet (for all categories: no. of vessels; size of vessels; certificate of ownership; gear used; no. of fishers; position co-ordinates of fishing grounds fished; no. of licenses)
- Effort of municipal fishery (no. of vessels; size of vessels; motorised or non-motorised; gear used; no. of fishers; position co-ordinates of fishing grounds fished; type of licensing; no. of licenses)
- Fish and fishery products utilisation
- Processing (type; no. of processing permits; products produced)
- Fish landing centres and ports
- Markets (location; used by whom; sale to middlemen)
- Facilities (ice plant, cold storage)
- Biology of main species caught (spawning area; migration pattern; fecundity)
- Status of fisheries resources in the area (no. of fish; degree of exploitation)
- Resource assessment (status of coral reefs; mangrove forests; seagrass beds)
- Environmental data (weather; disasters; pollution; industry development; agriculture runoff; water quality; deforestation)

- Effect of environmental parameters on the fishery
- Rules and regulations, ordinances, local initiatives such as protected species; fish sanctuaries
- Information on local resource management projects, type of projects and their status (from regional BFAR office)

Of the information listed above, catch data is currently collected by the BAS, and at selected locations by the FRMP and the CRMP. Environmental data collection and resource assessments are carried out by the FRMP and the CRMP, as well as numerous coastal resource management projects conducted by NGOs and other organisations / agencies. Through the Fisherfolk Registration Form, many FARMCs collect information on the municipal fishery, including the number of licenses issued, catches, vessels and gear use etc. Information on local resource management projects is included in the data collected for MCD of the CRMP.

4.5.2 Socio-economic information

- Identification of issues relating to fisheries in the community
- Income of commercial fishers (not from fishers themselves, because they tend to understate their earnings, independent assessment required)
- Prices of fish
- Income of municipal fishers
- Alternative livelihood strategies feasible for area
- Fish and fishery products utilisation
- Processing (type; no. of processing permits; products produced)
- Location of fish landing centres and ports
- Markets (location; used by whom; marketing chain information)
- Processing information (who does what, prices of products etc.)
- Facilities available (ice plant, cold storage)
- Degree of organisation of fishers (no. of organisations / co-operatives / associations)
- Activities currently carried out as part of other projects / programmes relating to livelihoods, income generation, food security, etc., maybe from regular detailed project / programme progress report
- Socio-economic status of women, men and children in different areas. Possible indicators include main income; other sources of income; no. of meals per day; electricity / water availability; availability of TV, radio, refrigerator, antennae; no. of children; education of children; ownership of land
- Women's participation in fishing and aquaculture, including what work they carry out; decision-making power

Of the information above, only fish prices form part of the official statistics collected by BAS. Information on alternative livelihoods and family sizes form part of the Fisherfolk Registration Form used by many FARMCs, and the remaining socio-economic information is currently only collected as part of the FRMP.

4.5.3 For monitoring, control and surveillance (MCS)

- Law enforcement needs of LGUs
- Local opinion about laws and law enforcement
- Licensing system for municipal fishers
- Local laws, rules and regulations
- Municipal fishing fleet: number of different sized vessels; motorised & non-motorised; fishing grounds fished
- Commercial fishing fleet: number of vessels in each category, certificate of ownership, assessment and certificate of inspection from the Philippine Coast Guard; fishing grounds fished
- Information on whether law enforcement committee is operational
- Bantay Dagat operational plan
- Number of operations conducted by law enforcement team
- Details of memorandums of agreement on use of patrol boat

- Data on actual use of patrol boat (to ensure it is used for law enforcement)
- Extent of training of law enforcers in the use of facilities and equipment in patrol boat
- Number of apprehensions for fishery law violations
- Nature of violations
- Number of cases filed in court, and the status of the case thereafter (convictions)
- Quantity of confiscated evidence (fish, vessels, gear, explosives, others) and estimated value of confiscated evidence
- All information listed under 4.5.1 and 4.5.2

The information above is currently not provided by the BAS, but much of it is collected as part of the FRMP and CRMP.

4.6 Data and information requirements for compliance with international management responsibilities

The Philippines formed part of the Indo-Pacific Fisheries Council when it was formed in 1948 through the 'Agreement for the Establishment of Indo-Pacific Fisheries Council' treaty. The agreement for the Council was amended by the 'Amendment to the Agreement on the Indo-Pacific Fisheries Council, 1961', where the membership to the council became open to all member states of the United Nations (Batongbacal, 2000).

The FAO International Code of Conduct For Responsible Fisheries obliges countries to conserve stocks and ensure exploitation is sustainable, through the collection of data to enable decision to be based on scientific evidence. To ensure that a precautionary approach to fisheries management is followed, states are obliged to collect the following information (from Halls et al., 2000):

- i) Catch numbers or nominal weight by species, and fishing effort by fishery, fleet and location
- ii) Where appropriate, length, weight, age and sex composition of the catch, and other biological information supporting stock assessments, e.g. growth, recruitment, distribution and stock density
- iii) Vessel data and information for standardising fishing effort

The Convention on Biological Diversity, which was ratified by the Philippines in 1993, requires states to:

(a) Develop national strategies, plans or programmes for the conservation and sustainable use of biological diversity or adapt for this purpose existing strategies, plans or programmes which shall reflect, *inter alia*, the measures set out in this Convention relevant to the Contracting Party concerned; and

(b) Integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies.

The information needs to fulfil these management responsibilities are those listed under Sections 4.4 and 4.5. Currently, items i) and iii) of the information pertaining to the FAO International Code of Conduct for Responsible Fisheries is being collected by the BAS, although the confidence in the statistics could be improved with further funding which would increase coverage of the surveys. Reliable and detailed catch information is currently only available for the top ten species caught (Recide, pers. comm.), but further funding could increase the reliability of the information for the less commonly caught species. Information listed in ii) is currently only collected as part of the FRMP.

4.7 Data and information requirements for international reporting responsibilities

4.7.1 FAO Regional Fishery Commission Requirements

The Philippines is a member of the Asia Pacific Fishery Commission (APFIC), and is required to report the following information to the FAO Fisheries Department annually (from Halls et al., 2000):

- i) Nominal (live weight) catch statistics from the countries' flag vessels that fish in the area, by species

- ii) Annual production of fishery commodities, imports and exports (country, volume, value and processing method)
- iii) Fleet statistics (number and total tonnage of fish catching, processing, and support vessels utilised in commercial, subsistence and Artisanal fisheries by size and type of vessel)
- iv) Employment statistics for full-time, part-time and occasional workers in fishing and aquaculture by gender

The information listed in i), ii), and iii) is currently collected by the BAS, apart from details of the processing methods. Employment statistics for subsidiary industries is collected only as part of the FRMP.

