INTERACTIVE MECHANISMS FOR SMALL-SCALE FISHERIES MANAGEMENT

Food and Agriculture Organization of the United Nations
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Interactive mechanisms for small-scale fisheries management

Report of the regional consultation
Bangkok, Thailand, 26-29 November 2001

Food and Agriculture Organization of the United Nations
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PREPARATION OF THIS DOCUMENT

This publication contains the report of and papers presented at the Regional Consultation on Interactive Mechanisms for Small-scale Fisheries management, organized by the FAO Regional Office for Asia and the Pacific (FAO/RAP) in collaboration with the Coastal Development Center (CDC) of Kasetsart University, Thailand, from 26 to 29 November 2001. The papers have been compiled and edited by Dr. Heiko Seilert, an FAO Consultant, and Mr. Marcel Barang, an independent editor.

SEILERT, H.E.W., ed. 2002. *Interactive mechanisms for small-scale fisheries management: Report of the regional consultation.* FAO Regional Office for Asia and the Pacific, Bangkok, Thailand. RAP Publication 2002/10, 153 pp.

ABSTRACT

The "Regional consultation on interactive mechanisms for small-scale fisheries management" was initiated by FAO and co-organized by the Coastal Development Centre, Kasetsart University, Bangkok, Thailand. The Consultation The consultation discussed issues concerning small-scale fisheries management based on experiences at both national and regional levels. To overcome various constraints encountered, the consultation developed an interactive plan to implement decentralized small-scale fisheries management. The plan is divided into three phases and describes in a matrix constraints and identified solutions in implementing small-scale fisheries management for six identified areas, namely Organization, Content/substance, Legal, Support, Training and Process. This interactive plan is designed for the needs of fisheries managers at different political levels, non-governmental organizations and others working in the field of small-scale fisheries management**.**

Distribution:

Participants of the Consultation
Members of the Asia-Pacific Fishery Commission
FAO Fisheries Department
Fishery Officers in FAO Regional Offices
Relevant international/regional fishery organizations

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EXECUTIVE SUMMARY

The "Regional consultation on interactive mechanisms for small-scale fisheries management" was initiated by FAO and co-organized by the Coastal Development Centre, Kasetsart University, Bangkok, Thailand. The Consultation was held at the Miracle Grand Convention Hotel, Bangkok, from 26 to 29 November 2001 and attended by 28 participants from nine countries, i.e. Cambodia, India, Indonesia, Malaysia, Myanmar, the Philippines, Thailand, the United States of America and Viet Nam, and five organizations, i.e. the Mekong River Commission (MRC), the Food and Agriculture Organization (FAO), the Coastal Development Centre (CDC), the Southeast Asian Fisheries Development Center (SEAFDEC) and Kasetsart University, Thailand.

The Consultation reviewed the fisheries situation in the Asia-Pacific region, an ecosystem-based fisheries management approach and a regional synthesis on small-scale fisheries and their management in the region. The national experiences in implementing small-scale fisheries management as well as specific problems encountered at the project level in Asian countries were presented and extensively discussed at the Consultation.

In considering steps required in decentralizing small-scale fisheries management, technical terms to describe the action required for implementing small-scale fisheries management were compiled. These actions were modified and grouped into six areas, i.e. Organization, Content/substance, Legal, Support, Training and Process. A flowchart on actions from government-based, top-down, centralized fisheries management to community-based, bottom-up, decentralized fisheries management was then developed and the identified actions were grouped in this chart according to their need in such a decentralization process (see page 114).

For each action, the Consultation identified constraints in the implementation process. The resulting matrix of areas, divided into actions with their identified constraints, was then completed with recommended solutions to overcome these constraints. Extensive discussions about proposed solutions, better described as activities, took place as these solutions were largely depending on the political, cultural and social background of each participant.

The three-phased matrix is formulated as the **interactive plan for the implementation of small-scale fisheries management** (see pages 118-140). Although divided into three phases, the Consultation felt that the move towards decentralized fisheries management is not straight forward, i.e., routinely progressing from one phase to the next. Some of the identified activities are specific for only one phase in the plan, others may have to be repeated or done continuously in all phases. The need for clearly identified parameters to measure the necessity for such repetition or continuation of activities was discussed as a base for recommendations for further action that will lead to the next phase.

The structure of the developed interactive plan is as follows:

PHASE		
AREA		
ACTIONS	**CONSTRAINTS**	**ACTIVITIES (Solutions)**

This plan provides a mechanism to implement small-scale fisheries management for managers at different political levels, for non-governmental organizations and others working in the field of small-scale fisheries management. The plan recommends comprehensive activities needed for successful implementation. It can be read following the flow of the three phases or by looking at specific areas, for example the legal or training area.

Finally, the participants at the Consultation expressed the wish to provide a general statement for the readers of these proceedings for clarification and also the points below, which have evolved from the four days of discussion:

This document is intended to facilitate the process of decentralizing small-scale fisheries management. It offers suggestions for a decentralization process, based on experience of practitioners from various fields. The document would be useful for stakeholders, e.g. government agencies at all levels, communities, non-governmental organizations and others in the field.

Furthermore, the participants wished to state that:

a) The premise of this document is that the shift to decentralized small-scale fisheries management is considered desirable.
b) Constraints listed may not necessarily be seen as constraints only, they may also be seen as opportunities or prerequisites for decentralization of small-scale fisheries management;
c) The terms used may depend on national definitions (e.g. poverty) or understanding (environmental or fisheries point of view, etc), as they relate to the different objectives, e.g., conservation, use, development, holistic and ecosystem-based management;
d) Participatory monitoring is a prerequisite for the entire process of implementing decentralized small-scale fisheries management;
e) Political will and financial support are not a necessity but would facilitate the process;
f) The phases described do not provide a strict timeframe; they are intended to underline decentralization as a dynamic process with feedback and fine-tuning based on monitoring and evaluation;
g) Decentralization of small-scale fisheries management may not be necessary or appropriate at all levels. Some responsibilities might be better centralized.

Regional Consultation on Interactive Mechanisms for Small-scale Fisheries Management

Bangkok, Thailand, 26-29 November 2001

OPENING OF THE CONSULTATION

The participants were welcomed by Torkul Kanchanalai, Vice Rector, Kasetsart University and Veravat Hongskul, Senior Fisheries Officer of the FAO Regional Office for Asia and the Pacific. The welcoming speech of Prof. Kanchanalai is attached as Annex 5.

OBJECTIVES OF THE CONSULTATION

The consultation involved experts from governments, development agencies, donors and selected NGOs, experienced in implementing small-scale fisheries management, sharing their views and experiences. These experts discussed the constraints in decentralized small-scale fisheries management and possible ways to solve resulting problems.

The objectives of the consultation were as follows:

1. How best to address small-scale fisherfolk or fishing communities;
2. To identify responsibilities and obligations in decentralized small-scale fisheries management;
3. To identify the constraints in implementing local fisheries management and to group these in categories, such as social, economic, environmental, legal constraints, and interagency liaison;
4. To develop practical solutions for the different groups of constraints to assure environmentally sustainable, economically feasible and socially sound decentralized management decisions; and
5. To link these findings in a holistic scenario of interactive mechanisms for the implementation of decentralized small-scale fisheries management schemes.

PRESENTATIONS AT THE CONSULTATION

The papers presented at the consultation were divided into three groups: regional papers, country papers and experience papers.

The regional papers introduced the subject of small-scale fisheries management from different viewpoints, i.e. from the production side, using an ecosystem approach and based on the regional experience from a regional fisheries officer. The country papers summarized country experiences in small-scale fisheries management from the different Asian countries. The experience papers focused on experience in implementing small-scale fisheries management in different projects of the Asian region.

TOWARDS STRENGTHENING COASTAL FISHERIES MANAGEMENT IN SOUTH AND SOUTHEAST ASIA

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Introduction

Marine capture fisheries in many countries in the South and Southeast Asian region showed a rapid development in the 1970s and 1980s. The use of nylon material and the adoption of new fishing gear (e.g. trawls, purse seines) increased the catch. Many governments in boosting the development of fisheries introduced subsidy programmes through various means such as soft loans for boat purchase and reduced fuel prices. Motorization programmes were common in many countries to enable traditional fisherfolk to fish farther offshore. Meanwhile, national and foreign investment has contributed to the construction of infrastructures such as fishing ports and facilities such as ice plants, cold storage facilities, canneries and other processing plants. The entrance of fish and fisheries products from Asia into the global market has also played an important role as a driving force for further development. By the 1980s certain resources in the coastal areas started showing signs of overexploitation. Conflicts among fisherfolk with different gear became common news in the media, especially the conflict between trawlers and operators of other gear such as gillnets, trammel nets and other static types of gear.

The emergence of conflicts among fisherfolk prompted countries to develop rules and regulations as part of their fisheries management. Zoning schemes in the coastal areas had been common practice in the region for area allocation of fishing gear. Area and season closures were also introduced in some countries. Another management tool which emerged in the region was the introduction of licensing, especially for industrial fisheries. Law enforcement was stepped up through the strengthening of monitoring, control and surveillance programmes.

The development of fisheries in the region has resulted in the expansion of fishing operations further offshore, in particular for the fleets targeting pelagic resources. Some countries, especially those with a large exclusive economic zone such as India and Indonesia, offered licenses for foreign vessels through various bilateral arrangements. Joint venture in fishing through shared capital or vessel charters appeared even among developing countries in Asia (e.g. Bangladesh and Thailand, Indonesia and Thailand) or between developing and developed countries (e.g. Indonesia-Japan, India-Korea Rep., Indonesia-Taiwan).

Status and trend of fisheries

Developing countries in South and Southeast Asia border the two main oceans, the Eastern Indian Ocean (FAO statistical area-57, see Figure 1) with three countries in South Asia, India, Bangladesh and Sri Lanka, and four countries in Southeast Asia, Myanmar, Thailand, Malaysia and Indonesia. The developing countries in Southeast Asia, Cambodia, Indonesia,

Malaysia, the Philippines, Thailand and Viet Nam, border the Western Central Pacific Ocean (FAO statistical area-71).

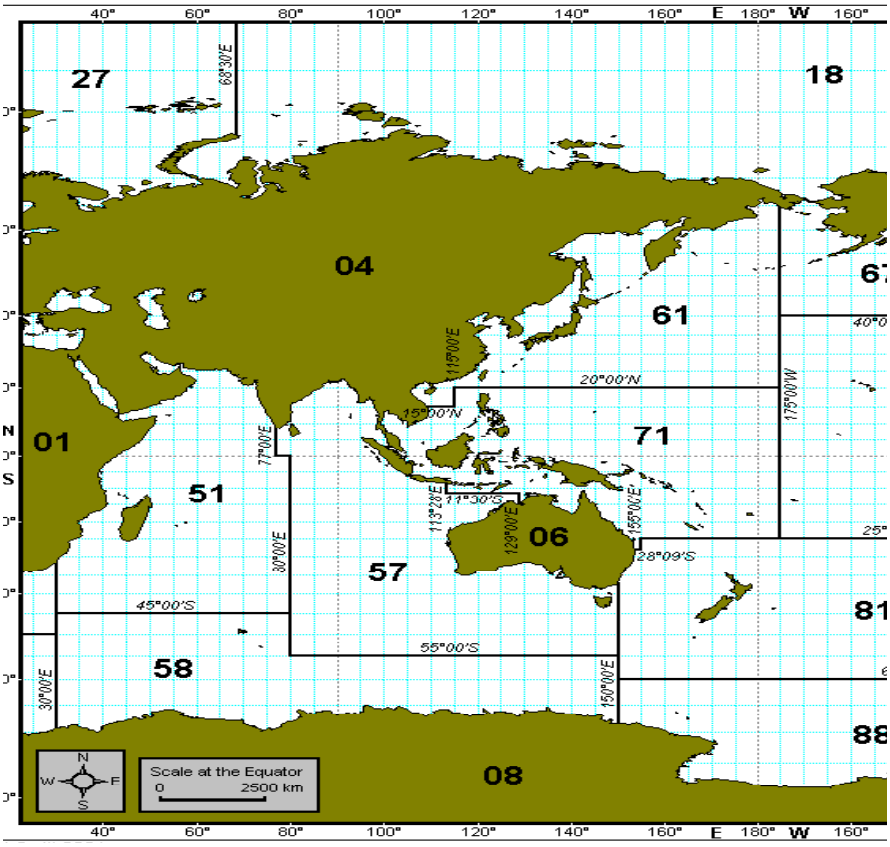

Figure 1. FAO statistical area: Eastern Indian Ocean (area-57) and Western Central Pacific (area-71)

Eastern Indian Ocean

Since 1970 the total catch from developing countries in the Eastern Indian Ocean has shown a steady increase from 1.0 million tonnes to 4.3 million tonnes in 1999 with an average annual increase of 5.1 percent (Figure 2). The total catch had increased more than fourfold during the last three decades. The main contributors for the total catch in 1999 were Thailand with 20.2 percent followed by India with 19.5 percent, Indonesia with 18.2 percent and Myanmar with 16.9 percent.

In terms of species-group composition, the small-pelagic fish catch contributed 28 percent, the demersal group 12 percent and the tuna group 8 percent (Figure 3). The high proportion of miscellaneous fish, i.e. 40 percent, was due to the coarse breakdown of species groups in Bangladesh and Myanmar. Trawl fishing was common in the eastern part of India, Myanmar and the west coast of Thailand. Purse seine fishing targeting pelagic fish is common in the eastern part of India and in the west coast of Thailand. Gillnet fishing for tuna is common in Sri Lanka while long-line fishing is popular in Indonesia.

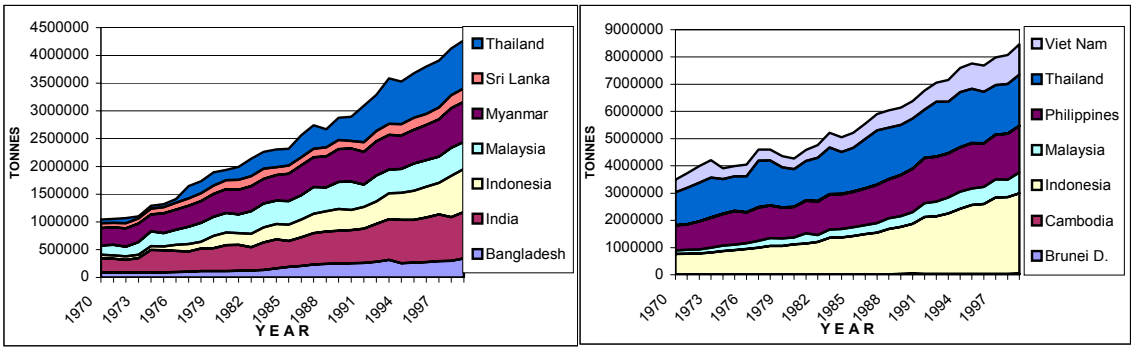

Figure 2. Trend of catch of the developing coastal states in South and Southeast Asia in the Eastern Indian Ocean (left) and Western Central Pacific Ocean (right)

Western Central Pacific Ocean

Catches in the developing countries facing the Western Central Pacific Ocean grew from 3.5 million tonnes in 1970 to 8.5 million tonnes in 1999, with an average annual increase of 3 percent, compared to 5 percent in the Eastern Indian Ocean. During the past three decades the catch hardly more than doubled (Figure 2). Trawl fishing concentrated in the shelf area from Viet Nam down to the Gulf of Thailand, the coastal waters of Malaysia and the Java and Arafura seas of Indonesia. Trawl fishing in the western part of Indonesia (including the Java Sea) came to an end in 1980 with the imposition of the trawl ban by the government. The main contributors to the total catch of the region in 1999 were Indonesia with 34.9 percent, Thailand with 22.1 percent and the Philippines with 20.3 percent.

In terms of catch composition small-pelagic fish contributed 36 percent, the tuna group 14 percent and the demersal group 12 percent (Figure 3). The contribution of miscellaneous fish was 26 percent, much less than in the Eastern Indian Ocean. Trawl and purse seine fishing played a significant role in coastal waters of the countries bordering the Western Central Pacific Ocean. Coastal purse seining mostly targets small-pelagic fish (mackerels, sardines and scads), while purse seining in offshore waters aims for tuna. Tuna purse seining is common in the Philippines and Thailand, while pole-and-line and long-line fishing as well as gill-netting are commonly practised in Indonesia.

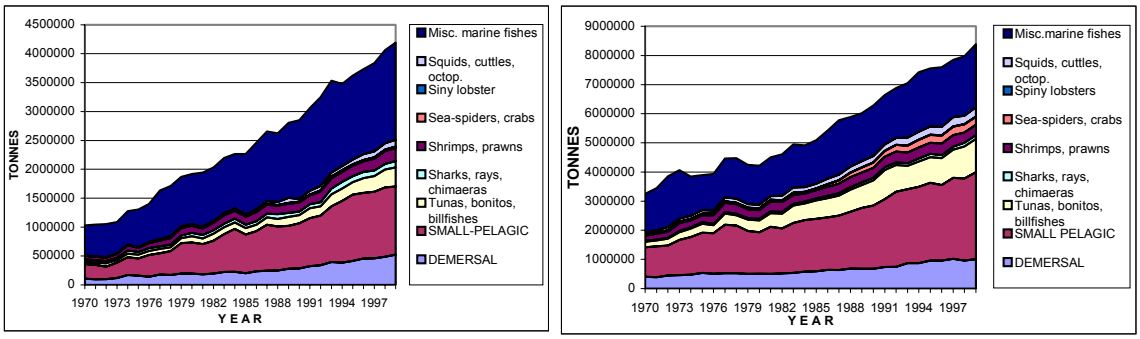

Figure 3. Trend of catch of the developing coastal states (by species groups) in the Eastern Indian Ocean (left) and the Western Central Pacific Ocean (right)

Distant-water fishing fleets

The fleets of distant-water fishing nations have fished in the Eastern Indian Ocean and in the Western Central Pacific Ocean (Figure 4). In the case of the Eastern Indian Ocean, the fleets from Japan, Korea (Republic of) and Taiwan have been active since early years. Meanwhile, with the fall of the communist regime in the Soviet Union, the Soviet fleets stopped their operations in 1985. China and the Philippines were latecomers, in 1995 for China and 1998 for the Philippines. The Philippine fleets were likely composed of re-flagged vessels from other countries as was the case for the Iran-flagged vessels.

The distant-water fleets were mostly fishing for tuna and the total catch in 1999 amounted to 61 300 tonnes for the Eastern Indian Ocean. Purse seine fleets of France and Spain have also expanded their operations from the Western Indian Ocean (FAO statistical area-51) to the Eastern Indian Ocean since 1996, although their 1999 catch was still below Taiwan's. The distant-water fleets fishing in the Western Indian Ocean caught slightly more than 800 000 tonnes in 1999 of which Taiwan contributed 33 percent, Japan 25 percent and the United States 22 percent.