4.7.2 The Southeast Asian Fisheries Development Center

The Philippines also have reporting requirements to the Southeast Asian Fisheries Development Center (SEAFDEC). SEAFDEC requires member countries to contribute annual fisheries statistics, including:

- Gross fisheries domestic product
- No. of people employed in the fisheries and related sectors, and their wages
- Prices of fish and fish products
- Fish production (amount and value for different sub-sectors) for inland and marine fisheries
- No of fishing establishments by size of management for marine fisheries
- No. of fishers by working status for marine fisheries
- No. of fishing boats by type and tonnage
- Catch by species, value and gear type for marine fisheries
- No. of fishing units by gear type for marine fisheries
- Catch by species and value for inland fisheries
- Wholesale price at landing centre for freshwater and marine fish
- Consumer price for freshwater and marine fish
- Disposition of catch for marine and inland fisheries and total
- No. of fish processing establishments and production
- Export and import by fishery commodities
- Export / import of fishery commodities by country of origin / destination

All information listed above is currently collected by the BAS, although as mentioned in Section 4.6, the species aggregated data could be made more accurate.

4.7.3 CITES

The Convention on International Trade in Endangered Species (CITES) on wild fauna and flora was created to protect many plants and animals against illegal trade. Countries who sign the treaty have agreed to control or prohibit trade in over 40,000 species of animals and plants. The parties to the treaty apply a system of permits and certificates which are issued when certain conditions are met and which have to be presented when consignments of specimens of species listed under the agreement leave or enter a country.

The Philippines ratified the CITES on 18 August 1981, and became party to the agreement on 16 November 1981. BFAR is the country's designated CITES Management and Scientific Authority for aquatic species. It is also the sole CITES Permit Issuing Authority for aquatic species by virtue of DA Special Order no. 462. The management authority for all fishes, dolphins, aquatic snakes, aquatic plants, and invertebrates is BFAR while for all terrestrial and aquatic vertebrates except fishes, dolphins and snakes it is the Protected Areas and Wildlife Bureau of DENR (DENR-BFAR-DILG, 2001).

- The number and types of permits and certificates granted
- The trade in specimens of the species listed by CITES
- The size and sex of the specimens in question

Reports should include detailed information on imports, exports, re-exports and introduction from the sea of specimens of, and manufactured products from, species listed by CITES. Exact quantities

should be listed wherever possible, as should countries imported from and exported to, and impacts on wildlife resulting from the trade.

4.7.4 Convention on Biological Diversity

The Philippines ratified the Convention on Biological Diversity in 1993. Reporting requirements are stipulated in the Convention as follows:

Each Contracting Party shall, at intervals to be determined by the Conference of the Parties, present to the Conference of the Parties, reports on measures which it has taken for the implementation of the provisions of this Convention and their effectiveness in meeting the objectives of this Convention (<http://www.biodiv.org/convention/articles.asp?lg=0&a=cbd-26>).

4.8 Data and information requirements to support community-based fisheries

In the workshop and individual interviews carried out for this report, the BFAR identified the following information needs:

- Pertinent issues for coastal communities, possibly ranked in order of importance, indication of what the community would like to achieve
- Coastal resource assessment (including status of coral reefs; mangrove forests; seagrass beds; fish stock assessment; endangered species in area; index of existing projects and activities including artificial reefs, fish attraction devices etc.)
- Environmental data including water currents, recruitment areas, migration patterns of species (possibly from traditional / local knowledge)
- List of reserves / sanctuaries etc. in local area and rules pertaining to these
- Socio-economic information about coastal communities, including information on sources of income; alternative livelihoods; means of fishing (vessels and gear used, species caught, grounds fished); employment in fishing and ancillary industries by gender; current use of resources in local area
- Information on alternative livelihoods that are feasible for area
- Catch and effort data for municipal fisheries (species and weight by vessel and gear type and per fisher)
- List of projects and programmes in local area, information (from regional BFAR offices) about the success of individual projects
- Laws, rules and regulations pertaining to the management of municipal fishery

Aside from catch and effort data, the information listed above is currently only collected in areas where the FRMP or the CRMP operate.

4.9 Data and information requirements to coordinate and evaluate community-based fishery management activities

Information needs voiced by BFAR staff during the workshop and interviews are shown below:

- Reliable catch and effort data for municipal fisheries (BAS needs more funding than currently available to achieve this, or possibly to access information from other sources, including the municipal fisherfolk registry facilitated by the FARMCs in many areas)
- More accurate production figures from commercial fisheries, especially for migratory species (BAS needs more funding than currently available to achieve this, and better transparency from industry relating to production figures. Efforts already made on this front through the Convention for the Conservation and Management of Highly Migratory Species in the Western and Central Pacific which provides for data collection on key species by the Oceanic fishery programme of the South Pacific Community)
- Municipality plan, including list of proposed activities, details of M&E system used and M&E results

- Environmental data including area and status of fish stocks; coral reefs; mangrove forests; seagrass beds; existing artificial reefs; Fish Attraction Devices; marine reserves and sanctuaries; endangered species; weather patterns, industry, agriculture and pollution sources of the area; sea temperatures and water quality, etc.
- Details on existing livelihood or resource management oriented projects, including information (from regional BFAR office) on the success of these
- Socio-economic data including food security; alternative livelihoods; participation in, and income from, fisheries and related activities for men, women and children; size of families; level of children's education; feasible alternative livelihood activities in area

The information above summarises that collected from about 100 municipalities within the FRMP for the PhilFIS.

4.10 Any other data needs and constraints

As mentioned in Section 3.4, the BFAR and DENR recognise the limited capacity for government at any level to carry out adequate monitoring to establish Maximum Sustainable Yield (MSY) or Total Allowable Catch (TAC) with any certainty. DENR-BFAR-DILG (2001) state that accurate stock assessment data currently are not obtained and monitored other than in certain FRMP locations (and they specifically mention the cost of obtaining such estimates). They also state that in almost all locations in the Philippines, MSY has long been surpassed, and quote several studies showing that the MSY was reached in the 1980.

5 Description of existing, and identification of potentially appropriate, data collection tools, sources and methods

5.1 Existing data collection sources, tools and methods

5.1.1 Bureau of Agricultural Statistics

Prior to 1987 BFAR was responsible for generating fisheries statistics, but in 1987 Executive Order 116 transferred the responsibility for the collection, compilation, analysis and dissemination of fisheries statistics to the Bureau of Agricultural Statistics (BAS). With the new responsibility, seven staff were transferred to the BAS from BFAR, but additional funding for fisheries statistics was not provided to the BAS, which is already responsible for the generation of statistics for agriculture (Recide, 2003). From 1990 to 1995 the National Fishery Information System Project was conducted under the Fishery Sector Program. Part of this project was the generation of provincial and regional fisheries production estimates for commercial and municipal fishing, and for aquaculture. Since the completion of the project, the BAS has received funding from BFAR to generate fisheries statistics, but the magnitude of funding changes from year to year (Recide, pers. comm.). The BAS normally conducts non-probability surveys during the first part of the year in all provinces, and probability surveys during the second half of the year in the top producing provinces. The coverage of these surveys depends on the amount of funding available from BFAR (Recide, 2003).

Statistics are mainly gathered to satisfy national reporting requirements, which stipulates that quarterly summaries of the production of fish must be generated (Recide, pers. comm.). Quarterly fisheries data review meetings for all Regional Agricultural Statistics Officers are held at the BAS central office. In these meetings, officers present regional data and explain and justify levels and changes in reported values. Fisheries statistics are published in quarterly performance reports and also in statistical handbooks published annually. These publications are provided to the Department of Agriculture, BFAR and other agencies and organisations, which use the data for policy and programme formulation purposes (Recide, 2003).

Marine fisheries

Commercial fisheries include all operations using boats of more than 3 gross tons. Marine municipal fisheries include fishing operations using boats of less than 3 gross tons, or without the use of a boat. Both fisheries are surveyed using similar techniques. Information collected about commercial and municipal fisheries include weight and value of catch by species, gears and vessels used.

The sampling frame for the surveys are lists of commercial and municipal fish landing centres by province, which was last updated in 2000. Surveys are normally only conducted in the top producing provinces. Landing centres are stratified into three levels: top producing in the province; Stratum 1 - major fish landing centres; and Stratum 2 - all others. Sampling follows a two-stage stratified random sampling design using province as the domain, fish landing centres as the first stage unit and the fishing boats as the second stage unit. The top producing landing centre is always surveyed and random samples are taken from Stratum 1 and 2. Sampling is carried out every second day at each landing centre at peak times only, but the survey includes questions about activities at non-peak times. The duration of each survey varies with funding availability. In 2002, 35 commercial fish landing centres from seven top producing provinces were sampled from April to December. The plan for 2003 is to conduct probability surveys in October in all 54 commercial fish producing provinces to cover a total of 145 fish landing centres. For municipal fisheries 359 sample municipal fish landing centres from 64 provinces are expected surveyed from October to December 2003 (Recide, 2003).

The data is collected by contractual staff from the Barangay surveyed, who are hired for 1,600 pesos per month to survey the commercial fishery, or 1,400 pesos per month to survey the municipal fishery, by the BAS Provincial Operating Centres in each province. The contractual workers gather data using centrally prepared structured questionnaires (Recide, 2003).

Data processing was computerised in 1994, and falls under the responsibilities of the Provincial Operation Centres, who receive training on the use of processing systems from BAS central. Summary sheets are validated by the provincial staff and forwarded to Regional Operating Centres, where regional summaries are made and forwarded to the central office of the BAS. The central BAS office generates the national statistics including the catch by fishing gear, by fishing ground and by species. National Data Reviews for all Regional Agricultural Statistics Officers are conducted quarterly.

Non-probability surveys are conducted when funding is insufficient or released too late to carry out probability surveys. These surveys involve quarterly visits to selected landing centres by statisticians, who carry out key informant interviews with fishing boat operators, fishers and traders. A centrally produced survey form is used to record the data (Recide, 2003).

In addition to the probability and non-probability surveys, monthly monitoring of catches occurs within landing centres managed by the Philippine Fisheries Development Authority, LGUs, or private managers. Currently there are 56 such landing centres, who report all fish catches to BAS field personnel using a standard form prepared by BAS central (Recide, 2003).

Marine fish landings are estimated using the following formulas (from Recide, 2003):

Landing centre:

$$Y_{LCD} = \left(\sum_{i=1}^b Y_{bi} \right) \times \frac{B}{b}$$

Where:

- Y_{LCD} = Fish landed in sample landing centre per day
- Y_{bi} = Fish landed per sample boat at the landing centre
- B = Total number of boats that unloaded at the LC
- b = Number of boats surveyed

$$Y_{LCM} = \left(\sum_{i=1}^d Y_{LCDi} \right) \times \frac{D}{d}$$

Where:

Y_{LCM} = Fish landed in the sample landing centre per month

Y_{LCDi} = Fish landed in the sample landing centre per day

D = Total no. of days in month

d = number of survey days in month

Stratum

$$Y_{st} = \sum_{i=1}^n Y_{LCMi} \times \frac{N}{n}$$

Where:

Y_{st} = Estimate of fish landings in a stratum

Y_{LCMi} = Estimate of fish landings in sample landing centres per month

N = Total number of landing centres in stratum

n = Number of sample landing centres in stratum

Province

For provinces with probability surveys:

$$Y_s = \sum_{i=1}^3 Y_{sti}$$

Where:

Y_s = Estimate of fish landings for province from probability survey

Y_{sti} = Estimate of fish landings in the i^{th} stratum

For provinces without probability surveys:

Y_o = Estimates from other administrative records

Monthly provincial estimates:

For provinces with probability surveys:

$$Y_p = Y_s + Y_o$$

Where:

Y_p = Monthly provincial estimate of fish landings

Y_s = Estimate of fish landings for province from probability survey

Y_o = Estimate of fish catch from other sources

For provinces with non-probability surveys:

$$Y_{pi} = (1 + \%cha)Y_p(\text{prev})$$

Where:

- Y_{pi} = Estimate of fish landings for the province
 $\%cha$ = Percentage change estimated from key informant interviews
 $Y_p(\text{prev})$ = Provincial estimate for previous year

Inland fisheries

For inland fisheries, information on weight and value of landings is gathered.

The sampling frame for the survey is a list of inland fishing households. The frame for 34 provinces was updated in 2001, and 11 provinces were updated in 2002. Sample households are randomly selected by province, and surveyed half yearly or quarterly depending on funds available. Surveys last for 15 days (Coates, 2002). Contractual staff are paid 50 pesos per household interviewed to gather the information. When probability surveys are not possible because of lack of funding, quarterly Inland Municipal Fish Catch surveys are conducted. In these, sample fishing households report estimated percentage change in fish catch compared to the same quarter of the previous year. For both probability and non-probability surveys, standard forms prepared by BAS central office are used. In 2003 about 2000 households are expected surveyed (Recide, 2003).