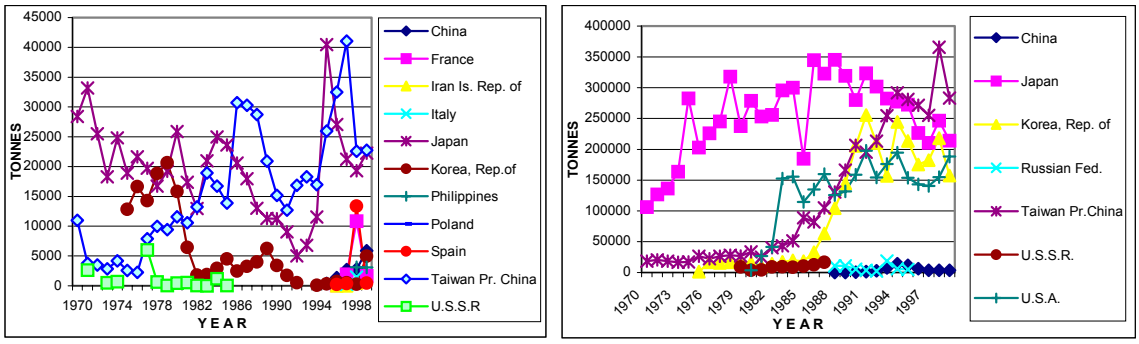

Figure 4. Trend of catch of the distant-water fleets fishing in the Eastern Indian Ocean (left) and the Western Central Pacific Ocean (right)

Issues confronting fisheries management in Asia

The fisheries sector plays an important role in Asia as a source of protein. In some coastal communities it is the only cheap source of animal protein. The sector also provides employment opportunities and foreign exchange earnings. Asia is one of the main suppliers of the global fish market and one of the main fish importers, to Japan and Korea in particular. Thailand has been the leader in fish export in Asia and the number one world exporter for a number of years. The amount of export from the developing countries in South and Southeast Asia bordering the Eastern Indian and Western Central Pacific oceans has steadily increased in the last three decades. The export value had increased from US$0.2 billion in 1976 to nearly US$9 billion in 1998, a 45-fold increase in two and a half decades (Figure 5). This extraordinary increase is largely due to the rapid rise of shrimp exports as a result of the fast development of the shrimp culture sector in the region.

Despite the impressive figures of catch and export of the developing countries in South and Southeast Asia, the sector faces serious challenges in the management of fisheries. Overexploitation of coastal resources has been reported in various regional and international

forums (IPFC 1987; 1994); the problem still persists. In addressing fisheries management in the developing countries of the region one should not disregard the general constraints confronting the region. They include:

- large number of population including fisherfolk
- poverty in the coastal area
- law and order is not well in place

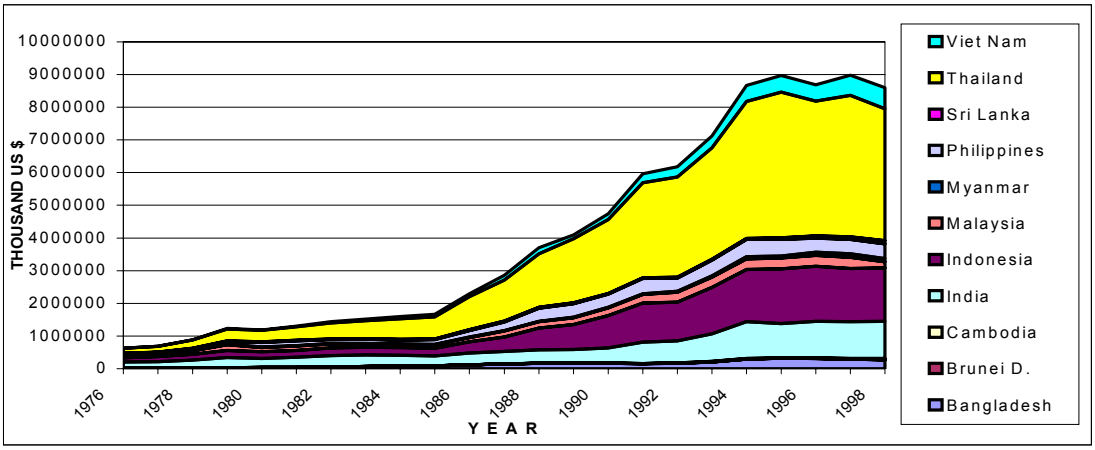

Figure 5. Trend of export of the developing coastal states in South and Southeast Asia

The status of fisheries management in the region is, to a large extent, conditioned by the above constraints. Countries are still struggling in building up fisheries management systems. Various management tools have been introduced and applied, some with successful results while others still face failures. In the end, sustainability of fisheries is measured by the performance of fisheries management. Problems in fisheries management in the region relate very much to the following issues:

- unlimited entry (open access) still persists in many coastal fisheries
- weakness of fisheries management systems
- inadequate law enforcement
- problems associated with multi-species and multi-gear fishing

Though a limited-entry policy has been applied in several countries, in most cases that policy only deals with industrial fisheries. Licensing has been granted but in many cases the attached conditions and requirements have not been duly observed. The requirement to provide catch information to the Department of Fisheries has not been strictly applied. This obviously constrains any effort in monitoring fish stocks. Development of gear and other appliances in vessels have not been well monitored and this has constrained fishing effort measurements. In most cases the management of fisheries is centralized, although very often it lacks systematic management planning. The absence of management planning hampers any effort to assess the impact of management on fisheries.

In the case of small-scale fisheries, a limited-entry policy is by and large absent. Although the fishing efficiency of traditional gear may be inferior to that of the industrial fisheries, the enormous number of fleets in a relatively limited area forms a magnified fishing effort leading to heavy fishing pressure.

For some countries, the existing fisheries management system is still weak. The lack of power in fisheries departments to control or influence vessel construction hinders their ability to

control the entrance of new fishing vessels. In other countries, permits for the construction of fish processing plants, i.e. canning factories and fishmeal processors, are delivered by other departments. Cooperation and integrated efforts are very much needed to prevent overinvestment in boat or processing plant construction, which leads to overfishing.

A similar situation occurs in the law enforcement system. In some countries, the fisheries department is not even the leading institution in this matter. Without good cooperation with other enforcement agencies, i.e. navy and police, effective law enforcement becomes remote. Law breaking in the ocean generally takes place out of sight and law enforcement is much more costly than on land and requires integrated efforts among the law enforcing agencies.

Multi-species and multi-gear fisheries have a special bearing on the collection of fisheries statistics. The high catch of miscellaneous fish in the statistics reflects the problem to analyse the species composition in the catch. In a limited number of countries the simple categorization of the catch, broken down into only four or five species groups, leads to the inclusion of unidentified fishes into the "miscellaneous fish" category. This results in the high catch of miscellaneous fish as appears in Figure 3. Multi-species and multi-gear fisheries also provide a special challenge for scientists to analyse potential species and technological interactions, which are important parameters in stock assessment.

How to strengthen management in the small-scale fisheries sector

There is no standard definition of small-scale fisheries (Panayotou, 1988). Is 'small scale' what is not 'large scale', but there is no exact boundary between the two. Other terms used include 'traditional sector' as opposed to 'modern sector', while the term 'subsistence sector' has the connotation that fishing is solely for the support of daily life. The Philippines uses the term 'municipal' as opposed to 'commercial' fishing. In trying to distinguish between the two groups of these various definitions, some countries use size of boat or type of motor, whether outboard or inboard engine, while some use the depth of water.

Regardless of the definition, small-scale fisheries, to a large extent, enjoy temporarily the absence of limited entry. This privilege, however, has its cost as it crowds fishing fleets in coastal waters, which leads eventually to overfishing. In addition, shrimp being the most expensive species group living in coastal waters, trawlers often invade the area and conflicts with these intruders cannot be avoided.

To address the management issues in small-scale fisheries, various elements need to be brought up. These include a code of conduct for responsible fisheries, a proper legal framework, fisherfolk's organizations, and the geographical area.

Code of conduct for responsible fisheries

Although a guideline for fisheries management is available, the code of conduct for responsible fisheries does not offer special guidelines for the management of small-scale fisheries. The general guidelines of fisheries management, however, mention the importance of community-based fisheries management when addressing small-scale fisheries. Some types of community-based fisheries management exist in several countries of Asia. Through a long process, community-based management has been well established in Japan (Yamamoto, 1998). In other countries, similar types of management exist in some selected fisheries, such

as beach seine fisheries in Sri Lanka (Dayaratne and Attapatu, 1992) and inland fisheries in South Sumatra (Naamin and Badrudin, 1992). It is disheartening to witness, in the process of governance evolution, failures of appreciating customary law in the new legislation of some countries (Panayotou; 1988; Zerner, 1992). The code of conduct for responsible fisheries recognizes the needs to respect customary law.

Legal framework

In many countries the management of marine capture fisheries rests with the central government. However, some sort of delegation of authority is given to state or provincial level and in some cases to district level. In Indonesia, the authority to license fishing boats of less than 30 GT has been given to the provincial governments. In the Philippines, with the 1998 fisheries code, the power of managing municipal waters has been delegated to the district governments. This type of legal provision when applied to other sectors may not have much constraint, but in the fisheries sector it could cause complications due to the mobility of resources and of the fishing fleets. Limiting the capacity of the central government to manage the fishing activities of the entire country, especially for the larger countries, might be useful. On the other hand, it could cause problems for the local governments when the latter are not yet ready to take the necessary action, including law enforcement.

In Japan, the provision of fishing rights to fishermen's associations plays an important role in the devolution of authority to fishing communities, which are represented by their associations. A community bound by customary laws is a potential candidate for the implementation of community-based management with fishing rights attached to it. It often happens, though, that fisheries legislation does not take into account the existing customary laws, which leads to direct conflicts with the locals.

Fishermen's organizations

Fisherfolk are important stakeholders of the fisheries sector and their participation in fisheries management is of importance. To be strong stakeholders, fisherfolk need to form organizations that represent them.

Illiteracy among fisherfolk is generally high. However, very often they have informal leaders, who could represent them. In some countries the government encourages fishing communities to establish fishermen's associations, with mixed results. In some countries, non-governmental organizations play a role in the formation of fishermen's associations. Such associations should participate actively in any management-related training that the government may initiate. A responsible association should take care of the property right delegated to the community or association.

In the absence of local organizations and despite the presence of fishing communities, local governments could play a role in the formation of community organizations through social mobilization as a part of project activities. Education is one of the most important components of project activities. Though in most cases it could be informal, it should be done continuously and sometimes facilitated on a one-on-one basis. White (1997) summarized lessons learned in a USAID project in the Philippines and Sri Lanka for the development of community-based management in a coral reef environment. Among the lessons learned, formation of capable and respected community groups was considered critical for the successful implementation of community resource management projects.

Geographical area

An important condition for community-based management is a defined geographical area for which the community will have the responsibility. If the resources are sedentary species, their geographical distribution could easily be observed and a boundary delineated. The geographical area may also be based on the depth of water where certain types of gear could operate. Consensus building is commonly used to delineate boundaries between communities. Without proper boundaries, it would be troublesome to implement any fisheries management and this may eventually contribute problems to the overall management planning. The geographical area of management should be linked to the distribution of the community. For a start, the larger the area the more chances for having problems in fisheries management. Normally one should start with a small area which may, in time, evolve to the agreed size.

Community-based management could also apply to small islands whose communities tend to be homogeneous. In the tropics, where coral reefs are common in association with islands, the geographical base for the establishment of community-based management could be the island itself. White (1997) summarized the successful development of community-based management in the reef islands of the Philippines and Sri Lanka.

Discussion

Small-scale fisheries play a significant role by contributing catch to the national production. With the continuously growing numbers of small-scale fisherfolk in developing countries, fishing becomes increasingly heavy in the coastal waters and eventually leads to conflicts among fisherfolk.

Related to the problems described above, many developing countries have embarked on projects addressing small-scale fisheries. Some donors have also supported regional projects in this regard such as the Bay of Bengal Programme (BOBP). The Asian Development Bank has financially assisted projects in the Philippines and Indonesia addressing coastal management issues. These projects encourage the promotion of community-based management and some lessons have been learned from them.

Important ingredients for the formation of community-based management in Japan have been described by Yamamoto (1998). The two principal elements are: the legal framework and the fisheries association. The legal provision gives the property right to the community through its association. Therefore, the property right issue becomes an important element as well. Thailand promoted a project of this kind in the Phang-nga bay which was also supported by BOBP (Nickerson, 1998). The results were encouraging. The success of the project was to a large extent related to the deployment of artificial reefs. The reefs served as communal property and every member of the community was responsible for their wellbeing. Through the process of building ownership in this regard, the fisherfolk developed communal responsibility for the wellbeing of the fisheries resources in the bay. This shows that the property right issue is important for the promotion of community-based management. The candidates for this type of management could be sedentary species but they could also be the immobile types of gear.

Fisheries management requires good planning. Through the FISHCODE project funded by Norway, FAO has promoted training workshops on management planning in Indonesia,

Malaysia and Thailand. Two workshops were organized in Indonesia, Denpasar, 1999 and Banyuwangi, 2001, on the management of sardine fisheries in the Bali Strait (FISHCODE, 1999a; 2001b). One workshop was organized in Thailand, at Cha-am, to discuss the management of anchovy fisheries in the Gulf of Thailand (FISHCODE, 2000a). In the meantime three workshops were conducted in Malaysia, Penang, 1999, Lumut, 2000 and Penang, 2001, to discuss and develop a management plan of small-pelagic fisheries on the west coast of Malaysia (FISHCODE, 1999b; 2000b; 2001a).

This project has promoted close cooperation among stakeholders through a series of discussions aiming at formulating the management plan for a concerned fishery. Anchovy fisheries in Thailand are highly developed and conflicts between fisherfolk using purse seine and those using other types of gear have been severe. The workshop did not produce the anticipated results as representatives of purse seine users did attend but those of other types of gear failed to show up. Nonetheless, the workshop was able to present the concept of fisheries management planning, a forefront element in the overall process of fisheries management. Malaysia, on the other hand, benefited from the three workshops and is currently preparing for a fourth workshop to further contribute to the elaboration of the draft management plan. The workshop will be supported by the remaining funds of BOBP. Understanding the concept of management planning is a prerequisite for a better formulation of a management regime. A management plan is not static and will evolve with time in line with the development and condition of the fisheries.

The establishment of community-based fisheries management demands an active role on the part of the local government in nurturing and promoting the need to manage the fisheries resources that the members of the community are concerned with. Time and effort are needed before the community is convinced of the need for collective action in management. Education and public awareness form the basic part of the process in which the government should work hand in hand with the community. Management planning could only be introduced at a later date in simple terms that the community can understand. A management plan is never perfect and always needs updating. Only when the community becomes mature can the adoption of a management plan become easy. Establishing community-based management normally takes time, but as a concept it seems to offer a good option for preventing overfishing and degradation in many coastal areas of the developing countries. As community-based management is locally specific, success and failure of its development need to be documented to enable one to learn from the lessons generated.

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ECOSYSTEM-BASED MANAGEMENT AND SMALL-SCALE FISHERIES: THINKING GLOBALLY, ACTING LOCALLY

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Introduction

"Responsible fisheries management should consider the impact of fisheries on the ecosystem as a whole, including its biodiversity, and should strive for sustainable use of whole ecosystems and biological communities...Harvesting any one species is almost certain to impact others…

[T]he impact of ecological linkages (e.g. through the trophic chain) between species may lead to changes in species dominance and affect the dynamic equilibriums of the resource system, potentially affecting future options.

These multi-species effects need to be considered in responsible fishing, which should aim to ensure that no species, whether targeted, by-catch or indirectly affected by fishing, is reduced to below sustainable levels" (FAO, 1997).

Trying to create a linkage between the local realities of small-scale fisheries and the grand concept of ecosystems is like trying to describe the linkage between an artist's paintbrush, the many brushes that the painter uses, the elements of a painting and the finished picture. Even if each paintbrush is carefully described, analysed and closely studied, it may not necessarily reveal how each one contributes to the total picture, even though we do know that the total picture could not have been without them. But how does this relate to fisheries, the management of people fishing them (especially in small-scale fisheries), and the ecosystem?

An overview of the GESAMP (2001) report provides a succinct summary of things that are currently affecting ecosystems:

- overfishing;
- direct impact of fishing on the environment;
- alteration and destruction of coastal habitats and ecosystems (e.g. wetlands, mangroves and coral reefs);
- sewage pollution leading to contamination of seafood (e.g. cholera, typhoid);
- industrial pollution (e.g. persistent pollutants (POPs), heavy metals, hormone-disrupting substances);
- changes (both increases and decreases) in sediment flows due to deforestation, public works, etc;
- pollution by nutrients (notably fertilizers) leading to widespread and increased eutrophication and contributing to the destruction of sea-grass beds and toxin-producing algal blooms; and
- global warming.

Indeed, it is not difficult to see that three of these things are directly related to humans' fishing activities. Thus, in responding to the question of how ecosystems and fishing activities (especially small scale fishing activities) are related, the response has several parts.

First, it is difficult to unequivocally determine when human fishing activities are the sole cause of impacts on the ecosystem. Despite this, however, it is clear that fisheries do have indirect effects caused by overfishing, modifying species composition, and genetic diversity. In addition, there are direct effects such as the physical impacts caused by dredging and trawling on the seabed, bycatch, and the use of destructive illegal techniques such as the use of dynamite and poisons.

Thus, small-scale fishing activities, depending on how they are carried out and the extent to which fish are caught, are part of the set of things that can impact ecosystems. The people engaging in small-scale fishing activities make up our fisheries paintbrushes and, together, they are an important part of the painting of fisheries and the greater ecosystem.

Describing ecosystems: issues of scope and purpose

There are many levels at which to describe ecosystems, thus it is important to determine the scope at which ecosystems are described and considered for management purposes. For example, large marine ecosystems (LMEs) are a very extensive and inclusive way of describing ecosystems. These are relatively large (200 000 km^2 or more) regions of ocean space. They encompass coastal areas from river basins and estuaries all the way out to the seaward boundaries of continental shelves and the seaward margins of coastal current systems.

Characterized by distinct bathymetry, hydrography, productivity and trophically dependent populations, fifty such areas have been identified. Several LMEs occupy semi-enclosed areas, such as the Black Sea or the Mediterranean, and can be divided in sub-areas (e.g. the Adriatic Sea). They include soft-bottom continental shelves, up-welling continental shelves, open oceans and polar oceans. Others are limited by open continental margins (e.g. the North-western Australian shelf) where their seaward limit extends beyond the continental shelf.