Fish landings are estimated as follows (from Recide, 2003):

Fish landings

For provinces with probability surveys:

$$Y_p = \sum_{i=1}^n Y_{hi} \times \frac{N}{n}$$

Where:

- Y_p = Fish landings in each province
 Y_{hi} = Fish landings of the i^{th} sample household
 N = Total number of households in the province
 n = Total number of sample households in the province

For provinces with non-probability surveys, the estimated catches are adjusted using the percentage change estimated from monitoring.

5.1.2 FARMC

According to Section 21 of the Fisheries Administrative Order 196 (Series of 2000), the M / C FARMCs are mandated to work closely with the LGUs to maintain a registry of fisherfolk. Data is collected through the FARMC Fisherfolk Registration Form, which is filled out as part of the fisher licensing process in some municipalities. The form requires the fisher to provide the following information:

- Personal details (name, address, next of kin, no. of children, etc.)
- Number of years in the municipality
- Main source of livelihood
- Number of years fishing
- Time of fishing (AM / PM)
- Number of hours spent fishing per year

- Name(s) of fishing ground(s)
- Type of fishing gear(s) used
- Types of fish caught (numbers of different species)
- Average weight of daily catch
- Peak season months
- Lean season months
- Type of fishing vessel (motorised / non-motorised / horse power if motorised)
- Other sources of livelihood / income
- Number of hours spent daily in other livelihoods
- Membership in fisherfolk organisation, position
- Community tax certificate details

Systems for the storage and analysis of the data collected are currently being developed in a number of municipalities, mainly through the use of Microsoft Excel spreadsheets. There are also plans to incorporate the information collected on the Fisherfolk Registration Form into the Philippine Fisheries Information System (PhilFIS) database of the Fisheries Resource Management Project (FRMP) of BFAR (see Section 5.1.4).

5.1.3 BFAR National Stock Assessment Program

The BFAR National Stock Assessment Program gathers data about fish catches, fishing effort and fish sizes caught to provide a basis for the formulation of policies for the management and conservation of marine resources. In 2002 the project continuously monitored 170 landing centres nationwide (BFAR, 2003a). The project is currently conducting fish landing site surveys for major and minor landing centres. A database system has been installed in BFAR regional offices. The database uses logbooks submitted by commercial fishing vessels to the national and regional offices. For minor landing centres, contractual staff or municipal enumerators conduct surveys. Data from the municipalities are transferred and consolidated at the BFAR regional offices, from where they are transmitted to the national level (PRIMEX-OAFIC, 2002).

5.1.4 Fisheries Resource Management Project

The Fisheries Resource Management Project (FRMP) is a project funded by the Asian Development Bank (ADB) and the Japan Bank for International Cooperation (JBIC). The FRMP has developed an elaborate database system (described further in Section 6). The data collection systems used within the FRMP are described below.

Presently, the catch and effort database of PhilFIS does not contain any data (PRIMEX-OAFIC, 2002), but it is intended that the data can be input from utilises the commercial logbooks databased in regional offices as part of BFAR's National Stock Assessment Program.

Contractual staff from universities collects ecological data using 'scientific methods'. Data collected and methods used include:

- i) Capture fisheries:
 - On-board trawl surveys (fishing ground, species (scientific & local name), weight, price, length (total length, fork length, standard length), body depths, sexual maturity)
 - Landing site surveys (species (scientific & local name), weight, price, gear & vessel used, fishing grounds)
 - Interviews using standard survey forms (species caught, changes in catch rate, gear types & ownership of these, fishing grounds (where, main characteristics, present, past), marketing (how much, to whom), consumption, income sources,
- ii) Coastal habitat:
 - Coral reef line intercept technique surveys (species of corals)
 - Coral reef video method surveys (area covered by species of corals)
 - Seaweed / seagrass frequency cover surveys (species cover in quadrats)
 - Reef fish abundance surveys (species transects)
 - Mangrove surveys using transect plot method (species, seedlings, saplings, tree circumference)

- Manta tow surveys
- iii) Water quality component:
 - Water property analysis (transparency, temperature, pH, dissolved oxygen)
 - Zooplankton abundance
 - Phytoplankton abundance
 - Metal and nutrient content (mercury, copper, arsenic, cadmium, phosphate, nitrite, nitrate, ammonia)
 - Primary productivity estimates (gross, net, and respiration) chlorophyll a, suspended solids, heavy metals, organochlorines, organophosphates, coliforms, faecal coliforms

Socio-economic data is also collected through household surveys carried out by contractual staff (commonly from NGOs). The data is collected using a single survey form, which includes:

- Demographic profile
- Household characteristics
- Fishing activities
- Income and livelihood
- Training
- Management support to fisheries
- Perceptions on illegal fishing
- Perceptions of coastal resource management
- Role of women
- Decision-making
- Attitudes on conservation and management of coastal resources
- Value orientation
- Socio-economic ranking

The ecological and socio-economic data detailed above is collected as part of project monitoring at FRMP sites. Contractors collecting the data are required to submit the data in electronic format to the Fisheries Information Management Center (FIMC) of the FRMP (situated at BFAR central office in Manila). As part of the FRMP, monitoring handbooks have been prepared by the contractors (PRIMEX-OAFIC, 2002).

5.1.5 Coastal Resource Management Project

Data collection also takes place under the Coastal Resource Management Project (CRMP), a seven-year project (initiated in 1996) funded by the US Agency for International Development (USAID) and implemented by the Department of Environment and Natural Resources (DENR) in partnership with the BFAR, the Department of Interior and Local Government (DILG), LGUs, NGOs, and people's organisations. The project provides technical assistance and training in coastal resource management to local governments and communities. A component of the CRMP was the establishment of Municipal Coastal Databases (MCDs) in each of the project locations. The information gathered for the database is shown in Table 9.

5.1.6 Limitations of current methods

The use of contractual workers for data gathering is recognised as a problem, mainly because these, despite pre-survey short training courses, often have insufficient biological knowledge to discern different species (Coates, 2002; Recide, 2003). The fast-changing environment also provides problems, as frames are quickly outdated (Recide, 2003). The inland fishing survey was criticised by Coates (2002), who reported that because of funding constraints most information was generated from non-probability surveys, and was therefore essentially estimates. He considered the basis of the frame of fishing households unclear, because involvement in fishing should be established from sampling of random households rather than pre-determined fishing households as participation in inland fisheries changes greatly with time. Coates (2002) also questioned the reliability of interviewing individuals within households within the inland fisheries survey; a technique he reports commonly leads to underestimations of catches. Further, he questioned the validity of the data reported by licensed

fishers, whom he reports BFAR suspects of under-reporting their catches because they fear for taxation repercussions.

The data collected as part of the FRMP is comprehensive and would form a great basis for management decision-making. The system started by the FRMP is intended to form the basis for development of national data collection in the future. However, this blue-print for data collection is likely to be very expensive, and it remains to be seen whether the funding is available to extend these efforts beyond the life of the project, let alone to a national level. Further, because so much data is collected in such great detail, the database system developed for storing and analysing the data (described in Section 6) is elaborate and requires both a high degree of capacity of local and national staff and appropriate (and expensive) hardware and software. The majority of staff responsible for the development of data collection, storage and analysis systems within the FRMP are consultants from the Pacific Rim Innovation and Management Exponents, Inc., Philippines (PRIMEX) and the Overseas Agro-Fisheries Consultants Ltd., Japan (OAFIC), and the 'lack of available counterpart staff', or the lack of experience with computing in counterpart staff from BFAR has plagued the project since its outset (PRIMEX-OAFIC, 2002). This limitation is recognised by the FRMP and BFAR, and several human resource development efforts have been undertaken.

5.2 Required accuracy and precision of data to support 4.3 to 4.10

The required accuracy of sampling depends on the intended use of the statistics (Stamatopoulos, 2002), and as this has not been officially formulated yet, it is difficult to assess how accurate the data generated should be. The need to co-ordinate data collection efforts by various projects and programmes to maximise the benefits of limited funding is already recognised by the Bureau of Agricultural Statistics (BAS), who along with BFAR have started a National Fisheries Technical Working Group, where various agencies meet to discuss data collection and analysis issues. Within the Department of Agriculture, the BAS and BFAR meet frequently to discuss how they may make the best of the funding available.

Table 9: Information included in the MCD. CRM: Coastal Resource Management; LGU: Local Government Unit; NAMRIA: National Mapping and Resources information Authority. Source: CMMO (2002).

MCD data fields	Details
<p>GENERAL INFORMATION Municipality / City name & classification Province & Region Coastal barangays Non-coastal barangays Municipal / City population Land area of LGU Length of municipal shoreline Area of municipal waters LGU office responsible for CRM</p>	<p>Name and population of coastal barangays Name and population of non-coastal barangays Total population Official land area in km² In km Area of municipal waters based on NAMRIA certified technical description Primary office implementing coastal resource management programmes</p>
<p>LGU BUDGET Budget year No. of full time CRM staff Total LGU budget Total CRM budget Total CRM-related revenue</p>	<p>The year the budget was allocated Total number of staff regularly employed by, or detailed to the municipality to work on CRM related activities LGU budget for each year as approved, including all sources of the municipality / city to work primarily on CRM activities Total budget allocated for CRM-related activities each year, including all activities Total income or revenue generated by municipality each year from use of its coastal resources, including from fishing licenses, concession fees, entrance fees, etc.</p>
<p>CRM ORGANISATIONS M / CFARMC BFARMC M / C Bantay Dagat Barangay Bantay Dagat Report year Rating Other CRM-related organisations / projects</p>	<p>Whether and when established Whether, where and when established Whether and when established Whether, where and when established The year M / C FARMC and Bantay Dagat effectiveness and rating is reported Qualitative rating of the level of activity of FARMCs and Bantay Dagats as determined during the annual M&E, including i) inactive; ii) active; or iii) institutional Names of any other related organisations / projects working within the municipality, including NGOs, fisherfolk co-operatives, people's organisations, other agencies, etc.</p>

Table 9 continued.

MCD data fields	Details
CRM PLANNING Year Coastal profile completed Multi-year CRM plan prepared Plan adopted by Municipal Resolution Ordinance Plan implemented and revised based on M&E Coastal resource assessment	Year each phase of the CRM planning process completed Yes / no (coastal profile presents data gathered from CRM planning assessment, describes baseline conditions, issues etc.) Yes / no (plan includes description of area, management issues, goals, objectives, legal & institutional framework, etc.) Yes / no, specific resolution / ordinance adopting the CRM plan entered in legislative framework above Yes / no List of coastal resource assessments conducted within the municipality or in barangays therein including year done, geographic coverage and methodology (participatory, rapid, detailed / scientific, others)
CRM & FISHERIES LOCAL LEGISLATION Ordinance details	Year when ordinance / resolution passed and approved, number of ordinance / resolution, title and summary description
COASTAL RESOURCE / HABITAT STATUS Coral reef area Seagrass area Report year Coral reef condition Mangrove area Report year Mangrove conditions	Total area covered by coral reefs within municipal waters, based on local knowledge or field surveys Total area of seagrass beds within municipal waters, based on local knowledge or field surveys Year of any field surveys or coastal resource assessments conducted on the condition of coral reef and seagrass areas within the municipality % coral cover within municipal waters for each survey period Total mangrove area within the municipality (ha) based on local knowledge or field surveys Year of any field surveys or coastal resource assessment conducted of mangrove areas Condition of mangrove area as determined on annual monitoring (poor, fair, good & excellent condition)
MUNICIPAL FISHERIES Report year Municipal fisheries production No. of registered municipal fishers Average catch Registered municipal fishing boats Motorised Non-motorised Commercial fishing vessels	Year of fisheries survey or coastal resource assessment was conducted within municipal waters Metric tons per year for municipal fisheries Number of full or part time municipal fishers registered Estimate of average catch (kg / person / day) Number of fishing vessels less than 3 gross tons registered in the municipality Number of motorised fishing boats (3 gross tons or less) registered in the municipality Number of non-motorised fishing boats (3 gross tons or less) registered in the municipality Number of commercial fishing vessels (more than 3 gross tons) based in municipality

Table 9 continued.