Defined by natural parameters, LMEs most often straddle political – and, thus, frequently national or other jurisdictional – boundaries. Although identified for the purpose of comprehensive monitoring of their condition, it is not implausible to hope that with increasingly productive regional cooperation they could be used as a basis for ecosystem-based management of any and all shared natural resources.

At the LME level of ecosystems, it may not be clear that there are obvious linkages to small-scale fisheries or their management - even though such linkages are present. However, within LMEs there are smaller systems that can also be considered as sub-sets of large marine ecosystems, and it is these smaller systems which, in fact, correspond to areas commonly used by small-scale fisheries and aquaculture activities.

For example, within a particular LME the scope of a smaller ecosystem can encompass:

- seas,
- coastal waters,
- gulfs,
- bays,
- lagoons, and
- estuaries.

Focusing even more, the scope of ecosystems can consist of local areas or systems such as coral reefs or artificial reefs. And, moving beyond the marine environment and onto land, in the context of inland fisheries ecosystems may be described by:

- estuarine systems,
- watersheds,
- river systems, and
- lakes.

Clearly, small-scale fisheries are found in these types of systems. Hence, the issue is simply one of scope, of subdividing larger ecosystems into subsets and finding the components of larger ecosystems that correspond to the size of the small-scale fisheries in the area that are under management consideration.

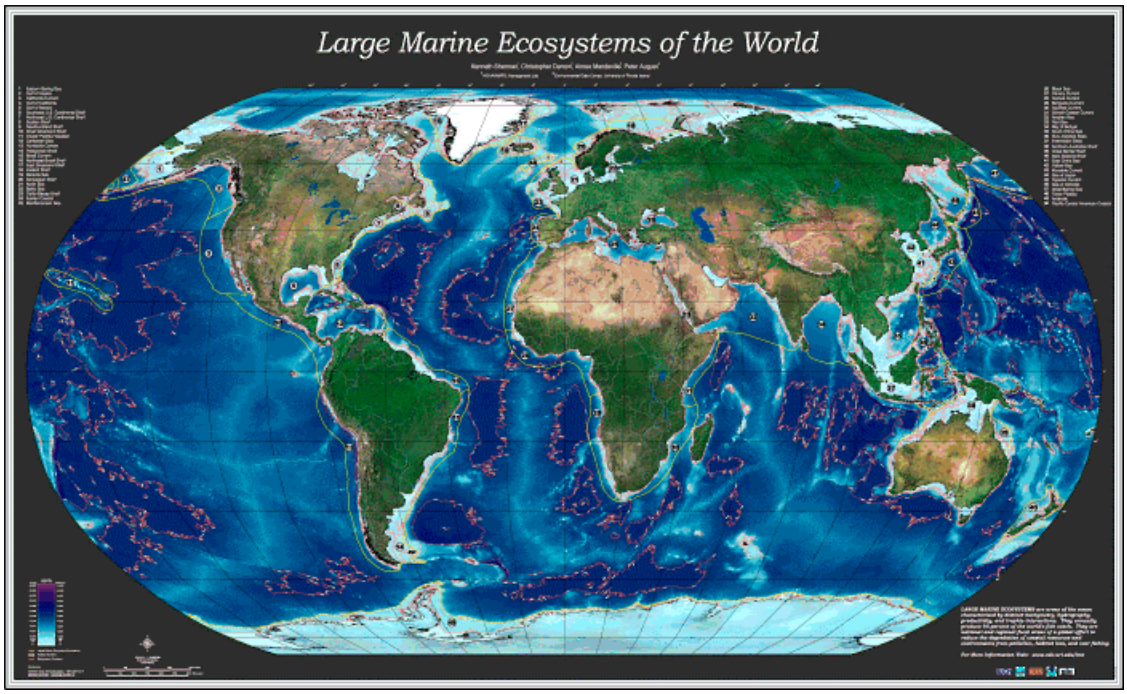

Figure 1. Map of the large marine ecosystems of the world
Courtesy of LME Project (hhtp:/www.edc.uri.edu/lme/data.htm)

Development of ecosystem-related issues

The concept of ecosystems is not a new consideration in fisheries governance, but it is becoming an increasingly explicit component of governance. For example, the 1982 United Nations Law of the Sea Convention (UNCLOS) requires that states ensure that harvested species and species associated with or dependent on harvested species are not overexploited in either of two relatively large ecosystem areas: namely, in national exclusive economic zones (Article 61) and in the high seas (Article 119). This ecosystem concept was strengthened by the 1992 United Nations Conference on Environment and Development and by other international instruments within and outside the fisheries sector.

In addition to the 1995 Code of Conduct on Responsible Fisheries, the 1993 FAO Compliance Agreement and the 1995 UN Fish Stocks Agreement, there is mention of ecosystems and management in:

- the 1995 Global Plan of Action for the Protection of the Marine Environment – adopted to address the fact that 80 percent of marine pollution is caused by human activities on land;
- the Convention on Biological Diversity, which came into force in 1993 and the Jakarta Mandate on Marine and Coastal Biodiversity, adopted in 1995 to provide a new global consensus on the importance of marine and coastal biological diversity;
- the mandate of the FAO Commission on Genetic Resources for Food and Agriculture, which was broadened to cover aquatic resources;
- the International Coral Reef Initiative (ICRI), which is dedicated to reef conservation and management since 1994; and
- the Marine Protected Areas initiative, which was launched by the Global Environment Facility and the World Bank, in collaboration with the World Conservation Union, the Commission on National Parks and Protected Areas and the Great Barrier Reef Marine Park Authority.

The Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem that was held 1-4 October 2001 in Reykjavik, Iceland, contained similar references to ecosystems and fisheries management. It was intended as a conference to identify the means by which ecosystem considerations can be included in fisheries management.

The Reykjavik Declaration (Attachment) urges all those involved with fisheries to have an increased awareness of the many interactions in ecosystems as they worked to continue the implementation of:

- the FAO Code of Conduct on Responsible Fisheries (which provides a common and agreed guide to strengthening and building fisheries management systems);
- International Plans of Action (IPOAs); and
- the Kyoto Declaration on the Contribution of Fisheries to Food Security.

Perhaps most important, in all of these initiatives there is the recognition that humans cannot manage ecosystems as such and can only try to manage the human activities affecting ecosystems. Thus, the use of the term "ecosystem management" can be somewhat confusing or inaccurate. There is science-based fisheries research that has the task, among other things, of understanding and forecasting the impact of humans' fishing activities on ecosystems. Similarly, there is the management of humans undertaking fishery-related activities, but this is not management of ecosystems per se. The task of fisheries management is to among other things, take a precautionary approach to trying to design regulatory systems that minimize the impact of humans on fisheries and on the ecosystems of which fisheries is a part.

Creating a bridge between small-scale fisheries management and ecosystems

The bridge between the management of small-scale fisheries and ecosystems involves combining issues of scope with issues of purpose. In other words, there is a need to describe

- a fishing community (or communities),
- the relevant corresponding ecosystem(s) and the fisheries relationships within them,
- the management objectives/purposes of the people and their small-scale fishing activities and

- the feedback loop of how their fisheries-related activities affect the ecosystem(s).

One of the first steps, therefore, needs to involve identifying and describing the fisheries-related (but not necessarily just fishing) communities in the local area and the different ecosystems and their boundaries. The results of these descriptions then need to be incorporated into the management objectives that the particular small-scale fisherfolk in the community have.

For example, if there is a small-scale fishery on a reef or lagoon that is used by a community, it is useful for the management of that fishery to explicitly recognize the scope of this ecosystem and to incorporate this information when managing the fishing activities. This may involve a combination of training, devolution of powers and the use of management strategies that create positive incentives for people and empower them:

- to be stewards and to take care of fisheries resources;
- to consider inter-related institutional, governance, policy, legal, regulatory, social, economic issues;
- to build on culture and to reinforce existing social norms, rules and traditional structures; and
- to cope with new forces of globalization, trade and commercialization.

Similarly, if there is a reef or lagoon system that may be negatively affected by local activities, one component of the fishery's management plan may include maintenance and/or rebuilding strategies. By working to maintain (or rebuild) local ecosystems, habitats and the biodiversity of the area, the community is actively working to obtain optimal benefits – i.e. to help the productivity of their fisheries. In short, they can be working to ensure that they are using the marine ecosystem in a sustainable manner and are also contributing to their:

- food security,
- economic and social safety nets,
- maintenance of culture and heritage,
- employment, and/or
- profit.

Another step involves identifying and describing how the various components of an ecosystem should be shared amongst users. If the ecosystem corresponds to a single group of small-scale fishermen, this may involve little more than incorporating existing mechanisms for sharing fisheries resources into a fisheries management plan as a way of reinforcing and strengthening them.

However, if there are overlaps between ecosystems and the communities using them, the process becomes more complex. If this is the situation, the communities need to find and to include mechanisms for cooperating among themselves and for sharing their uses of the overlapping ecosystems. Simply put, for fisheries management purposes – and especially in cases of overlapping communities, resources and/or ecosystems – there is a need to have clearly defined, incorruptible administrative procedures or rights-based allocation systems to determine who gets what or how much and where and when.

Yet another step of building the bridge between the management of small-scale fisheries and ecosystems involves finding a way of coping with the many contradictory objectives regarding the use of fisheries resources. This involves working with stakeholders towards establishing attainable management objectives that reflect a balance among the now-expanded

plethora of concerns. This is not a simple task, although in many respects the bridge between these two involves applying the basic principles of fisheries management:

- managing fishing capacity and avoiding excess capacity;
- building on existing social conditions and strengthening positive incentives that promote responsible fisheries;
- taking into account the social, economic and cultural interests of fisherfolk;
- conserving biodiversity and protecting and restoring endangered and depleted species;
- assessing adverse environmental impact on resources; and
- minimizing pollution, waste and discards as well as catch by lost or abandoned gear, the catch of non-target species, and impact on associated or dependent species (CCR, Art 7.2.2).

Summary

The bridge between small-scale fisheries management and ecosystems is created by making sure that large-scale inter-relationships and linkages in ecosystems are taken into consideration, even at very local and focused management levels.

Although we simply do not have the ability to manage ecosystems, we do have the capability to manage humans and their activities within marine and inland freshwater ecosystems for fisheries-related purposes and in a manner that is precautionary. Furthermore, we can use the growing amount of information about various ecosystems to support these management policies, structures and plans.

This will enable small-scale (and other) fishing communities to work on securing present and future options by maintaining their ecosystems and the biological diversity within them in a manner that the resources of most interest – as well as other resources in the ecosystem – can be used in a sustainable way and are not significantly perturbed or affected beyond the environment's natural variability.

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ATTACHMENT

REYKJAVIK DECLARATION ON RESPONSIBLE FISHERIES IN THE MARINE ECOSYSTEM

Having met at the Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem from 1 to 4 October 2001,

Appreciating the initiative taken by the Government of Iceland and the Food and Agriculture Organization of the United Nations (FAO) to organize the Conference with the co-sponsorship of the Government of Norway,

Recalling that this initiative was endorsed at the Twenty-fourth Session of the FAO Committee on Fisheries (26 February-2 March 2001) and at the One Hundred and Twentieth Session of the FAO Council (June 2001),

Reaffirming that the 1982 United Nations Convention on the Law of the Sea (the Convention) sets out the rights and duties of States with respect to the use and conservation of the ocean and its resources, including the conservation and management of living marine resources,

Recalling that in recent years the world community has agreed on several additional legal and political commitments that supplement the provisions of the Convention, including the Rio Declaration on Environment and Development and Agenda 21 (Chapter 17),

Reaffirming the principles of the FAO Code of Conduct for Responsible Fisheries,

Recalling further the four International Plans of Action formulated in accordance with the Code of Conduct, namely for the Management of Fishing Capacity, for the Conservation and Management of Sharks, for Reducing Incidental Catch of Seabirds in Long-line Fisheries, and to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing,

Reaffirming that the FAO Council during its One Hundred and Twentieth Session recommended that ecosystem-based fisheries management studies to be conducted by FAO as agreed in paragraph 39 of the Report at the Twenty-fourth Session of the FAO Committee on Fisheries should be balanced and holistic in approach,

Welcoming and taking into account the discussion in the scientific symposium of the Conference,

Recognizing that sustainable fisheries management incorporating ecosystem considerations entails taking into account the impact of fisheries on the marine ecosystem and the impact of the marine ecosystem on fisheries,

Confirming that the objective of including ecosystem considerations in fisheries management is to contribute to long-term food security and to human development and to assure the effective conservation and sustainable use of the ecosystem and its resources,

Appreciating that the Conference represented an important opportunity for all fisheries stakeholders to jointly assess the means for including ecosystem considerations in fisheries management,

Aware that the sustainable use of living marine resources contributes substantially to human food security, as well as dietary variety, provides for the livelihood of millions of people and is a central pillar of many national economies, especially low-income food-deficit countries and small island developing states,

Recognizing the complex interrelationship between fisheries and other components of the marine ecosystems,

Convinced that including ecosystem considerations in fisheries management provides a framework within which states and fisheries management organizations would enhance management performance,

Affirming that incorporation of ecosystem considerations implies more effective conservation of the ecosystem and sustainable use and an increased attention to interactions, such as predator-prey relationships, among different stocks and species of living marine resources; furthermore that it entails an understanding of the impact of human activities on the ecosystem, including the possible structural distortions they can cause in the ecosystem,

Recognizing the need to strengthen and sustain management capacity, including scientific, legal and institutional frameworks with the aim of incorporating among other things ecosystem considerations,

Emphasizing that the scientific basis for including ecosystem considerations in fisheries management needs further development and that there is incomplete scientific knowledge about the structure, functioning, components and properties of the ecosystem as well as about the ecological impact of fishing,

Recognizing that certain non-fisheries activities have an impact on the marine ecosystem and have consequences for management. These include land-based and sea-based activities which affect habitat, water quality, fisheries productivity, and food quality and safety,

Recognizing also that the majority of developing countries face major challenges in incorporating ecosystem considerations into fisheries management and that international cooperation and support are necessary,

Declare that, in an effort to reinforce responsible and sustainable fisheries in the marine ecosystem, we will individually and collectively work on incorporating ecosystem considerations into that management to that aim.

Towards this end, we further declare:

1. Our determination to continue effective implementation of the FAO Code of Conduct, which is our common and agreed guide in strengthening and building fisheries management systems, as well as the International Plans of Action as formulated in accordance with the Code, and the Kyoto Declaration on the Contribution of Fisheries to Food Security.

2. There is a clear need to introduce immediately effective management plans with incentives that encourage responsible fisheries and sustainable use of marine ecosystems, including mechanisms for reducing excessive fishing efforts to sustainable levels.

3. It is important to strengthen, improve and, where appropriate, establish regional and international fisheries management organizations and incorporate in their work ecosystem considerations and improve cooperation between those bodies and regional bodies in charge of managing and conserving the marine environment.

4. Prevention of adverse effects of non-fisheries activities on the marine ecosystems and fisheries requires action by relevant authorities and other stakeholders.

5. While it is necessary to take immediate action to address particularly urgent problems on the basis of the precautionary approach, it is important to advance the scientific basis for incorporating ecosystem considerations, building on existing and future available scientific knowledge. Towards this end we will undertake to:

(a) advance the scientific basis for developing and implementing management strategies that incorporate ecosystem considerations and which will ensure sustainable yields while

conserving stocks and maintaining the integrity of ecosystems and habitats on which they depend;

(b) identify and describe the structure, components and functioning of relevant marine ecosystems, diet composition and food webs, species interactions and predator-prey relationships, the role of habitat and the biological, physical and oceanographic factors affecting ecosystem stability and resilience;

(c) build or enhance systematic monitoring of natural variability and its relations to ecosystem productivity;

(d) improve the monitoring of by-catch and discards in all fisheries to obtain [a] better knowledge of the amount of fish actually taken;

(e) support research and technology developments of fishing gear and practices to improve gear selectivity and reduce adverse impact of fishing practices on habitat and biological diversity;

(f) assess adverse human impact of non-fisheries activities on the marine environment as well as [its] consequences for sustainable use.

6. The interaction between aquaculture development in the marine environment and capture fisheries should be monitored through relevant institutional and regulatory arrangements.

7. Our determination to strengthen international cooperation with the aim of supporting developing countries in incorporating ecosystem considerations into fisheries management, in particular in building their expertise through education and training for collecting and processing the biological, oceanographic, ecological and fisheries data needed for designing, implementing and upgrading management strategies.

8. We resolve to improve the enabling environment by encouraging technology transfer contributing to sustainable management where appropriate, introducing sound regulatory frameworks, examining and where necessary removing trade distortions, and promoting transparency.

9. We urge relevant technical and financial international organizations and the FAO to cooperate in providing states with access to technical advice and information about effective management regimes and about the experience from such arrangements, and other support, devoting special attention to developing countries.

10. We would encourage FAO to work with scientific and technical experts from all regions to develop technical guidelines for best practices with regard to introducing ecosystem considerations into fisheries management. These technical guidelines should be presented at the next session of the FAO Committee on Fisheries.

And request that the Government of Iceland convey this Declaration to the Secretary-General of the United Nations, the Director-General of the Food and Agriculture Organization of the United Nations, the Chairman of the World Summit on Sustainable Development to be held in Johannesburg in September 2002 and relevant fisheries management organizations for their consideration.

REGIONAL SYNTHESIS ON THE CURRENT STATUS OF SMALL-SCALE FISHERIES MANAGEMENT IN ASIA

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Introduction

Global fisheries production has reached 130 million tonnes in 2000, including 36 million tonnes produced by aquaculture. Fifty percent of the world's 85 million tonnes of marine fisheries resources are fully exploited, 25 percent are overexploited and only 25 percent could support higher exploitation rates. The reported 11 million tonnes freshwater production is most likely underestimating the total production of these areas several-fold. The Asian region alone is responsible for about 50 percent of the global production, including 90 percent of the total aquaculture production.

For several reasons officially reported fisheries data underestimate fisheries production in the region, particularly from small-scale fisheries. Data from fisheries projects under the Mekong River Commission (MRC) indicate that the total fish production in the Mekong Basin, particularly from small-scale fisheries, is several times higher than that officially reported. Estimates of the total production from small-scale fisheries in coastal waters in the Philippines are three times as high as the officially reported total production. Data from a DANIDA-funded project in Viet Nam sets the production from marine capture fisheries for analysed fishing fleets at 3.5 million tons, compared to 1.3 million tons officially reported. Based on these observations, the real status of the exploitation of the living aquatic resources in the region is even worse than that described by FAO.

Production data alone do not properly reflect the importance of the fisheries sector for the food security and livelihood of millions of mostly rural poor people involved in fisheries. FAO estimates that about 90 percent of the world's 30 million fisherfolk work in Asia, roughly 80 percent of them as small-scale or artisanal fisherfolk. A careful look at some data from the Philippines shows a more alarming picture. Based on data from the Census of Fisheries (1980) and the Census of Population and Housing (1980) of the National Census and Statistics Office, the province of Cebu alone had 98 commercial fishing enterprises with about 1 427 employees but 54 299 artisanal fisherfolk (ratio 1:38). Half of these artisanal fisherfolk were full-time fishermen. Therefore, Philippine fisheries are characterized by a large number of artisanal and subsistence fisherfolk. Interpolating recent data from 1999, with about 1 million people employed in the fisheries industry (Ganaden, 2001), with the 1:38 ratio of industrial versus artisanal fisherfolk found for Cebu, about half of the whole population in the Philippines is somehow involved in artisanal fisheries. This figure definitely overestimates the total number of people employed in fisheries, but it underlines the importance of artisanal fisheries for the rural poor in the Philippines. Similar calculations, based on employment data or the presence of fishing gear in rural households, can be made for other Asian countries, indicating that the total number of people directly engaged in small-scale fisheries alone is probably several times higher than the officially reported data for the whole fishing sector.

One of the reasons for these discrepancies is the division of Asian fisheries into commercial fisheries and small-scale fisheries. While commercial fisheries, as a source of tax income, is under some control of the state, small-scale fisheries is largely uncontrolled. With a high number of mostly rural poor fisherfolk, a huge diversity of fishing gear and methods and almost no knowledge about the total production or resulting importance of this sub-sector, small-scale fisheries does not receive much public attention. Characterized by open access to the aquatic resources and small investment needed for fishing, small-scale fisheries provide the last livelihood opportunity for millions of poor people. As a result, the total number of small-scale fisherfolk will further increase.

Small-scale fisherfolk face increased competition from commercial fisheries, which moves closer to the shoreline and enters bays and estuaries. In addition, their grounds are under serious stress from pollution due to human and industrial settlements and degradation from the restructuring of waterways, estuaries and bays.

Small-scale fisheries provide employment, household income and food for the rural poor people in the riverine, estuarine and coastal areas in Asia. Although in most cases their fishing grounds are already overexploited and exposed to pollution and environmental degradation, millions of rural poor still see fishing as their only option to earn a living. In such a situation only fisheries management will make it possible to optimize the use of aquatic resources and provide the highest benefits for its users.

Small-scale fisheries management

Several concepts have been developed to manage the living coastal aquatic resources. While environmental projects have focused on manageable areas, as developed in various zoning approaches, fisheries projects focused on resource users, for example in co-management or community-based fisheries management concepts, which have proven to be useful. But only the combination of resource user and environmental management will lead to less destructive fishing and better protected coastal areas. The underlying idea is that local fisherfolk know best about the status of their aquatic resources and are therefore best qualified to make management decisions.

Resource management concepts were implemented through projects using scientific approaches in testing decentralized fisheries or resource management. Very little has been done or developed to implement small-scale fisheries management on the national scale. Some experience is available from the Philippines, where the 1998 fisheries code delegates fisheries management authority of coastal waters to municipalities and their fisherfolk's organizations.

The problems in small-scale fisheries management are related to social, economical, environmental, legal and administrative issues. A short list of the overall problems will describe this:

- a high and growing number of fisherfolk using fairly simple fishing techniques,
- fishing on already overfished coastal living aquatic resources, which are under stress because of pollution and coastal and riverine degradation, and
- free and open access to the resources due to the lack of specific fishing rights.

Small-scale fisheries management, dealing mainly with fishing activities in the near-shore areas, has to include measures assuring the protection and preservation of the coastal aquatic habitats. "A focus on the entire ecosystem and not only on individual stocks is urgently needed to protect and utilize marine resources," stated Serge Garcia, Director of FAO's Fisheries resources Division [FAO Press release: PR 01/58e The Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem (1-4 October 2001)].

Small-scale fisheries management has to address all these problems and has to implement solutions to these problems. The experience gained in co-management schemes over the last decade shows that decentralization of management authority is an effective tool to optimize resource management. However, for countrywide implementation the level of decentralization has to be identified.

The Philippines has successfully mobilized and organized her fishing communities to get involved in the taking-over of management authority. In other countries the idea is not that far developed. Many countries still lack mobilized and organized local fisherfolk. Depending on history, country-specific approaches have to be developed to involve fisherfolk in small-scale fisheries management. This is the initial step for the implementation of co-management schemes.

Forming communities

A prerequisite for the implementation of decentralized fisheries management is the existence of organized fishing communities. Once identified, the fisherfolk have to be mobilized and organized to form their own organizations to define their needs and demands. In general, it is recommended to use a participatory approach in mobilizing local fisherfolk. However, traditions and the existing political system may prevent people from speaking up and articulating their needs. In addition, in countries under former socialistic control the establishment of cooperatives and people's organizations may be seen critically. Already at this stage a lot of information exchange and some training will be needed to assure that the importance of the matter and the needs to get organized are fully understood.

Forming communities may be difficult if the fisherfolk in one area come from more than one village or belong to more than one ethnic or religious group. Depending on the given commonalties broad criteria should be chosen to form these communities. Clear and transparent ways of getting organized will help the members to see the advantages of such organization. Rules for members, as well as member exclusion and the way a membership is issued, have to be developed and applied equally to all.

Problems may occur if fisheries have not been properly managed and open access has led to a high number of competing fisherfolk. It might be difficult to find a common understanding for the formation of fisherfolk groups. It should be made clear that the new legal framework provides the opportunity to participate in the management of the near-shore living resources and that this has to result in the organization at the fisherfolk level to make decisions. Non-compliance with the rules established under the new fisheries organization will be a violation of existing national rules and regulations and punishable by law.

Additional problems occur if the local fisherfolk depend on boat owners and middlemen. One strategy is to break the dependence either legally or through financial support. Another strategy might be to involve boat owners and middlemen in the formulation process of

communities. Much mobilization and training for the fisherfolk would be needed before such a community has the capacity to make independent decisions. From limited experience in the field, the best way to overcome this problem is to break such dependence.

Informing fishing communities

Any decentralized management scheme is dependent on information exchange. The lowest level of co-management is to inform the local fisherfolk about management decisions that affect their fishing activities. This process needs well-organized channels of communication, the presence of the managing body at the community level and a certain technical background in the community to understand these management decisions.

The example of the Philippines shows that communication between the Bureau of Fisheries, the fisheries agency in the Philippines, and the local communities is inadequate due to the lack of staff in the field. Already at this stage of co-management it becomes clear that decentralized small-scale fisheries management is not a cheap option. Investments will only pay off in the long run; the beneficiaries will be the rural poor.

Listening to communities

Once communication is established, the managing agency must listen to the local fishing communities in regard to development or implementation of local fisheries management decisions. Local communities may have their own views and ideas regarding the use of the living aquatic resources and the outcome of such consultation may influence the decision-making process.

Advising communities

If communities have received rights to manage their living aquatic resources, they may seek advice on fisheries issues from the responsible government agency. Again, this process needs the presence of the government agency at the village level as well as established channels of communication. It also requires well-trained fisheries staff in the government offices responsible for giving such advice. Therefore, training and motivation are needed not only in the communities but also in the relevant government offices.

Cooperating with communities

Cooperation between the government agency and the fishing communities needs fine-tuned mechanisms of communication, well-established personal contacts, and trust in each other. It is a long process to reach this level of decentralized fisheries management. It further depends on input of other agencies to create

- awareness of biological issues,
- awareness of environmental issues and
- awareness of the legal framework.

This includes cooperation with environmental offices, which have to be present with qualified and trained staff at the grassroots level, and legal assistance from extension workers trained on the legal aspects of fisheries.

Facilitating intercommunity exchange

Although sharing the same coastal resources neighbouring fishing communities may have problems in communicating with each other. This may be related to a different ethnic origin of the two communities, different religions or even different languages. For successful co-management these communities need to establish mechanisms to communicate and to manage their aquatic resources. With the help of extension workers information exchange may be facilitated and a common understanding for management mechanisms for shared resources or fishing grounds may be developed. This has to be done in a, for both sides, transparent and non-discriminatory way.

Empowering communities

The last step in co-management is the empowerment of the communities. Once they have developed rules and regulations to manage their aquatic resources and have agreed with their neighbouring communities on such a regulatory framework, they automatically wish to enforce these rules. Normally, these functions are covered by other government authorities, i.e. police, fisheries department, coastguard, etc. However, in most countries in Asia the presence of these government authorities at sea is limited, mainly due to financial constraints. Fisherfolk might be trained to cover these responsibilities, namely monitoring, control and surveillance, and may take the oath of office to cover these functions. One example from Thailand shows that such empowerment is possible. However, it needs a common agreement not only within the community and neighbouring communities but also with all government authorities concerned. This step needs a well-developed legal framework at the national level, a lot of training not only for the fishing communities but also for cooperating government offices, like police or coastguard. It is the final step in implementing community-based fisheries management.

In community-based fisheries management the fishing community covers all functions regarding the management of living aquatic near-shore resources. Seen as the ultimate goal for small-scale fisheries management, community-based fisheries management needs much communication, training and mobilization. The above drafted strategy to implement such management schemes also shows that implementation is neither easy nor cheap. It needs commitment at all levels and a very careful approach adjusted to local situations. Once successfully implemented, it will benefit the rural poor fishing communities, who will get a better share of the living aquatic resources and have a stronger stake in managing their resources.

SMALL-SCALE FISHERIES MANAGEMENT IN CAMBODIA

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Background

The fisheries sector in Cambodia plays a very important role for the national economy and food security. Before the 1970s, Cambodia's fish production was regarded high with about 20 tonnes/km^2. This is reflected in a local proverb saying "where there is water there is fish". Inland capture fisheries is more important for Cambodian people than marine fisheries. Catch figures show that 80 percent of fish production comes from inland fisheries. However, freshwater fisheries productivity has declined dramatically due to increasing population, growing pressure on natural resources and the ecosystem, e.g. agricultural activity encroachment and development, deforestation, overexploitation of the fisheries resources as well as hunting and collection of wildlife and other resources.

Fisheries management in 1970-75 seriously suffered from warfare; control of fishing activities was neglected. During the communist Khmer Rouge period (1975-79), collective management was commonplace throughout Cambodia; there was no private sector; all fishing grounds belonged to the collectivity and most fishing activities were small-scale. Since 1979, Thay (2001) reports that the fisheries resources and exploitation have been managed in different arrangements which can be summarized as below:

- Public fishing area (1979-82)
  The country was just rid of the Pol Pot regime and people could fish freely in all fishing domains (public fishing areas). Fisheries management was unknown and there was no fisheries department.
- Solidarity groups (1982-89)
  The Department of Fisheries was organized and the exploitation of fisheries resources was managed through solidarity groups called *Krom Samaki*.
- Fishing lot auction (1989-98)
  The fisheries laws was promulgated. The basis of the law was a modification and upgrading of the fisheries laws of 1965. The fishing activities in that period were divided into three categories:
  - Large-scale fishing (fishing lots)
    Fishing lots (*loh nessaat*) are concessions auctioned by the Cambodian government to the highest bidder for exclusive exploitation over a two-year period. This was one of the main instruments of government to generate revenue from the rent of fisheries resources. (Van Zalinge et al. 2000)
  - Medium-scale fishing (*dai* fishing)
    A *dai* is a kind of bag net or stationery trawl positioned in the river to capture fish migrating downstream. (Van Zalinge et al. 2000)
  - Small-scale fisheries or family fishing
    Family fishing and paddy field fisheries have open access and do not require a license, but gear is subject to certain restrictions on size and use. Access to fishing lots is limited to the closed season (June-September). (Van Zalinge et al. 2000)

This paper will:

- describe the current status of small-scale fisheries management;
- discuss experiences in implementing small-scale fisheries management in which legal adjustment and legal instruments, problems and constraints are further discussed; and
- recommend possible solutions for overcoming constraints facing small-scale fisheries management in Cambodia.

Current status of small-scale fisheries management

Importance of small-scale fisheries for the rural poor

More than 85 percent of the Cambodian people live in rural areas and agriculture and fisheries are their main protein suppliers and income-generating activities. Azimi et al. (2000, cited in Gum 2000) note that 15 percent of the population of Cambodia depend on the Tonle Sap fisheries for their livelihood. Gum (2000) concludes that access to common property resources, especially fisheries, represents an insurance against agricultural risks. Loss of access to fisheries resources will affect the livelihood, in particular, of the rural poor and those with limited access to agricultural land.

In this paper, small-scale fisheries are classified into:

- *Small-scale fishing*, defined as open access fishing, where fishermen do not require a license but fishing gear is subject to restrictions on size and use. Also, this refers to rural inhabitants who live in or near the fishing domain (fishing lots and public fishing areas). People who live in the fishing domain and fish year round are regarded as direct primary users/stakeholders; those who live outside the fishing domain and come to fish during the dry season are categorized as indirect primary users/stakeholders (based on FAO Siem Reap PRA in Fishing lots #3 and #6, 2001). According to Ahmed et al. (1998, quoted in van Zalinge et al., 2000), family fishing is estimated to produce at least 115 000 tonnes annually.
- *Paddy field fisheries* are also significant and important for rural dwellers that live far from the main fishing domain or the main river. Generally, farmers, beside rice cultivation, depend on paddy field fisheries resources such as fish, crabs, shrimps, frogs, beetles, snails, aquatic plants (morning glory, lotus and water lily) and so on as protein sources. Wet season rain-fed, lowland and deep-water rice ecosystems covered about 1.8 million ha in Cambodia in 1994-95 (Nesbitt 1997, quoted in van Zalinge et al. 2000). Paddy field fisheries production ranges from 25 to 62 kg/ha (Leelaptra, 1992; Gregory, 1997, cited in van Zalinge et al., 2000). With the range of 25-62 kg/ha and the total paddy field areas of 1.8 million ha, the annual paddy field fisheries production could be 50 000-100 000 tonnes. Gregory & Guttman (1997 cited in van Zalinge et al. 2000) state that surplus yields of aquatic animals and plants from the paddy fields are sold and provide significant supplemental income in some cases.
- *Small-scale aquaculture* started in 1993 in Svay Rieng and Prey Veng provinces and then expanded to Takeo and Kompong Speu provinces, with the initiatives of PADEK, SAO and AIT. Currently, the organizations involved in aquaculture development in Cambodia are AIT, MRC, PADEK, FAO Siem Reap, GTZ and others. In areas where paddy field fisheries have declined considerably, small-scale aquaculture is considered a good alternative fish protein source for rural poor people. (More information can be found in Kaing Khim's thesis on the effects of small-scale aquaculture development practices in the Lower Mekong Delta, Cambodia, AIT, Bangkok).

Total small-scale fisheries production, excluding small-scale aquaculture production due to insufficient data for estimation, ranges between 165 000 and 215 000 tonnes annually. This represents 50 to 57 percent of the annual inland water catch in Cambodia. This shows that the family-scale or subsistence-fishing component of the total inland fisheries catch has great significance. In terms of production and distribution it can be considered as important as the commercial component. (Degen et al., 2000; Shams & Ahmed, 1998; Nao & Sina, 1997; van Zalinge & Nao, 1999, cited in Gum, 2000).

Typical and common small-scale fishing gear is similar to middle-scale gear but for smaller sizes. Examples of small-scale fishing equipment are gillnets, traps, dip nets, cast nets, hooks and lines, *tru*, cylindrical bamboo trap (*lop*), plunge baskets (*angruth*), spears (*snor*) and others.

Underestimates of the past and current status of small-scale fisheries management

As already mentioned, small-scale fisheries contributes significantly to the livelihood of rural poor people in terms of protein source and income generation. However, the importance of small-scale fisheries was overlooked and underestimated by the central government and local authorities and even other institutions. The past government policy towards commercial fishing lot auctioning and agricultural production had negative effects on people depending on aquatic resources. The intensification and expansion of lot boundaries and the pressures exerted by lot owners and operators have affected an increasing number of small-scale fisherfolk in the local communities (Thay, 2001). Gregory and Guttman (1999, cited in Gum 2000) raised concern about the many efforts of the Cambodian government and development agencies to increase rice production with little appreciation of the importance of paddy field fisheries resources that are significantly used by rice farming families. Gum (2000, cited in Thay, 2001) has documented from many authors reliable information on the general issues of fisheries management during the period 1998-2000. The main issues include:

- the focus on revenue collection from the fishing lots rather than sustainable fisheries resource management or equitable rural development;
- conflicts between conservation and conversion of inundated forests into agricultural lands;
- growing numbers of short-term benefit seekers (local and outside people and fishermen, military and police);
- tension and conflicts between local people and lot owners over the resource use; and
- sublease of the total lot areas to private interests for exclusive exploitation.

In consideration of how the above issues were affecting the poor people's livelihood, the government undertook a swift reform of fisheries management. The reform entailed the reshuffle of the high-level administration of the fisheries department and the provisional withdrawal of provincial fisheries inspection stations in all fishing lots throughout the country. Moreover, the request of local fisherfolk to reclaim their territory for public fishing areas was partly met by returning parts or the whole of fishing lots to the local communities. Fishing lots were recently handed over to local communities.

The challenges for all the parties involved, from government to fisherfolk, are to manage, develop, use and conserve in a sustainable manner the fishing areas released from fishing lots.

The concepts of community fisheries or fisheries co-management have been introduced recently.

Experiences in implementing small-scale fisheries management

Historically, the main objective of fisheries management has been the conservation of fish stocks (King 1995). In order to ensure the long-term sustainable use of fisheries resources, the Department of Fisheries had tried its best to manage them. The fisheries laws was established in 1980 to manage and allocate these resources for earning income for the nation and providing the Cambodian people with protein-rich food in the form of fish. The law mostly dealt with passive management objectives, in which input control is the main management tool. For example, the law strongly prohibited all kinds of illegal fishing gear such as light fishing, electro-fishing and *muro-ami* (Ly, 1990). It also prohibited fishing in the closed season (fish spawning season). Fish sanctuaries in freshwater water systems were also closed during fishing season to commercial and medium-sized fisheries but not to small-scale fisheries. Clearing or cutting down inundated forests and coral mining was prohibited by the fisheries laws. Furthermore, the fisheries department has acquired its own fisheries inspectors and patrol boats to monitor fishing activities in Cambodian waters. Touch (1995) mentioned that the department tried to increase and promote fisheries facilities and human capacity to manage fisheries resources. However, the law is very weak and passive, and it will be necessary to carefully revise it in order to ensure adaptively and scientifically optimal catches without decreasing the stocks. The law is being revised by the Department of Fisheries in collaboration with the World Bank, which provides funding.