MCD data fields	Details
<p>COASTAL LAW ENFORCEMENT Bantay Dagat / fish wardens Operational patrol boats Frequency of coastal law enforcement Apprehensions Cases filed Convictions</p>	<p>Number of Bantay Dagats / deputised fish wardens actively involved in coastal law enforcement activities within municipality for each year Number of patrol boats that are owned and / or operated by the municipality / city used for coastal law enforcement patrols Average frequency of coastal law enforcement patrols conducted within the municipal waters (low: monthly; medium: weekly; high: daily) Number of apprehensions within the municipality / city for violating laws governing municipal waters, coastal resources and fisheries Number of cases filed in court for violating coastal laws for each report year subsequent to apprehensions made Number of cases decided with finality by the court convicting individuals for violating coastal laws and fisheries within the municipality</p>
<p>ILLEGAL / DESTRUCTIVE COASTAL ACTIVITIES Illegal / destructive fishing Illegal intrusion of commercial fishing Illegal conversion of mangroves Illegal cutting of mangroves Illegal shoreline development</p>	<p>Level of illegal / destructive fishing (not present; low: monthly; medium: weekly; high: daily) Entry of commercial fishing vessels into municipal waters (not present; low: monthly; medium: weekly; high: daily) Conversion of mangrove areas and swamps into other uses without permit (not present; low: monthly; medium: weekly; high: daily) Unauthorised cutting of mangroves (not present; low: monthly; medium: weekly; high: daily) Physical infrastructure, reclamation, sand mining etc., within the foreshore and shoreline area without permit (not present; low: monthly; medium: weekly; high: daily)</p>
<p>MARINE PROTECTED AREAS (MPAs) Details of MPA Bio-physical condition Fish abundance Enforcement rating Title of MPA zone Specific restrictions within each zone</p>	<p>Name, area (ha) as declared in ordinance, year ordinance approved, ordinance number, location (barangay(s)) % of living coral cover within MPA, average of several transects Total number of fish in every 500 m² of the sanctuary, average of several transects Status of enforcing the official restrictions and / or regulations of each MPA as determined during annual M&E (not enforced; enforced but inactive; actively enforced) E.g. 'core'; 'no take'; 'buffer'; 'research & education', etc. Summary of specific restrictions or regulations that apply to each of the MPA zones listed</p>
<p>MANGROVE MANAGEMENT Management details Managing organisation details Area planted Status of mangrove management activity</p>	<p>Management approach or instrument that govern activity (e.g. reforestation), year initiated, location (barangay(s)), area managed (ha) Name, number of members Total area planted under the management activity each year (ha) Status of the activities as determined during the annual M&E (organisational / planning stage; operational stage; sustained operation / expansion stage)</p>

Table 9 continued.

MCD data fields	Details
<p>ENVIRONMENT-FRIENDLY ENTERPRISE DEVELOPMENT</p> <p>Details of enterprise development activity</p> <p>Environment-friendly attributes</p> <p>Coastal residents involved</p> <p>Status of enterprise / livelihood activity</p>	<p>Name, year initiated, location (barangay(s))</p> <p>Descriptions of project (e.g. promote fishing alternatives; reduce fishing pressure; promote value added products, etc.)</p> <p>Number of coastal community members directly involved and benefiting from project</p> <p>Pilot project; operational phase or sustained production / expansion phase</p>
<p>CRM-RELATED TRAINING / PARTICIPATORY ACTIVITIES</p> <p>Details of activities</p>	<p>Title / subject of activity, year conducted, no. of participants, duration of activity, activity sponsor</p>

5.3 Potential improvements to existing systems

The BAS plans to improve the information collection system through the exploration of alternative methodologies for surveys, and through the collaboration with fishing boat operators and fishing establishments to ensure that data collected is accurate (Recide, 2003). No firm plans for a change of methodology have been made yet.

The FRMP recognises that elaborate training and capacity building of BFAR and LGU staff is required for the PhilFIS (see Section 6) to be sustainable beyond the project lifetime, as well as substantial funding to implement it on a national level (PRIMEX-OAFIC, 2002).

5.4 Alternative sources, and data collection tools

The use of data generated as part of research projects was advocated by Coates (2002). In the Philippines, the value of the data generated by projects such as the FRMP and the CRMP has been recognised, and the BAS currently does not collect data where these projects already operate. The problem with relying too much on data generated by externally funded project is of course that the scope and focus of such projects change with funding agency priorities, and that project activities rarely continue past the cessation of external funding. The BAS recognises this, and therefore has a system in place for collection of data which is reliant only on BFAR funding (the fluctuations of which cause separate problems), which is supplemented by data from other, externally funded, projects (Recide, BAS Director, pers. comm.).

5.5 Attitudes towards participatory data collection systems, required incentives etc.

The Local Government Code (Republic Act 7160, 1991) is favourable to integrated management and participatory processes through the provision for inter-LGU collaboration, partnerships with NGOs and establishment of multi-sectoral development councils.

Participatory methods are currently not used by the Bureau of Agricultural Statistics (BAS), the agency responsible for national data collection on the fishery.

The ADB funded Fisheries Resource Management Project (FRMP) uses a variety of participatory methods to collect socio-economic data about fishers and coastal communities, and have trained local collaborators from the LGUs in these techniques. Methods used include Rapid Resource Appraisal, semi-structured key informant interviews with fishers, resource mapping, community walk-throughs, focus group discussions and workshops (PRIMEX-OAFIC, 2002).

5.6 Use and potential of traditional knowledge

Within the FRMP specific activities were planned aiming to increase the awareness about indigenous knowledge, and to include traditional knowledge in fisheries resource management planning (BFAR, 2002b).

6 Data storage and processing methods

6.1 Existing and proposed including software, hardware, data processing capacity

A number of data storage and processing methods currently exist within the Philippines. The Bureau of Agricultural Statistics (BAS) operates the official national statistical system. Additional database initiatives include the FRMP PhilFIS, which is likely to become further developed and form the basis for data storage and processing methods for management purposed by the BFAR. Other database systems used for fisheries management include the Municipal Coastal Database (MCD) developed by the Department of Environment and Natural Resources (DENR) and the 'knowledge based, decision support and adaptive system for coastal resources management and sustainable offshore fisheries development project' (KDACS) developed by the University of the Philippines in the Visayas. In

addition to those systems mentioned here, a variety of smaller systems are likely to exist and be used at local levels.

6.1.1 PhilFIS

The Philippine Fisheries Information System (PhilFIS) is a centralised system located within the Fisheries Information Management Center (FIMC) of BFAR. The client-side user interface design, validation rules, transaction processing, reporting, system configuration and administration and exception handling were developed using Microsoft Visual Basic 6.0. The database design, except for the Document Database and Licensing and Violations Database, were implemented using Microsoft SQL Server 2000. Stored procedures (Structured Query Language programs) were developed using Microsoft Query Analyzer, providing centralised instructions which can be accessed by any participating client. The generation of report forms were developed using Seagate Crystal Reports and integrated into Visual Basic as component modules. PhilFIS will be able to generate about 100 reports once fully operational. Test data were developed to simulate scenarios for carrying out functions, and unit and system testing was carried out and errors corrected or eliminated.