Legal adjustment and legal instruments

Small-scale fisheries have open access, do not require a license to fish and use smaller gear than the middle-scale fisheries operators. It can be done in floodplain areas, in fishing lots during the closed season and in paddy fields during the rainy season. Family fisheries are estimated to produce 160 000-250 000 tons annually in Cambodia (Deap et al., 1998).

An example is a cylindrical drum trap, a small-scale fishing gear with a length of less than 0.80 metre and 0.30 metre in diameter. If it is larger, it is classified as middle-scale fishing gear. The gear is made of bamboo sticks sewed together by wild strings and has a double entrance to prevent fish or other aquatic animals from escaping. It is used to catch aquatic fauna everywhere within the water system during the rainy season, in particular freshwater fish.

The Mekong River system is rich in biodiversity, particularly in fish species. Rinboth (1996) recorded about 500 species of fish within the system. However, fewer than 100 species have been caught and recorded around the Tonle Sap by large and medium-sized fishing gear. Nao et al. (1996) stated that there were some 280 fish species gaining access to the productive floodplain, into which huge quantities of fish migrate from the main rivers and floodplains of the Mekong River system.

Apart from fisheries, the Mekong River system has other resources such as inundated forest. Many species of fauna use the flooded forest and floodplain as feeding and nursing grounds. The spawning strategy of many fish species also ensures that eggs and larvae are swept into the floodplain area, which has plentiful food resources for both brood stock and larvae.

Problems and constraints of fisheries management

The richness of fisheries resources leads to high competition for control. Some problems in small-scale fisheries management create conflicts among stakeholders. These include the sale of common-access areas by the lot owners and the military taking over open-access ground and selling it to individual fishermen. This means that the livelihood of the community is affected, and poaching inside the fishing lot by the village fishermen is very common, often involving electro-fishing. In addition, agricultural activities inside the fishing lot by the community conflict with the use of water for different purposes. Also, the extension of fishing lot boundaries, when they are not clearly demarcated, may cause problems.

The operational problems of small-scale fisheries management are as follows:

1. Overfishing: Inland fish stocks are overexploited for large-size fish stocks and fully exploited on small-size fish stocks. Van Zalinge and Nao (1999) hypothesized about the state of exploitation of fish stocks of large and small migratory fish species and showed that large fish and medium-sized fish are overexploited, while small fish are fully exploited. Csavas et al. (1994) pointed out that circumstantial evidence shows that inland fisheries of Cambodia are under stress as indicated by the decline of larger-sized fish in the catch reported by fishermen and the Department of Fisheries. Castro and Huber (1992) stated that if the fish population size is very small, the number of the newly born is also small because there are not many potential parents. In addition, the decrease of fish stocks is due to ecosystem changes within the freshwater environment such as habitat degradation.

2. The Department of Fisheries lacks human resources, especially personnel with degrees such as MSc and PhD. There are very few fisheries officers with postgraduate degrees compared to officers with lower degrees. At present, there is not a single graduated PhD fellow in the field of fisheries or living aquatic science.

3. The Department of Fisheries lacks scientific data. The data they have are not scientifically reliable. No time series data of fish stocks exist. Therefore, stock assessments are badly needed to estimate the fishing effort, the fish landed, the biological processes and the fishing operations. Other parameters are also needed such as natural mortality and recruitment in order to find out the maximum sustainable yield and maximum economic yield. When these parameters are found, wise management and allocation of resources may be implemented in a sustainable way for use by the generations to come.

4. Illegal fishing activities and transportation of fisheries products occur all over the country. Fishermen fish and transport fisheries products illegally, with the support of high-ranking officers, and sell them to neighbouring countries. In the absence of alternatives locals may catch fish to earn some income, even if they know that their activities are destructive or illegal.

5. Existing fisheries law and regulations are hardly applied. They do not provide the proper tools for scientifically based fisheries management and allocation of resources. The law deals with only passive fisheries management, for which input controls have been used as management tools such as ban on gear, gear size, mesh size, closed season, closed areas and the like. Even though the law has existed for decades, its

enforcement has been very poor due to the lack of means in the fisheries department such as patrol boats, and corruption scandals have occurred involving inspection officials right from the start.

6. There are too many conflicts between resource users and managers, especially as the population of Cambodia grows very fast. People need land to build their houses and to establish agricultural farms to support their families, while the government needs the land for fishing lots or fish sanctuaries. If more land is used as fishing ground or fishing lot or fish sanctuary, people do not have land for settlement. On the other hand, if all land is used by farmers, people will not have any fish to eat anymore. In addition, there have been many conflicts between lot owners and local people on fishing rights and property. The local people want to catch fish around their villages whose areas have become fishing lots auctioned by the owners, and these owners will not allow local people to fish within their lots. These matters have occurred in many provinces with freshwater fishing grounds, and high-ranking politicians, including the prime minister, have had to intervene.

7. There has been a problem of too much bureaucracy within the fisheries department and more generally the Ministry of Agriculture, Forestry and Fisheries. In order to deal with anything related to fisheries or fisheries management and development, there are long complicated procedures for decision-making, and it takes a very long time for a decision to be reached.

8. Finally, the Department of Fisheries faces budgetary limitations and infrastructure deficiency. It does not have enough money to run its administration and all offices in all provinces. Those offices are very poor and do not have any modern office materials such as computers, photocopy machines, fax, phones, etc. These commodities are only found at headquarters.

These are the problems and constraints that blight the fisheries sector of Cambodia. Long-term rehabilitation and improvements are required to lead the fisheries sector to a higher level in order to develop and manage fisheries in a sustainable way.

Some possible solutions to overcome constraints in small-scale fisheries management

The Department of Fisheries has to try its best to manage the resources and solve the conflict between users. Despite its 1500 employees – most of whom are in enforcement – fisheries are not well managed. This is illustrated by the increasing number of conflicts associated with the lot system (and some other fisheries) and the 1999 government decision allowing the 68 most valuable lots to be operated as "research" lots, which has led to increasing fishing pressure on the fish resources and conflicts with fishing communities.

The basic problem relates to the extremely low salaries of civil servants and the implicit possibility to use the power of the law for one's own benefit. Therefore, the ultimate solution must be the improvement of salaries and the scaling down of the number of employees. For this, internally generated tax revenues need to be increased.

In the short term, management could be improved by allowing people with more appropriate training to play a more responsible role in the fisheries department. (This has been under

implementation as of the end of October 2000.) The organizational structure of the department needs to be revised and responsibilities to be clarified. The new fisheries law should be completed after a consultation process with the principal stakeholders.

The solutions include:

- Making the auction system fully transparent and reducing the number of subleases and the amount of capital required to begin operation of lots.
- Determining fishing lot boundaries:
    - a transparent process to determine fishing lot boundaries by building up the fisheries department's capacity to use appropriate technology for boundary verification such as GIS and GPS;
    - include all fisheries habitats and exclude villages and agricultural lands, etc; and
    - hold consultations with all stakeholders in the area. For example, promote stakeholder participation, including both local communities and authorities.
- Increasing the transparency of the "burden" book rules for the management responsibilities. These should be made available to the public, especially to local communities and authorities.
- Improving lot management through longer leases, more responsible managers, year-round management and better relations among stakeholders.
- Raising ecological awareness.
- The rights of small-scale (family) fisherfolk need to be established, in such a manner that they will not increase the pressure on the fish stocks.
- Development issues: Particularly, the management and development projects for the Tonle Sap area, such as the building of harbours, roads, navigation channels, etc, will have a negative effect on fisheries if the management system is not improved. The ecosystem will deteriorate, as the development projects will increase accessibility to and employment in the area. This will intensify the population pressure on the environment through the destruction of natural habitats due to the increased need for farmlands, fuel wood, fishing, etc. Instead, creation of employment in the areas directly outside the floodplains could relieve these pressures.
- The present revision of the fisheries law provides an excellent opportunity to establish a stronger and more focused institutional framework that allows broader participation of local users in protecting habitats and allows them to benefit from improved yields. These users comprise lot operators, national and local authorities, military and militia groups and small-scale fisherfolk.

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SMALL-SCALE FISHERIES MANAGEMENT IN INDIA: NEED FOR A PARADIGM SHIFT

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Introduction

After China, Peru and Japan, India is the fourth largest fish producer in the world. The combined marine, coastal and inland fish production of India, from capture and culture fisheries, stood at 5.4 million tonnes in 1999, of which the marine sub-sector alone accounted for 3 million tonnes. Almost the entire marine fish production is from the territorial waters under the jurisdiction of state governments. The estimated population of fisherfolk, both full-time and part-time, has grown from 2 million in 1973 to about 6 million in 1995. The majority operate from un-decked vessels.

'Small-scale' fisheries in India

'Small-scale' is not a recognized legal category in India. If overall length (OAL) or gross registered tonnage (GRT) is used – 20-m OAL or 25 GRT – for defining the small-scale sub-sector, almost the entire fishing fleet would fit these criteria. Trawling units are not generally considered small scale even if they are below 20-m OAL or below 25 GRT. Traditional, artisanal or small-scale fisheries range from rudimentary dugout canoes to motorized 16-m plywood or FRP vessels.

The expansion of small-scale fishing operations since the 1990s has had several effects. The gear base of small-scale fisheries has been losing its diversity. Artisanal fisheries have become more differentiated: they include both powered and non-powered vessels, and both active and passive gear groups. There has been a tremendous expansion of fishing capacity and increasing fishing pressure in the artisanal sector. In the traditional fisheries of Kerala, the number of plywood vessels has increased by 300 per cent, from less than 2 000 in 1991 to close to 6 000 in 1998, all motorized.

Conflicts over resources and overfishing pressure

There are exacerbating conflicts within the small-scale sub-sector among different gear groups as a result of the increased mobility of fishing vessels, capacity expansion and overfishing pressure. Thus, gear conflicts that were mainly confined to trawl and non-trawl groups have now become frequent among artisanal gear groups. With motorization, the division of labour seems to have broken down by making it easier for unskilled people to migrate into fishing activities. Built-in conditions of limited-access regimes have collapsed under the pressure of motorization.

According to the Central Marine Fisheries Research Institute (CMFRI) of India, the potential of current fishing grounds has already been exceeded. Although trends in marine fish production do not show a decline, recent observations by CMFRI indicate that fisheries are shifting from large piscivorous fish towards small invertebrates and planktivorous fish. There is fishing down the marine food chain, a shift in mean trophic level from close to 3.5 in the 1950s to 3.2 in the late 1990s.

The state of Gujarat, currently the biggest producer of marine fish in the country, faces economic and biological overfishing pressures. The marine fish production of Gujarat has dropped by over 27 per cent to 552 000 tonnes in 1998-99, from a peak of 702 000 tonnes in 1997-98. Since the formation of the state in 1960 until 1998-99, when its total marine fish production increased sevenfold, the size of its mechanized fleet (both IBM- and OBM-powered vessels) expanded 50-fold, and the value of fish production increased by over 500 times. There were about 17 000 mechanized fishing vessels on the register in 1998-99, of which over 14 000 vessels were IBM-powered vessels.

Fisheries management in India

According to the Seventh Schedule, Article 246 of the Constitution of India, fisheries within the territorial waters are under the jurisdiction of the state government and fishing and fisheries beyond territorial waters are under the jurisdiction of the central government.

The Territorial Waters, Continental Shelf, Exclusive Economic Zone and other Maritime Zones Act, 1976 of India recognizes [Section 7 Para (4) (a)] the sovereign rights to conservation and management of living resources in the Indian exclusive economic zone in addition to their exploration and exploitation. Section 15 (c) further gives power to the central government to make rules for conservation and management of the living resources of the exclusive economic zone, and Section 15 (e) for the protection of the marine environment.

The basic fisheries legislation that followed this act, namely the Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Act, 1981 and the Maritime Zones of India (Regulation of Fishing by Foreign Vessels) Rules, 1982, however, does not make any mention of conservation or management. The only Indian legislation which mentions "undertaking measures for the conservation and management of offshore and deep-sea fisheries" is the Marine Products Export Development Authority Act, 1972 [Section 9(2)(a)], but no management measures are known to exist under this act. There is still an absence of a legal regime to manage fisheries operated by Indian nationals using vessels of Indian origin in the Indian exclusive economic zone beyond territorial limits.

All the maritime states of India (with the exception of Gujarat) have enacted the Marine Fishing Regulation (MFR) Act since the 1980s. It is based on a model piece of legislation prepared by the Ministry of Agriculture, Government of India, more than two decades ago "to protect the interests of different sections of persons, esp. those engaged in fishing with traditional fishing craft; to conserve fish; and to regulate fishing on a scientific basis; and to maintain law and order".

The act was drawn up at a time when coastal fisheries were mainly divided into mechanized and non-mechanized fishing units and when there were tremendous conflicts between the two sub-sectors over access to fishing space and resources, sometimes leading to destruction of

life and property. It has been primarily used to separate trawlers from other gear groups. In this sense, the act has been mainly used for the purpose of maintaining law and order at sea.

The main emphasis of the MFR Act is on regulating fishing vessels in their respective 12-mile territorial sea mainly to protect the interests of fishermen on board traditional fishing vessels. There are no legal mechanisms to address all aspects of fisheries management. There is no coordination between different maritime states, although vessels are increasingly migrating into the waters of adjacent states. Since the pressure of overfishing is felt most acutely within territorial waters, the most important requirement towards conservation and management would be to reform the state-level conservation and management regime. The MFR Act is in urgent need of amendment.

There is a need to see conservation and management of marine fisheries in proactive terms to rebuild, restore or maintain any fisheries resources and the marine environment and consistent with the UNCLOS and other international legal instruments that India has acceded to. Conservation and management are also to be made the collective responsibility of the central and the state governments in an integrated manner. Adopting the proactive principles to rebuild, restore or maintain any fisheries resource or the marine environment will be a major step ahead of the reactive principles to regulate, restrict and prohibit fishing by fishing vessels, as currently emphasised under the MFR Act of the maritime states.

Measures are required to protect the marine environment from pollution. The Water (Prevention and Control of Pollution) Act, 1974, although rarely invoked, has made provisions to protect the coastal sea from land-based sources of pollution subject to the discretion of the state government. This act, in conjunction with the Coastal Regulation Zone Notification of 1991 under the Environment (Protection) Act, 1986, can contribute to regulating land-based sources of pollution in the coastal waters up to a maximum distance as decided by the state government.

Gear selectivity is another area where there is scope for improvement. The negative impact of bottom trawling on fisheries resources and fish habitats, although recognized internationally is yet to translate into legal measures to restrict its negative cascade effects on fish resources and fishing communities. Similarly, the use of fine-meshed nets in estuaries also needs to be effectively regulated.

Conservation and management of fisheries resources and habitat protection measures should be accompanied by institutional mechanisms that bring about equitable allocation of these resources. One important requirement would be building up effective fish-worker organizations which can take up fisheries management functions and which can also draw from the strengths of traditional fisheries management systems wherever they exist.

Building up such fish-worker organizations is an important prerequisite for introducing limited access regimes in Indian fisheries since local organizations where fish-workers have full participation will have greater legitimacy among coastal communities. Consider that, according to a conservative estimate of FAO, there are about 182 000 un-decked and 57 000 decked fishing vessels in about 4 000 marine fishing villages, with an equal number of landing centres in India.

Kerala seems to be the only state that has recognized the importance of fisheries management, especially its ecological and social dimensions. It already has a fisheries development and

management policy initiated through a consultative process in 1994, which recognizes, inter alia, (1) the ecosystem dimensions of fisheries; (2) a reform "to ensure that the rights of ownership of fishing assets will rest only with those who fish"; (3) fisherfolk participation in fisheries management; and (4) the need to bring to the attention of other sectors their negative impact on marine and freshwater ecosystems. These policies, however, are yet to become legislation.

At the national level, efforts are beginning towards fisheries management although the details are still being worked on. It is believed that there will be financial allocation under the Tenth Five Year Plan of India (2002-2007) for fisheries management programmes for the first time. The plan document is expected by the end of November 2001.

Conclusion

Conservation of fisheries resources, protection of fish habitats and allocation to fisherfolk are the three most important considerations in fisheries management. The existing legislation and policies for the fisheries sector are still in the development mode of the 1980s. Within the industry and at the level of state governments there is no clear recognition of the need to introduce management measures, including limited access regimes. The state governments seem to be caught in a bind where they find it difficult to reverse fisheries policies developed at a time when fisheries resources were underutilized. Even for small-scale fish-worker organizations to agree to fisheries management requirements – for example, the need for fleet reduction or greater gear selectivity – it is almost conditional that such measures have to be preceded by greater regulation of trawl or large-scale fisheries. Given the length of its seaboard, the growing fisherfolk population and fleet size, lack of coordination between states and absence of enabling legislation, effective fisheries management policies and programmes are likely to take a long time to be conceived and implemented. The situation is exacerbated by chronic poverty and unemployment in many coastal areas, where the government has no easy position to see the problems and prospects of the fisheries sector in isolation from other social and economic problems. It is yet to be recognized and understood that sustainable marine fisheries are in the long run the best protection for coastal communities from poverty.

SMALL-SCALE FISHERIES MANAGEMENT IN INDONESIA

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Definition

There is no definition of Indonesian small-scale fisheries based on any formal law, either at the national or at the provincial level. The term of small-scale fisheries, however, is explicitly mentioned in government codes and ministerial decrees. The definition of small-scale fisheries is widely understood by scientists, academics, bureaucrats and politicians to mean fisheries undertaken by ordinary people in contrast to fisheries done by formal fishing enterprises. In terms of boat size and technology type, small-scale fisheries is often referred to as fishing activities without using boats, using non-powered boats, or boats with outboard engines or under 30 GT inboard engines. For the sake of management, small-scale fisheries is confined to activities within 12 nautical miles from the shore or in waters under the jurisdiction of provincial governments.

Current status of fisheries

Small-scale fisheries are growing steadily in numbers although mechanization, modernization and use of other fabricated inputs are taking place. The number of small-scale fishing households increases in magnitude and seems to be unchanged in percentage (Table 1). At the same time, the number of large-scale fisheries increases tremendously. It means that new entrants to the industry come from various scales and types of boat. Although small-scale fleets are converted to large ones, it is not enough to reduce the amount of small-scale fleets. As a consequence, about 82 percent of the small fishing fleets dominate Indonesian capture fisheries.

Table 1. Fishing establishments by scale and type of boat

Scale/Type	1989	2000	2000 [%]
Without boat	45 298	50 785	11.21
Non-powered boat	208 171	220 599	48.69
Outboard engine	64 723	98 647	21.77
Subtotal	318 192	370 031	81.67
Inboard engine	40 240	83 073	18.33
Total	358 432	453 104	100.00

In total, there are 2.3 million people who work directly as marine fishermen, of whom 1.2 million are full timers and 1.1 million are part timers. The definitions of full- and part-time fisherfolk are not based on time spent fishing but rather on the contribution of fishing to household income. Therefore the full-time fishers are those whose household income derives entirely from fishing, while the part timers are those whose income derives from fishing and other economic activities.

Aside from 2.3 million fisherfolk who directly depend on fishing, there are those who work in forward- and backward-linked activities. A recent study indicated that for every 100 fishermen, there are 40 supporting workers in input supply and fish processing and 5 working in fish marketing. Therefore, altogether there are about 3.4 million people who directly and indirectly work in fisheries.

Table 2. Number of fishing gear in 2000

Gear	Number (Unit)
BED-equipped net	541
Seine net	41 651
Purse seine	10 082
Gillnet	187 815
Lift net	45 196
Hook and line	247 905
Trap	71 549
Shell collection	8 885
Muro-ami	1 326
Cast net and harpoon	34 553

Various types of fishing gear are used ranging from modern, labour-saving ones like trawl and fish nets (modified trawl for fish), the labour-intensive technologies such as purse seine and pole and line, down to traditional technologies like beach seine and spear fishing. Before 1983, all types of fishing gear could be operated throughout Indonesian waters. But Presidential Decree Number 39/1980 banned trawling. By adding a by-catch excluder device (BED) in the net, trawl is allowed to operate in certain eastern waters of Indonesia. For statistics and data collection, fishing gear is categorized into 11 groups. The biggest group is hook and line, followed by gillnet, lift net and trap. The BED-equipped net is the smallest in number, but gives a substantial amount of commercial and export fish (Table 2).

Fisheries have a significant contribution as foreign exchange earner. The export of fisheries products had steadily increased and reached the peak value of about US$2 billion in 1998. However, due to global economic crises coupled with internal political, peace and order problems, exports have declined. In the year 2000, the export value reached US$1.6 billion only. The main exports were shrimp and tuna. Recently, some other species have been introduced for export to compete in the tough markets, although the volume and value of these products are small. In addition, export items have been diversified from frozen products to higher-value products such as block sashimi, and even fresh fish.

The performance of the fisheries sector can be seen from its contribution to GDP. As generally applied in Indonesia, GDP is based only on production and unprocessed or primary products. The value of activities resulting from fish processing, fish marketing and other fish-based products which are an essential part of the fisheries system are included in the GDP of the non-fisheries sector. Therefore the GDP of fisheries tends to be underestimated. Based on the primary products, fisheries' contribution to GDP is only about 2 percent. In the early 1970s, the share of the fisheries sector was three to four percent of GDP. The figure slowly went down to about 2 percent i the late 1970s and has remained unchanged until now.

Management experience

The management of small-scale fisheries in Indonesia is not as intensive as in large-scale fisheries. This is because there are many fishermen operating very small fishing units scattered throughout the remote islands and waters. Therefore, while laws and regulations are supposed to apply to the entire fisheries sector, only large-scale fisheries comply with them. Small-scale fisheries, on the other hand, tend to operate without any management approach. This may be due to the lack of facilities, personnel and operational funds.

Under the Fisheries Code No. 9/1985 and Government Regulation No. 15/1990, all fishing units should operate with licenses issued by the government. For the boats up to 30 GT, the licenses are issued by the local governments through local fisheries services at district or provincial level. Boats of more than 30 GT must get a license from the central government, through the Directorate General of Capture Fisheries. The exception to fish without license is for small-scale fishing for household consumption only. In other words, subsistence fisherfolk are not obliged to apply for licenses.

Problems arise from the interpretation of subsistence fishing. In the case of Indonesian fisheries, the meaning of subsistence and commercial fishing are intermingled, depending on the situation faced by the fishermen. Throughout the year, fisherfolk always bring home some fish for family consumption regardless of the scale of their equipment and the amount of landing. This means that every fisherman does subsistence fishing by nature. Outside peak fishing season most fishermen operate their gear just to fulfil their consumption needs and therefore totally act as subsistence fishermen. During peak season, however, they catch fish for consumption as well as for sale in the markets. However, they still claim that they are subsistence fishermen in order to avoid licensing.

Aside from the application of licenses as a tool of fisheries management, the government has taken a zoning or fishing belt approach so that a particular type and scale of technology can only fish in particular waters. There are three fishing zones: (1) within 4 miles from the shore, (2) between 4 and 12 miles and (3) from 12 miles outwards. The fishing zone approach has been applied since the 1980s, but it was never effectively implemented. In 1999, the approach was revived, with the number of zones reduced from four to three. The small-scale fishermen are privileged to catch in zones 1 and 2. They may go to zone 3 if they are able to do so. Yet, large-scale fisheries which are obliged to fish in zone 3 often enter zones 1 and 2. Consequently social conflicts between the two groups are unavoidable, and the fish resources, especially in inshore waters, tend to be degraded and are overexploited.

Another approach used in fisheries resource management is mesh size restrictions. Fishing methods which are perceivably destructive are strictly prohibited. Although the use of very fine mesh, cyanide, and blast fishing are prohibited, in reality there are many places (regions) where these methods are still practised. In other words, in regions where there are many small fisherfolk, they apparently do not comply with regulations. In other places, however, although local fisherfolk obey the regulations, fishermen from other places come and fish using destructive fishing methods.

Poaching by international fishermen is another problem faced by the Indonesian small-scale fisherfolk. Illegal fishing boats of neighbouring countries often fish in waters destined to small-scale fishermen. The Indonesian navy detained in the last two years 98 Thai boats and

two Vietnamese boats illegally fishing in Indonesian waters. Some cases were brought to court, fishermen were sentenced and their boats confiscated or destroyed.

Ineffective regulations are generally due to lack of enforcement. The geographical condition of Indonesia, which consists of 17 508 islands with a coastline of 81 000 km and water areas of 5.8 million km^2, has indeed the potential to further develop fisheries, but it also translates into problems of management. The lack of funds, personnel and facilities severely hampers the enforcement of law and regulations.

In Indonesia the management approaches in small-scale fisheries follow a government-led management scheme. However, considering that the approaches are not well implemented, one may say that there is no management in Indonesian small-scale fisheries. In other words, the fisheries are *de jure* under a government-managed regime but de facto enjoy open access.

The result of this fisheries management regime is very clear: the poverty of the small-scale fisherfolk. A recent study indicates that the average family gross income is about Rp400 000 (about US$40) per month. With the average family size of four, it means that the per capita monthly income of a fishing family is about US$10. This figure is far below the monthly income of workers in the manufacture and industrial sectors, which is about US$100 per month.

Solution to the problems

To overcome the above-mentioned problems, at least two main sets of policy have been devised recently by the government. The first policy set is a review of the political economics of fisheries, and the second is decentralization by giving more responsibilities to districts and provincial governments. Within the framework of the reform government policies are essentially directed to revitalizing people-based economics which are characterized by the promotion and development of small and medium-scale enterprises.

Within the first set of policy are (1) reformulation of the objectives of fisheries development, (2) establishment of the Department of Fisheries and Marine Affairs (DFMA), (3) establishment of the Indonesian Maritime Council (IMC) and (4) promotion of good governance in the fisheries sector.

The objectives in fisheries development used to be focused on export and production. The new policies' main objective is to increase the wellbeing of fisherfolk. This priority may be achieved by increasing production, especially from aquaculture, increasing added value of the products, promoting export, raising domestic demand and consumption of fish, and rationally managing fish resources. Therefore, there is a big shift in fisheries management. If before, the management was directed to producing fish in a sustainable manner, now it has shifted to a more rudimentary objective, that is, to improve the quality of life of fisherfolk.

Putting the fisherfolk first is not a slogan. With the new reform the government established DFMA. The main reasoning for the establishment of the department, according to President Abdurachman Wahid at the launching of his cabinet in October 1999, was to care and watch over small-scale fisherfolk so that they could be better off. Under DFMA, there is a special directorate whose main responsibility is to empower small-scale fisherfolk through the development of small and medium-sized enterprises, including cooperatives. The tasks of the

directorate include providing access to capital, markets and technology for small-scale fishermen and fostering community-based resource management through revitalization of custom and traditional practices owned by the people.

Along with the establishment of DFMA, the government established IMC whose function is to help the government in coordinating, synchronizing, harmonizing and integrating all marine activities so as to improve the economic situation of people whose life depends on marine resources. This implies that the fisherfolk's wellbeing is the concern of IMC, besides that of others also working in the marine sector in tourism and transportation.

The fourth policy is the promotion of good governance in fisheries. Good governance refers to the development of government services and practices of government tasks and obligations according to prevailing laws and regulations. To achieve this, control from people is encouraged. People's control can be realized if they are included at all stages of the development, from planning to programme evaluation and monitoring. In line with increasing participation of the people, non-governmental organizations and private voluntary organizations are encouraged and given more opportunity to participate in coastal community development.

Future development of decentralized management

Decentralization of management authority is now taking place in Indonesia in several sectors, except for foreign-related policies, national defence and financial policies. All other development activities including fisheries are decentralized. It means that district and provincial governments are given more responsibilities in development. In fisheries and community development, decentralization brings significant changes because district and provincial governments suddenly are given tasks, authorities and responsibilities they never had before.

With the enactment of Law No. 22/1999 on regional autonomy and Law No. 25/1999 on financial relations, regional autonomy has become reality. These two laws create the legal and financial framework for governance primarily by districts, with assistance from both the provincial and the central levels of government. Article 4 of Law No 22/1999 sets the general tone, that the law is intended to arrange and organize local societies, through their own decision, based on their own aspiration.

Law No. 22/1999 has tremendous bearing on coastal resource management. Most directly, Article 3 establishes a territorial sea under jurisdiction of the province that extends up to 12 nautical miles from the coastal shoreline. Within this territory, Article 10(2) elaborates that provincial authority includes three categories: (1) exploration, exploitation, conservation and management of the sea area, (2) administrative affairs and (3) law enforcement. Pursuant to Article 10(3), the district may establish jurisdiction over one third of the provincial waters, seaward from the island shoreline, or 4 nautical miles from the coastal shoreline. The elucidation of Article 10(2) explicitly states that traditional fishing rights are not restricted by the regional territorial sea delimitation.

With these autonomy laws, which were beginning to be implemented in January 2001, districts and provinces are free to set their own government structures. Of 30 provinces and about 270 coastal districts, all the provinces and about 200 districts have fisheries service

offices whose function is to develop fisheries in their areas. With decentralization, some districts have begun to identify types of resource management practices by their people that had vanished in the last 50 years. With the help of district parliaments that also have a fisheries and marine affairs section, district governments are now developing their own laws on marine fisheries in their areas. Traditional fisheries resource management, customary laws, traditional territorial use rights, indigenous technologies and most of all the aspirations of fisherfolk are included in local laws enacted by district parliaments.

Concluding remarks

Some districts are rich and some poor, so decentralization is not balanced and equal. Districts rich in natural resources can outsource people to develop their regions, they may provide infrastructure and facilities for development and they may finance their people to establish people-based economic activities. This is not the case for districts poor in natural resources. In the future there will be a discrepancy in the development of districts which may lead to conflicts over the utilization of fish resources especially in the bordering waters of districts.

The first problems of managing small-scale fisheries have arisen due to claims over waters by one district which has closed the opportunity for fishermen coming from other regions, although these waters are their traditional fishing grounds. Again, the definition of traditional and modern fisheries may vary from one district to another and lead to different interpretations and actions to protect and control the aquatic resources.

With the bigger roles, responsibilities and authorities accruing to district governments, community-based management systems have begun to be established by some districts. However, several other districts are still in the process of finding out the ways and approaches they have to follow. Advocacy, supervision, extension and empowerment of local people by the central government, NGOs and private voluntary organizations are going on. But they cannot reach all the districts that may have different interests and problems. The decentralization of fisheries management is still in the infancy stage. It can only grow if there are enough nutritious inputs supplied by the central government, NGOs and voluntary organizations under the auspices of international agencies.

CO-MANAGEMENT OF SMALL-SCALE FISHERIES IN MALAYSIA

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Introduction

As with most of her sister countries in Southeast Asia, Malaysia is greatly dependent on fish resources to satisfy the protein needs of her population. Fish resources in Malaysia may be obtained from three sources: fresh water (e.g. rivers, lakes), brackish water and marine water. Of these, marine fish resources are the most important, being connected to the eating habits of the people who greatly prefer the tastier marine fish to freshwater fish in their diet.

The fishing community of the country has always relied on traditional types of gear such as drift or gillnet, hook and line, fish trap, bag net, barrier net, etc, allowing for small-scale operations. In the 1960s, new fishing methods were introduced: mainly trawlers and purse seiners, collectively known as commercial fishing gear. But the greater number of fishermen still use traditional gear. Thus, management decisions undertaken to address the fisheries situation in this country inevitably affect the lives of the greater number of small-scale fisherfolk, even though they are primarily directed at commercial fisheries.

A number of terms are used when describing the various situations relating to small-scale fisheries. For the purpose of this paper, the following definitions have been adopted:

- Small-scale fisheries: fisheries that is undertaken using small-scale boat, gear and equipment.
- Artisanal fisheries: fisheries that is undertaken mostly for home consumption using selected traditional gear.
- Subsistence fisheries: fisheries that is undertaken mainly for home consumption using selected traditional gear.

Current status of small-scale fisheries in Malaysia

The 1998 Malaysian Annual Fisheries Statistics estimated that 81 548 fisherfolk earned their livelihood by catching fish. Out of these, 51.6 percent (42 111) operated traditional fishing gear in small-scale fisheries throughout the country (see Table 1 at the end of this paper). In terms of fish production, an estimated 289 275 tonnes of fish (23.63 percent of total fish landing) were caught by these small-scale fishermen in 1998 (Table 2).

Operating mostly in inshore coastal waters, small-scale fishermen use common traditional gear such as drift or gillnet, hook and line, fish trap (both stationary and portable), lift net, bag net, barrier net, push net and shellfish collection apparatus to support their livelihood. Depending on the geographical location and availability of the fish resources, some types of gear are preferred to others.

On the west coast of Peninsular Malaysia, the drift or gillnet is extremely popular and is the dominant traditional gear used (in terms of number of fishermen and catch): 87.5 percent of the small-scale fishermen used this gear in 1998 (Table 3). The annual catch of this gear in 1998 was about 74 000 tonnes – or slightly over 66 percent of the annual total fish landed by small-scale fisheries in the area. Second in dominance was the bag net (employed by some 4.3 percent of the small-scale fishermen in 1998), and this was followed by hook and line (2.4 percent).

On the east coast of Peninsular Malaysia, the drift or gillnet and hook and line are the two most important gear types employed by small-scale fishermen (Table 4). In 1998, the drift or gillnet was the dominant gear in terms of number of fishermen, followed by hook and line. But in terms of highest catch by traditional gear, the open nature of the South China Sea appropriately supports the effective use of hook and line. An estimated 24 000 tonnes of top-quality fish was caught by this gear in 1998.

In Sarawak, the dominating traditional gear types are the drift or gillnet, bag net and hook and line (in this order of importance); in Sabah waters, the main gear types are the drift or gillnet, hook and line, and lift net.

In the 1960s and 1970s, small-scale fishermen made up to 80 percent of the total fishing workforce. But gradually, over the last few decades, due to marked improvement in commercial fishing technology, an increasing number of these traditional fisherfolk have switched to commercial gear, thus increasing profitability. At present, the remaining number of small-scale fishermen exceeds only slightly the number of commercial fishermen.

Figures 1 to 12 provide the catch trends of the dominant traditional gear types operating in the waters on the west and east coasts of Peninsular Malaysia, Sarawak and Sabah between 1988 and 1998.

Annual fluctuation in the catch, within a specific range limit, is normal, and is to be expected within fisheries modes. In most observed cases, however, the catch trends appear as rising or horizontal, especially among the predominant small-scale fisheries by drift or gillnet and hook and line in Peninsular Malaysia, Sarawak and Sabah, indicating that fish resources will still be available in their coastal waters in the years to come.

Portable trap fisheries on the west coast of Peninsular Malaysia registered some reduction in catch in recent years, however, in contrast to the activities on the east coast which appeared to be making increasing profits. Bag net fisheries on the peninsular west coast also showed less catches, partly related to the decreasing number of fishermen within this fisheries.

The challenge for fisheries managers now would thus be in initiating proper management responses to ensure that fish resources will continue to be available in future, and in this regard, small-scale fisheries managers have chosen co-management to further develop and manage their fisheries.

Experiences in implementing small-scale fisheries management schemes

The development of the fishing industry for both commercial and small-scale fisheries in Malaysia has followed closely the guidelines of the National Agriculture Policy, which aims

to bring about changes in the industry so that it evolves into a commercial, modern and progressive sector. To fulfil its mission, the Malaysian Department of Fisheries has identified four broad objectives under the marine capture fisheries sector that need to be achieved, namely:

1. To increase the national fish production
2. To rationally manage fishing resources
3. To develop the deep-sea fishing industry
4. To maximize the income of the fishing industry

However, the policy is also sensitive to environmental and socioeconomic needs for a balance between fishing efforts, sustainability of resources and environmental conservation. To achieve this balance, various conservation and management strategies have been implemented, which among others include the following:

a) Limitation of fishing effort through the issuance of fishing gear and fishing vessel licences.
b) Restructuring of ownership patterns of fishing licences.
c) Management of a zoning system, which gives an exclusive right to the traditional small-scale fisherman to fish in Zone A, which is within 5 nautical miles from the coast, while other fishing zones are based on the tonnage of fishing vessels and types of fishing gear used.
d) Relocation or deployment of fishermen to other economic activities such as aquaculture, eco-tourism or other downstream activities.
e) Conservation and rehabilitation of the marine ecosystem through the establishment of marine parks and artificial reefs.
f) Continuous research and development, particularly in the monitoring of resource potential, and development of eco-friendly fishing technology.

To further enhance the effectiveness of the above-mentioned conservation and management strategies for small-scale fisheries, the fisheries department is adopting the co-management approach, which, when duly implemented, is hoped to instil, collectively within the fisherfolk community, a sense of positive values, conduct and responsibility, in order to increase their productivity and competitiveness.

The terms of reference which have been identified using this approach include:

1. To increase the awareness among the fishermen and fisheries department staff of the importance of the co-management approach to address local fisheries development and management issues.
2. To provide the required technical and human skills to both fisheries department staff and targeted stakeholders involved in the implementation of co-management programmes.
3. To provide the required platform and acceptable mechanisms appropriate to local conditions under which fisheries planning, implementation and monitoring programmes can be undertaken effectively.
4. To help identify and comprehend local fisheries development and management issues.
5. To reach a workable consensus after close discussions between fisheries department staff and stakeholders on ways to resolve these local fisheries development and management issues.
6. To evaluate the performance and effectiveness of fisheries management policies and programmes given local conditions.