The system comprises several databases, (listed below). The databases are initially intended for BFAR internal use, but an extension of the FRMP intends to base them on the World Wide Web. Details of the databases are provided in Table 10.

PhilFIS is designed to incorporate nearshore monitoring, control and surveillance (MCS) as a three-tiered system of data collection (monitoring), legislation (control) and enforcement (surveillance). The MCS investment plan includes the setting up of one national and eight regional MCS co-ordination centres. The FRMP project will support the government's efforts in MCS by strengthening the data management through PhilFIS, strengthening fisheries legislation and licensing systems and strengthening the law enforcement in municipal waters. However, the majority of the staff involved with PhilFIS are external consultants from PRIMEX and OAFIC, and it remains to be seen how sustainable the system is following the current handover to BFAR staff. Training of BFAR – FIMC and BFAR Regional Office counterparts form part of the 'systems technology transfer' planned in the remaining time of the project (PRIMEX-OAFIC, 2002), but FIMC cites problems with efficient capacity building as frequent staff turnover at the LGU level means that training is inefficient (Razon, Officer-In-Charge, Fisheries Information Management Centre, FRMP, pers. comm.). A pre-PhilFIS review of information and communications technology revealed that very few LGUs (and regional BFAR offices) have adequate computing and internet service provider services, and substantial funding would therefore be required for PhilFIS to go national (PRIMEX-OAFIC, 2002).

6.1.2 BAS statistics

The BAS survey processing systems are currently IMPS-based (Integrated Micro-Processing System) for data entry applications and DOS based-Cobol for the generation of statistical tables. The BAS uses IBM hardware for these systems. The Bureau is gradually changing to CPro for data entry, SQL Server for database development, and Stata for statistical analysis (Recide, pers. comm.).

Table 10: Details of PhilFIS databases. Source: PRIMEX-OAFIC (2002):

Database	Details
<p>Catch and effort database: Records time series catch and effort data consistent with community-based coastal resource management and time series data on deployment of fishing effort</p>	<p>65 tables to record time-series data on landed and on-board catches and their corresponding effort deployments. Designed to generate annual summaries of catch statistics for reef fishes, small and large pelagic fishes and tuna. All data can be geo-referenced to a statistical zone. Includes 'Surplus Production Model' based on Beverton & Holt stock-recruit model.</p>
<p>Map database: Archives digital images and maps for use in coastal resource management and allows users to overlay maps and create dynamic point maps</p>	<p>4 tables designed to contain ArcView generated geo-corrected digital images, including high-resolution baseline topographic maps, bathymetric data, overlay maps on land use, population density, coastal habitats, coral cover and other ecosystem related data. Supports thematic map construction of elements of geographical areas. Used to archive geo-corrected digital images commonly used in coastal fisheries management, allows user to overlay maps, and the storage of geographical representation of fisheries statistics in PhilFIS. Several map layers covering the FRMP sites can be compiled, to enable the development of appropriate data base for future planning and operations, data comparison studies and assessment of FRMP interventions.</p>
<p>Licensing and violation: Records community-based fishing licences and violations</p>	<p>61 tables for recording registry applications, fish worker licenses, fishing vessel licenses, fishing gear licenses, and violations tracking information. A configuration section specifies deployment levels for municipality, regional and national offices. System has independent middleware module application for synchronising data.</p>
<p>Resource and ecological assessment: Archives, analyses and reports community-based coastal fisheries studies related to fisheries resources and associated ecological elements</p>	<p>86 tables to cover capture fisheries, coastal habitat, and water quality. Designed to contain fisheries population dynamics, fisheries stock assessment, and fish fauna checklist. Each station record and geo-referenced data is associated with a statistical group of zones.</p>
<p>Social-economic assessment: Records socio-economic parameters of the community affecting the aquatic resources</p>	<p>117 tables, designed to record demographic data, sectoral gender parameters, and other socio-economic data.</p>
<p>Bibliographic collections database: Records bibliographic references related to fisheries science and management</p>	<p>6 tables designed to record bibliographic references to fisheries research and management in the Philippines, particularly on capture fisheries and aquaculture. System allows search and retrieval of complete citations of entries through searches on author, topic, keyword, subject or institution. Output formats include citation, concise or full listing. System allows printing of search results, but does not detail whether or where the reference is available.</p>
<p>Document database: Stores searchable scanned reports and documents</p>	<p>System to archive digital images of documents related to fisheries studies in the Philippines. Designed using Alchemy (an industry standard document imaging software), which contains a proprietary database to store digitised images, profiles and keywords to provide a search index. Includes utilities to browse and search digital copies of documents and to print these.</p>
<p>Fisherfolk registration: Records fisherfolk registry census data</p>	<p>10 tables for census data for fishers, intended to assist FARMCs to register and build a list of fishers in the Philippines. Tool for M / CFARMCs to use to efficiently store and retrieve fisherfolk data, and to generate summaries and / or analytical reports for informing management decisions and strategies.</p>

6.1.3 MCD

The DENR's Municipal Coastal Database (MCD) was created as part of its Coastal Resource Management Project (CRMP), funded by the United States Agency for International Development (USAID). The database comprises a number of fields dealing with budgets, resource management plans, the operational status of marine sanctuaries and mangrove reforestation, and training activities. Project activities are currently being implemented in 40 municipalities in three regions, and aims to:

- Provide a framework for monitoring and evaluation of coastal resources projects for use by the local government unit and other organisations
- Identify current status of, and information gaps within, coastal resources management activities
- Facilitate the collection of information by local government units

The MCD was designed to store and collate data and generate reports to facilitate planning, implementation and monitoring and evaluation of coastal resource management plans and programmes. The MCD is managed and used at four levels: municipal / city, provincial, regional and national. Each level has a distinct MCD installation CD, reports, and management and maintenance requirements. Data is transferred between different databases using CDs, floppy disks or USB portable memory devices. The MCD uses Microsoft Access and is designed to run on Pentium 1 PCs (CMMO, 2000).