7. To help determine new techniques or strategies, applicable under sustainable fisheries development and management, that may help increase the productivity and competitiveness of small-scale fishermen.
8. To closely monitor co-management programmes to ensure their effective implementation.
9. To identify the roles that need to be played by the various stakeholders in order to obtain their active participation to ensure the success of the co-management programmes.

Using this approach, the Department of Fisheries and small-scale fishermen, through their respective fishermen's associations, have established Kumpulan Ekonomi Nelayan or fishermen's economic groups (FEG) at selected main fishing villages throughout the country, aimed at upgrading the socioeconomic status of these fishermen. Some examples of these groups that have shown credible success in the implementation of co-management projects are:

a) FEG of Batin village at Seberang Takir, Kuala Terengganu
b) FEG of Pachakan Semerak at Pasir Putih, Kelantan
c) FEG of Sungai Buloh, Selangor
d) FEG of Sungai Ular at Kuantan, Pahang
e) FEG of Kuala Pontian at Rompin, Pahang
f) FEG of Penyabung at Sedeli, Johor

Economic co-management projects that have been undertaken jointly by FEGs and the fisheries department, with the funding coming mostly from the department or the government, include the launching and setting up of fish aggregating devices (FADs) and artificial reefs at specific sites in the coastal inshore waters, to facilitate the fishing activities of the small-scale fishermen. Such projects have given a sense of belonging to these fishermen, who rightly feel that the FADs and artificial reefs now belong to them and should be properly used, preserved and protected.

Other economic activities undertaken by the FEGs include the sale of fuel to fishing boats, wholesale of fish and fish products, and even an attempt to culture selected crab and fish species, as some of the FEGs in Selangor did. Attempts to resolve conflicts that commonly arise between small-scale and commercial fishermen, especially those pertaining to the destruction of traditional gear by commercial fishermen, are made using the FEG platform.

Legal adjustments and legal instruments

Malaysia is a federation of states, which means some matters are within the powers of the federal legislature and others within the powers of the state legislatures to legislate. Fishing in both maritime and estuarine waters is a federal matter, but fishing in the rivers and other fresh waters comes under state jurisdiction.

Under the Fisheries Act, 1985, the Ministry of Agriculture is empowered to make regulations for the proper management of marine fisheries resources. Small-scale fisheries, being related mostly to the estuaries and maritime coastal waters, thus come directly under this act as well as other provisions, notably as follows:

- Fisheries (Prohibition of Methods of Fishing) Regulation 1980: This regulation prohibits the use of destructive methods of fishing practices, which can result in

indiscriminate destruction of the coastal ecosystem, and its associated biodiversity. Under this regulation, pair trawling, cyanide fishing, electric fishing, and the use of explosives are banned. The use of the push net and large-mesh gillnets is also prohibited.

- Fisheries (Prohibited Areas) (Rantau Abang) Regulation 1991: The main objective of this regulation is to protect nesting turtles in the vicinity of the Rantau Abang turtle sanctuary area. This area, of approximately 160 square nautical miles of maritime coastal water, as specified in the schedule, is declared as a fisheries prohibited area. No person is allowed to kill or capture any fish within this specified area, except for fishing using anchovies seine net, hook and line, lift net and squid jigging, which are not harmful to turtles.
- Fisheries (Establishment of Marine Parks Malaysia) Order 1994: The establishment of marine parks and marine reserves is directly relevant to the conservation and management of fish resources, as it will ensure the protection of the environment, hence the sustainability of the resources in the protected area. This is in line with the principal goal of establishing the marine parks and marine reserves, which is to protect, conserve and manage marine ecosystems of significance, with the objective of directly protecting the aquatic flora and fauna, their habitat and natural breeding grounds. At present, four marine parks, which group the waters of 40 islands off the west and east coasts of Peninsular Malaysia, have been gazetted. The act for the establishment of marine parks in the state of Sabah comes under the state legislation, and, to date, three marine parks consisting of 10 islands have been established in the state.

Constraints in implementing small-scale fisheries management schemes

Since these small-scale fisheries management schemes for improving the standard of livelihood of fishermen have only been implemented within the last couple of years, a complete evaluation of the effectiveness of such schemes has still not been made. However, existing constraints that were known to hamper its smooth running, especially during the initial stages, would include:

Funding limitations

Funding has always remained the greatest factor that inhibits the effective implementation of any small-scale fisheries management project. In most cases, the government remains the sole fund provider for the project, and as such, only limited funding is available for the implementation of a limited number of projects, all these again to be completed within a specified period of time.

Human resource limitations

There is a need to upgrade the present levels of education, skill and responsibility of fishermen and fisheries department staff to become more productive, committed, skilful and competitive. A large number of fisherfolk are either unaware of or not impressed by the basic tenets of conservation and sustainable yields, and as such need special consideration for the further improvement of their knowledge.

Fishermen's dependence on middlemen

The dependence of a large number of small-scale fishermen on middlemen or *towkays* has likewise created some reluctance in their active participation in fisheries management schemes. The influence of these *towkays* on the fishermen is still considerable, since small-scale fishermen depend on them to borrow money to cover the initial operating expenditures in their fishing activities. In return, the fishermen often sell back their catches to these *towkays*, mostly at lower market value.

Awareness campaigns

There is a general lack of awareness campaigns by the authorities concerned, whether at national or local level, regarding the benefits of these small-scale fisheries management projects for small-scale fishermen.

Lessons learned

The following points illustrate some lessons that have been drawn from the co-management scheme:

- The basic philosophy of the government, i.e. the relevant ministry and department, to the co-management concept of small-scale fisheries as an initial step, which could in turn lead to rights-based fisheries, is important, and should be correctly portrayed and widely disseminated.
- Institutional arrangements for rights-based fisheries might take time before such fisheries can be fully implemented.
- The general level of education, responsibility and expertise of fishermen needs further improvement, with the government and relevant agencies spearheading the implementation of all activities that may result in the attainment of such goals.

Solutions to overcome constraints in small-scale fisheries management

A possible solution to funding limitations might lie with the ability to garner greater support for small-scale fishermen by the government. For this to be achieved, more extensive management schemes covering certain periods of time, which can promise greater economic returns to both the fishermen and the government, would definitely be more acceptable, and would thus have greater potential to be funded at higher cost. In the end, funding might even come from within the industry itself should such management schemes be successful in attaining greater economic returns for the fishermen concerned.

Human resource development programmes are useful tools to overcome this type of limitation, both in the short and long terms. The end products from such programmes should effectively raise the present levels of education, skill and responsibility of the fishermen concerned in matters relating to resource conservation and sustainable yields, for their benefit as well as that of future generations. Better economic returns that might be obtained after undertaking these programmes and applying them in their fishing activities might also result in lesser dependence on the middlemen.

Future development of decentralized small-scale fisheries management schemes including proposed solutions to noted constraints

It is rather difficult at present to indicate when decentralized small-scale fisheries management can be fully applied in Malaysia. To a large extent, such a move would depend on how effective and successful the ongoing co-management programme in small-scale fisheries is.

Estimated funding requirements for future initiatives

The funding requirements are difficult to estimate at the moment since they depend on a complete listing of the various activities and initiatives that may be undertaken for the benefit of small-scale fisherfolk, which would be considerable. Malaysia as a developing nation would of course welcome any assistance from recognized parties to help raise the economic level of her small-scale fisherfolk and the sustainable development of these fisheries.

Conclusion

Malaysia is committed to helping her small-scale fishermen and fishing industry to reach their maximum potential, and for this purpose the use of co-management scheme appears to suffice and is acceptable to all relevant parties, although a complete evaluation and success of the scheme has yet to be made.

Table 1. Estimated number of fishermen in small-scale fisheries from various parts of Malaysia and for the whole country between 1988 and 1998

	West Coast P'sular	East Coast P'sular	Sarawak	Sabah	Labuan	Malaysia
1988	19 919	10 770	8 959	9 679	371	49 698
1989	23 530	9 997	7 320	9 790	305	50 942
1990	21 621	10 446	7 503	9 017	349	48 936
1991	20 933	10 360	4 173	9 015	364	44 845
1992	19 953	10 002	4 127	10 931	392	45 405
1993	16 143	8 463	4 632	11 954	287	41 479
1994	15 010	8 399	4 500	13 345	280	41 534
1995	18 060	8 472	4 297	13 345	251	44 425
1996	15 500	8 596	3 747	14 070	281	42 194
1997						
1998	13 865	8 144	5 563	14 225	314	42 111

Table 2. Annual landings of the small-scale fisheries from various parts of Malaysia and for the whole country between 1988 and 1998

	West coast P'sular Landings (tonnes)	East coast P'sular Landings (tonnes)	Sarawak Landings (tonnes)	Sabah Landings (tonnes)	Labuan Landings (tonnes)	Malaysia Landings (tonnes)
1988	72 355	48 830	40 135	28 877	1 653	191 850
1989	100 884	49 918	29 071	21 815	4 681	206 369
1990	90 787	39 200	31 842	19 640	4 596	186 065
1991	75 777	36 361	29 677	57 432	5 347	204 594
1992	91 776	42 481	30 804	77 887	9 197	252 145
1993	106 858	46 742	30 717	71 871	6 588	262 776
1994	116 150	43 922	34 205	76 560	6 871	277 708
1995	131 555	36 753	35 984	81 052	8 274	293 618
1996	132 403	37 992	49 033	80 165	9 952	309 545
1997						
1998	111 393	57 302	36 793	73 910	9 877	289 275

Table 3. Annual catches of the traditional fishing gear on the west coast of Peninsular Malaysia in 1998 and number of fisherfolk involved

	Annual catch (tonnes)	Percent of total catch	Number of fisherman	Percent of group
Drift/gillnet	73 948	66.38	12 125	87.45
Lift net				
Stationary trap	659	0.59	135	0.97
Portable trap	529	0.47	96	0.69
Hook and line	5 693	5.11	337	2.43
Bag net	16 149	14.50	598	4.31
Barrier net	1 710	1.54	17	0.12
Push net	6 583	5.91	57	0.41
Shellfish collection	5 121	4.60	153	1.10
Miscellaneous	1 001	0.90	347	2.50
Total	111 393		13 865	

Table 4. Annual catches of the traditional fishing gear on the east coast of Peninsular Malaysia in 1998 and number of fishermen involved

	Annual catch (Tonnes)	Percent of total catch	Number of fishermen	Percent of group
Drift/gillnet	12 449	21.73	4 556	55.94
Lift net	9 460	16.51	218	2.68
Stationary trap	76	0.13	42	0.52
Portable trap	9 240	16.13	749	9.20
Hook and line	24 670	43.05	2 502	30.72
Bag net	1 354	2.36	32	0.39
Barrier net				
Push net				
Shellfish collection				
Miscellaneous	53	0.09	45	0.55
Total	57 302		8 144	

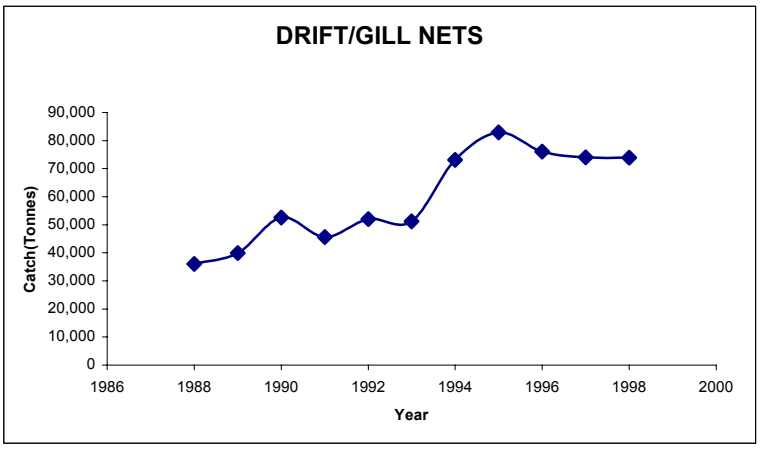

Figure 1. Catch trend of drift/gillnet fisheries on the west coast of Peninsular Malaysia between 1988 and 1998

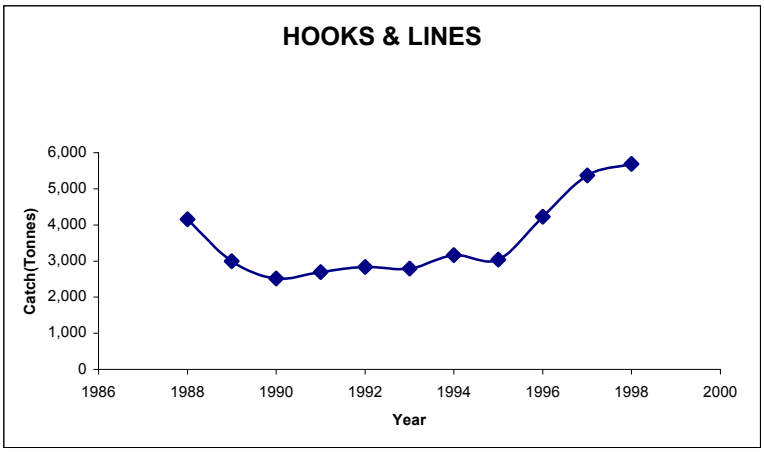

Figure 2. Catch trend of hook-and-line fisheries on the west coast of Peninsular Malaysia between 1988 and 1998

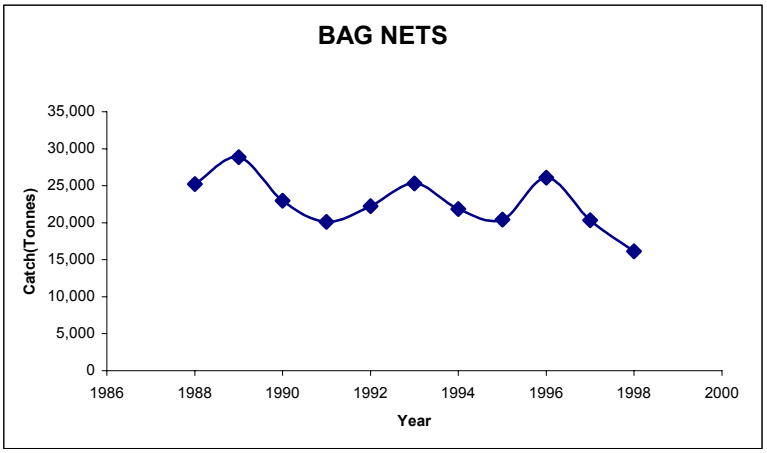

Figure 3. Catch trend of bag net fisheries on the west coast of Peninsular Malaysia between 1988 and 1998

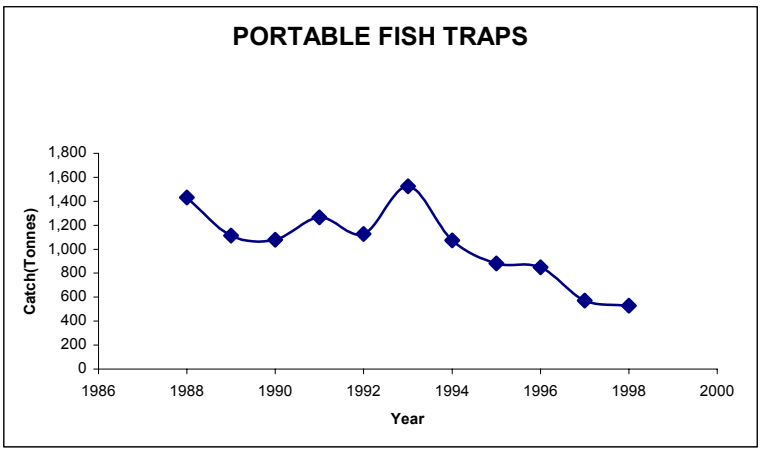

Figure 4. Catch trend of portable fish trap (*bubu*) fisheries on the west coast of Peninsular Malaysia between 1988 and 1998

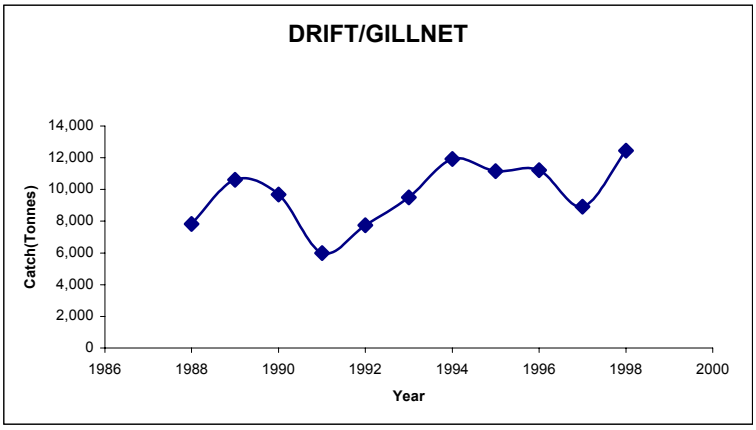

Figure 5. Catch trend of drift/gillnet fisheries on the east coast of Peninsular Malaysia between 1988 and 1998

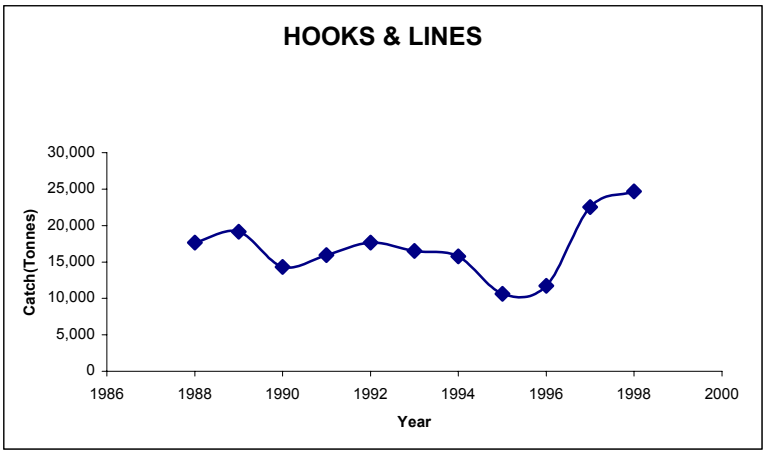

Figure 6. Catch trend of hook-and-line fisheries on the east coast of Peninsular Malaysia between 1988 and 1998