6.1.4 KDACS

The Institute of Marine Fisheries and Oceanology of the University of the Philippines in the Visayas in collaboration with the Department of Agriculture Bureau of Agricultural Research are developing KDACS. The system is a tool designed for local government units, which includes:

- A tool for generating municipal fisheries ordinances
- A tool for generating indicators for fisheries reserves (such as coral cover, catch per unit effort statistics, etc.)
- A fish identification tool (databased dichotomous keys)
- A fishery law helper tool, integrating all relevant laws in a searchable database

7 Identification of potentially appropriate data sharing and provision mechanisms

7.1 Channels of communication between and within fisheries institutions and stakeholders at different levels

See section 2.4. This report focuses on the information requirements of the DoF, and it is beyond the scope of this study to compare the information requirements of main co-management stakeholders. Regular updating of fisheries and aquaculture skills of LGU extension workers is carried out by BFAR when new technologies emerge, but most extension workers report having attended only one or two such courses in the last ten years. Municipal extension workers are also provided a P 1,500 per month incentive by BFAR to carry out fisheries and aquaculture extension in addition to their other duties.

7.2 Opportunities for facilitating sharing or the provision of data

7.2.1 What "external data and information" would the BFAR be interested to receive or is currently receiving e.g. from local communities, regional bodies etc.?

During the workshop conducted as part of this survey with BFAR staff, a need for information and guidance on how to formulate fisheries and natural resources management plans was voiced, as well as comprehensive guidelines on how, and from whom, to apply for funding from different funding agencies.

The Philippines and Indonesia executed a bilateral agreement on fisheries co-operation in 1974, agreeing to (source: Batongbacal, 2000):

- Promote mutual co-operation on the development of their fishing industries;
- Promote mutual consultation and exchange of technical assistance and research findings on all phases of fisheries, including utilisation of by-products
- Continue discussions to explore further means of co-operation in the fishing industry in both countries;
- Grant to nationals and other legal entities of both countries, treatment in trade, investments, and other economic activities no less favourable to that accorded to any other country, except that this did not preclude preferential arrangements relative to fishing industries between or among ASEAN members.

Several internationally funded projects are currently working with fisheries communities within the Philippines. Of these, the FRMP forms an integral part of the BFAR and through this project; the BFAR has received a great deal of input relating to capacity building.

BFAR is also the key collaborative agency for STREAM, through which it receives and shares information pertaining to livelihoods, institutions, policy development and communications and poverty alleviation.

7.2.2 What information would the DoF be willing to share/provide or is currently sharing or providing?

Through the PhilFIS initiative started under the FRMP, the BFAR is hoping to place the statistical databases (described in Section 6.1.1) on the BFAR website, for anyone to access.

7.3 Existing and proposed information provision to, or exchange among, fisher communities

The FARMC provides a direct link from BFAR to LGUs and fishing communities, and in areas where the FARMC is well established and functions satisfactorily, a good dialogue between BFAR (and other stakeholders) and the fishing communities have been set up. In areas where the FARMC is not functioning optimally, fishing communities sometimes find it hard to access information about fishing and aquaculture (Felsing et al., 2003). However, in many areas the LGU extension workers find it hard to access relevant and up-to-date information about fishing and aquaculture. In areas where the LGU take a strong interest in fisheries, or in areas where NGOs operate, cross-visits are arranged between communities, so that fishers from one area can see what works in another area (Nava, mayor of Jordan Municipality, Guimaras, pers. comm.).

7.4 Identification of requirements for sharing or providing information

In the Philippines, the most important vehicle for information sharing in the fisheries sector is the FARMC, and for information sharing to occur optimally, it is therefore important to strengthen the FARMCs. This is recognised by BFAR, who have made FARMC strengthening part of their agenda (Grutas, pers. comm.).

8 Existing or previous activities to develop data collection and sharing systems

See Section 6.1 for a description of existing and previous data collection and sharing systems initiatives.

9 Details of involvement in related research, studies, and programmes including references

A list of projects and programmes presently conducted in the Philippines is provided in Table 11.

Table 11: Projects and initiatives currently in operation in the Philippines relevant to fisheries management. Source: BFAR (2001b; 2003a).

Project	Funded / implemented by	Brief description
Fisheries Resource Management Project (FRMP)	Funded by ADB and OECF, implemented by BFAR and LGUs	Aims to address the critical issues of fisheries resource depletion and persistent poverty among municipal fishers. Intends to establish and implement a set of fisheries resource management systems amongst other things.
Community-Based Coastal Resources Management Program (CB-CRM)	Funded by government, implemented by BFAR and LGUs	Aims to assist communities to develop coastal resources management plans through participatory processes
Monitoring of Fish Sanctuaries and Artificial Reefs / Fish Refuges	Funded by government, implemented by BFAR and LGUs	Aims to monitor and establish fish sanctuaries / artificial reefs / fish refuges
Organisation / Strengthening of FARMCs	Government funded, implemented by BFAR	Support the establishment and strengthening of FARMCs at national and municipal level.
Red Tide Monitoring	Funded by government, implemented by BFAR, national government agencies and LGUs	Aims to monitor red tides and ensure public safety
Operation of Cyanide Detection Test Laboratories	Funded by government, implemented by BFAR	Aims to enable the government to detect the presence of cyanide in fish tissues to be used as basis for export permit allocations
Monitoring, Control and Surveillance (MCS)	Funded by government, implemented by BFAR	Aims to keep and ensure the integrity of marine fishery resources of the Philippines in its optimum productive conditions
Acquisition of Patrol Vessels	Funded by loan from the Spanish Government, implemented by BFAR	Aims to provide better capacity to implement ocean laws and regulations, deter illegal fishing activities, and facilitate the collection of fisheries information such as fishing effort, catches, MSY on MCS priority sites, fishing vessel traffic etc.
Fisheries Law Enforcement	Funded by government, implemented by BFAR	Aims to encourage fisher communities to police and manage their own fisheries resources
National Stock Assessment Project	Funded by government, implemented by BFAR	Aims to develop the institutional capacity of BFAR to carry out resource assessment, development and management. Data utilised by the FRMP.
Inland Fisheries Management	Funded by government, implemented by BFAR	Aims to augment fish production and continuous fish supply in landlocked or depleted areas. Includes the assessment of various lakes in the country and the preparation of lake management plans
Visayan Sea Coastal Resources & Fisheries Management Project	Funded by Germany, implemented by BFAR	Aims to bring together different stakeholders to work on effective management of the renewable resources of the Visayan sea
STREAM	Funded by DFID, AUSAID Implemented with BFAR	Aims to support poor people's livelihoods through improved communications, and by influencing institutions and policy development to better support the needs of poor people who are involved with fishing and small-scale fish farming

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