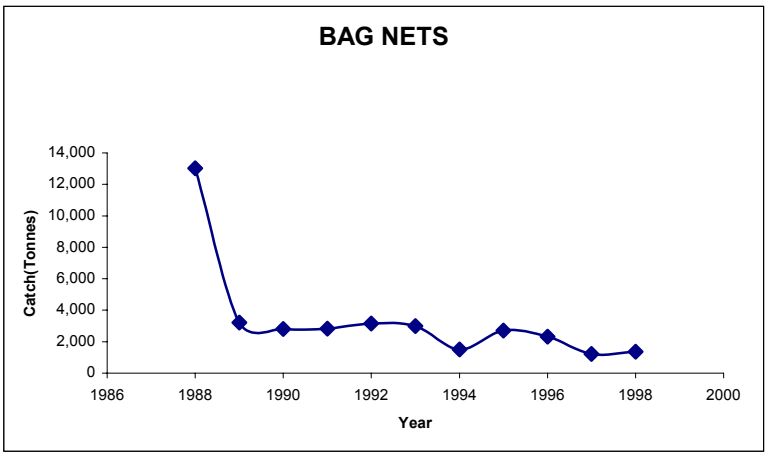

Figure 7. Catch trend of bag net fisheries on the east coast of Peninsular Malaysia between 1988 and 1998

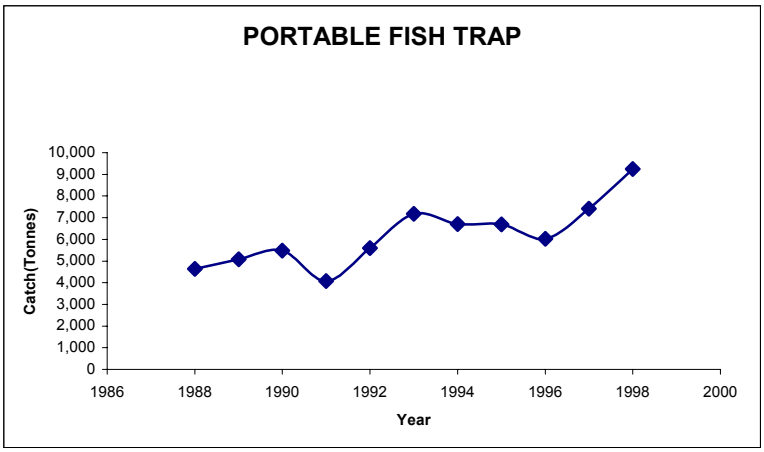

Figure 8. Catch trend of portable fish trap (*bubu*) fisheries on the east coast of Peninsular Malaysia between 1988 and 1998

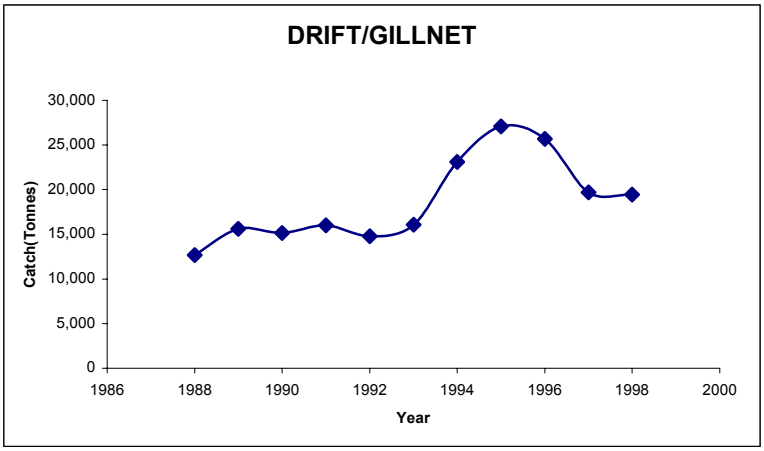

Figure 9. Catch trend of drift/gillnet fisheries in Sarawak waters between 1988 and 1998

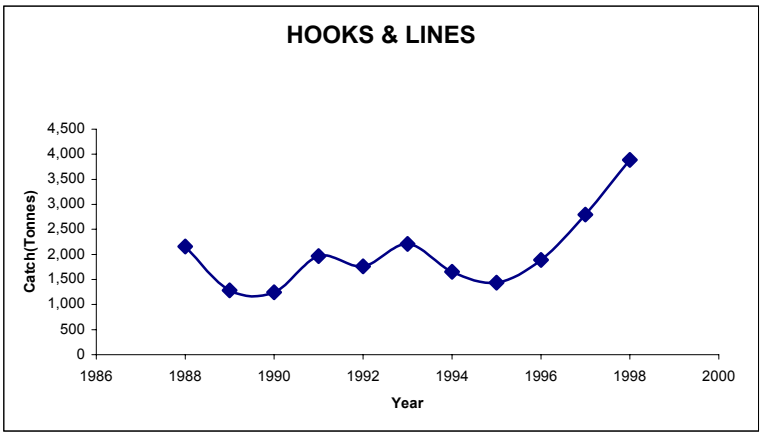

Figure 10. Catch trend of hook-and-line fisheries in Sarawak waters between 1988 and 1998

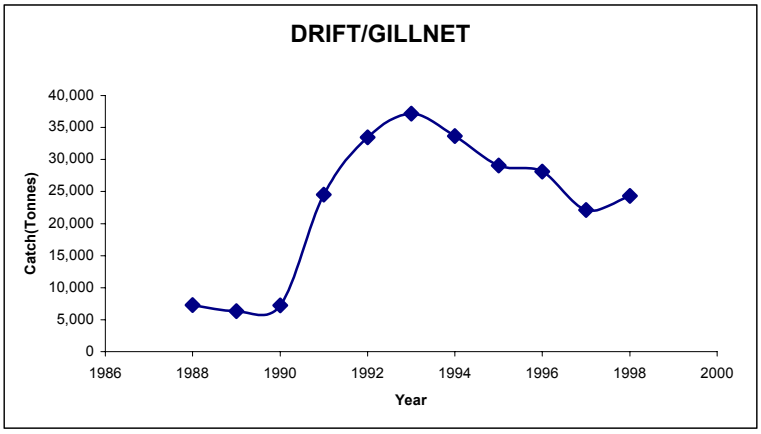

Figure 11. Catch trend of drift/gillnet fisheries in Sabah waters between 1988 and 1998

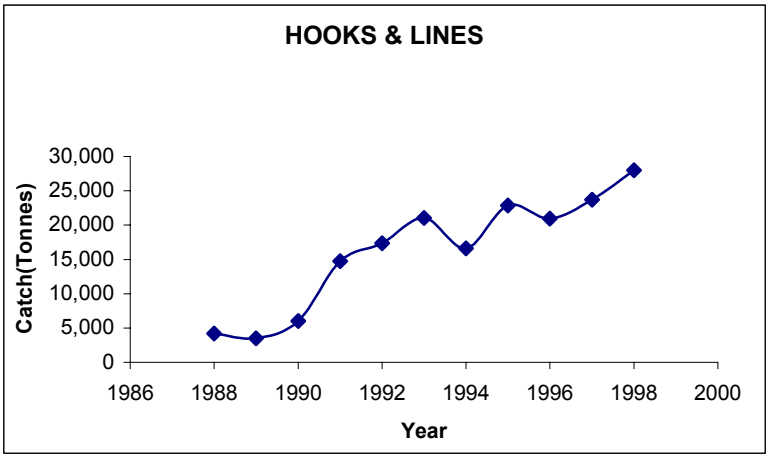

Figure 12. Catch trend of hook-and-line fisheries in Sabah waters between 1988 and 1998

SMALL-SCALE FISHERIES IN MYANMAR

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Introduction

Small-scale fisheries contribute over 50 percent to the total national catch. This report is primarily concerned with traditional fisheries, such as fishing with indigenous fishing gear, fishing for daily family consumption and income in coastal and brackish water areas, and flooded and open water bodies. However, frequent references are made to other types of fisheries, such as freshwater fisheries and offshore fisheries in order to put the small-scale sector in a proper perspective.

Fish is an important source of protein and it contributes up to 80 percent of daily protein consumption for the 51 million people in Myanmar. The main role of fisheries in Myanmar is to be a provider of food and employment. The production for 1999 amounts to 1.19 million tonnes of which marine fisheries accounts for 896 530 tonnes, or 67 percent of total production. The per capita consumption of fish is 22.7 kg. Freshwater fisheries including aquaculture provide 33 percent of the total production. Consumers still prefer freshwater fish, which sell at high prices. Marine fish is available at much lower prices and increasing quantities of it are available in the markets.

Small-scale coastal fisheries have great potential for development. In spite of having reached a considerable level through increased production, investments have been mainly been directed towards industrial fisheries and aquaculture.

The productivity of small-scale fisheries in Myanmar is attributed to the use of traditional fishing gear and methods. Priority should be given to the development of boat design, construction, fishing gear and methods. There is a shortage of appropriate fishing gear and equipment, engine spare parts and fuel. Myanmar still relies on imports. The country needs domestic manufacturers of fishing equipment. With local manufacturing of fishing materials and equipment, leading to a sufficient supply of cheap and high-grade fishing materials, readily available to fishermen, the production of the small-scale sector would be boosted substantially.

The total export production amounted to 144 623.85 tonnes with a value of US$218 million during 2000-2001. The export of fisheries products has an upward trend. The prospect of small-scale fisheries development in Myanmar is certainly bright since the resource potential is great and a huge market is waiting on the doorstep because of the big gap between demand and supply of fish in the international markets.

Current status of small-scale fisheries

Small-scale fishing activities in coastal areas are carried out within 5 nautical miles away from the shoreline in the Rakhine coast and 10 nautical miles in the Ayeyarwady and

Taninthayi coasts. Fishing is done by set fishing gear without boat or fishing gear with non-mechanized boats. If the boat is mechanized to assist moving fishing gear the engine should not exceed 12 HP and the overall length of the boat should not be more than 30 feet. The fishing season is from the beginning of September to the last day of June the following year. In fact, due to the severity of the weather during the monsoon season the actual fishing period is only seven months.

Fisheries resources

Myanmar has a coastline that stretches approximately from 21°N to 10°N over a distance of 1 800 km. With its large number of estuaries and islands, the total coastline will be close to 3 000 km. The continental shelf (0-200 metre depth) covers an area of 225 000 km^2.

Since the total investment in the marine fisheries sector is considerable, it was felt that at least a rough estimate of marine fisheries resources should be made, so that the risk of overfishing, overinvestment and consequent financial failure could be avoided.

With a view to identify new fishing grounds, stocks and a rationale for exploitation, a marine fisheries resource survey and exploratory fishing project was carried out with the assistance of FAO during 1979-83. Project activities consisted of acoustic/experimental fishing surveys with R.V. Fridtjof Nansan and trawl surveys with a vessel contributed by Myanmar.

According to surveys undertaken in marine fisheries, about 1.0 million tonnes of pelagic fish and 0.8 million tonnes of demersal fish exist as biomass in Myanmar marine fisheries waters. Out of the total biomass 0.5 million tonnes of pelagic fish and 0.55 million tonnes of demersal fish have been identified as total allowable catch or annual maximum sustainable yield (MSY).

Table 1: Total biomass and MSY in Myanmar marine waters

Area	Biomass			MSY		
	Demersal	Pelagic	Total	Demersal	Pelagic	Total
	[million tonnes]					
Rakhine	0.194	0.175	0.369	0.160	0.087	0.247
Delta (Yangon, Ayeyarwady, Mon)	0.334	0.505	0.839	0.220	0.252	0.472
Thanitharyi	0.256	0.295	0.551	0.170	0.147	0.317
Total	**0.784**	**0.975**	**1.759**	**0.550**	**0.486**	**1.036**

Since the surveys were conducted two decades ago a new survey is needed to identify the standing stock and MSY with the help of modern equipment and advanced technology.

Small-scale fishing gear

The common types of fishing gear in small-scale fisheries are lift net, stake net and cast net for onshore fisheries, gillnet, drift net, small shore seine, set net and hook and line for inshore fisheries. Small-scale fishery is done mainly with passive fishing techniques, catching the fish

by luring it or by chance. The most important and active fishing gear types are the encircling gillnet used for catching Hilsa species and the seine for small fishes such as anchovies and mackerels.

The small-scale fisheries sector has succeeded, to some extent, in increasing production due to mechanization of the craft and the introduction of imported synthetic fishing nets.

Table 2: Number of fishing implements and boats in inshore areas (1998-99)

Area	Implement	Boat (mechanized)	Boat (non-mechanized)	Boat Total
Thaninthayi	17 997	10 533	1 471	12 004
Ayeyarwady	3 220	361	1 368	1 729
Yangon	124	124	-	124
Mon	1 959	1 103	856	1 959
Rakhine	9 128	2 124	7 025	9 149
Total	**32 428**	**14 245**	**10 720**	**24 965**

Production

It is reported that the catch of traditional fishing gear without boat and inshore gear is about 60 *viss* per month (1 kg = 0.625 *viss*) and the catch with mechanized boats about 150 *viss* per month. There are fluctuations depending on season and the kind of fish caught.

Table 3: Inshore landing, indigenous fishing implements with small boats and not more than 12 HP in 1999-2000

State / Division	Implement of catch		Boat and landing		Total
	Number	Weight (ton)	Number	Weight (ton)	Weight (ton)
Rakhine	9 128	6 264.31	9 149	15 696.81	21 961.12
Ayeyarwady	3 230	2 216.66	1 729	2 966.42	5 183.08
Yangon	124	85.09	124	212.74	297.83
Mon	1 959	1 344.41	1 959	3 361.03	4 705.44
Thaninthayi	17 997	12 350.88	12 004	20 595.10	32 945.98
Total	**32 438**	**22 261.35**	**24 965**	**42 832.10**	**65 093.45**

Due to the long coastline and poor access to remote scattered fishing villages it is hard to collect the data from these remote areas. Nevertheless, based on experience and some sampling it is estimated that the total landing from the area is about two times in weight and the total production from the inshore areas is taken as 195 280.45 tons.

Small-scale fisheries management schemes

The Ministry of Livestock and Fisheries is responsible for the development of the livestock and fisheries sector. Under the ministry, the Department of Fisheries is the sole competent authority for fisheries management, conservation of resources, providing extension services,

conducting research and compiling national statistics in fisheries and fisheries-related infrastructure.

Though Myanmar marine fisheries have been steadily growing it is found that the diverse aquatic resources are not yet fully utilized. Catch reports, landing statistics and frequent research and surveys show the possibility of further expansion of fishing capacities and efforts for these underutilized resources. Fisheries management is pursued by proper licensing, prescribing exploitable species, prescribing environmentally friendly fishing gear and methods and regulating closed areas, closed season, etc.

Management activities should be based on assessments of the available fisheries resources, existing technology and markets, social and economic conditions, impact of other economic activities and other relevant factors, including foreign operation, where applicable. The objectives are to provide a legislative framework for a fisheries management system and to ensure, as much as possible, that both the fisheries people and the authorities concerned perform their roles within a sustainable framework.

Management measures

In order to conduct proper fisheries management the government has promulgated four fisheries laws. The main features of these laws relating to management are:

- reduction and eradication of mortality caused by men apart from legal fishing,
- preservation of areas, habitats and fishing grounds,
- protection of specific stocks and species,
- exploitation of resources on a rational, sustainable basis,
- inhibition of environment adverse effects on the industry and environment deterioration induced by the industry, and
- enforcement of fisheries laws and regulations.

In expending and promoting the fisheries industry, the Department of Fisheries exercises the above practices, making sure that there is no depletion of resources, environmental degradation or overfishing.

To conserve the juvenile fish and shrimp and to avoid conflicts between artisanal fishermen and trawlers, trawling is banned within five miles from the shoreline at the Rakhine coast and within ten miles from the shoreline in the Ayeyarwady and Taninthayi coasts. In addition, July and August are declared as closed season.

As most marine production comes from artisanal fishermen, it is essential to fulfil the needs of small-scale indigenous fishermen communities by increasing their income and improving their livelihood and their environment. Accordingly, zoning of fishing is based on the policy of protecting local fisheries. The Department of Fisheries gives priority to local fishermen by allowing them to operate in all zones. As declared in the Territorial Sea and Maritime Zone Law the waters between baseline and coast are reserved for local fishermen.

The rapid increase in demand for marine high-quality products has significantly accelerated the exploitation of shrimp and other demersal resources, resulting in resource use conflicts and violence between trawlers and small-scale fishermen. To ensure a more equitable exploitation and distribution of resources and to support the sustainability of small-scale

artisanal fisheries, efforts have been made by the fisheries department to limit the size and engine power of fishing boats in inshore areas. For effective management and control the department also determines the type of fisheries, the volume of business and method of fishing, the species of fish permitted to be caught, the size of the fish, the fishing implements and the fishing grounds. These conditions are attached to all fishing licenses.

Minimum mesh sizes and minimum catchable sizes for the main economic fish species have been established based on the rule of expansion and protection of the fisheries resources. For instance, the mesh size on fish trawl cod ends shall not be smaller than 2.5 inches, and 2 inches for the shrimp trawl cod ends. For the large mesh drift net, the minimum mesh size shall be 8 inches and for small mesh drift nets the size shall be 3.5 inches.

Socioeconomics

The total marine population engaged in fishing is 2 646 710 fisherfolk. They are broadly classified into two categories based on the nature of their work, as full-time and part-time fishermen. Full-time fishermen are those who have no income other than from fishing. Part-time fishermen are those who earn income from both fishing and other activities. Besides fishing, they may engage in fish processing, marketing and mending of fishing gear. As the income from fishing is seasonal and the bulk of the earning is often obtained during a few months of the years, fishermen are also involved in other activities such as agriculture and other works.

The majority of the fishermen do not own fishing vessels. Fishing vessels are owned by absentee boat owners, who take a major share of the catch. Due to the lack of surveys and of other information, the financial patterns among fishing communities are unknown. Collection of baseline information is already being made by fisheries officers in order to obtain a better understanding of the traditional fisheries system of the country.

Policy and objectives

The sectoral policies and principal objectives of the fisheries sector are

- to promote all-round development in the livestock and fisheries sector,
- to increase fish production for domestic consumption and share the surplus with neighbouring countries,
- to encourage the expansion of marine and freshwater aquaculture and
- to improve the socioeconomic status of fishing communities.

Requirements for the development of small-scale fisheries

1. Assess the potential of marine and coastal living resources including underutilized and unutilized stocks and species; develop methodologies and take measures for their conservation and sustainable use; and undertake studies on maximum sustainable yields of the various fish species.
2. Encourage research and develop long-term monitoring programmes, including databases, as well as information exchange with international conservation communities for technical and logistic support.

3. Develop and implement strategies for the sustainable use of marine living resources, taking into account the special needs and interests of small-scale artisanal fishermen, local communities and indigenous people to meet nutritional and other development needs, integrate small-scale fisheries development in marine and coastal planning taking into account their interest and, where appropriate, encourage representation of fishermen, small-scale fish workers, women, local communities and indigenous people.

In fact, the export potential of fish is still limited due to shortage of market structures, insufficient onshore facilities such as ice plants, cold storage, fishmeal and value-added fish processing plants. In order to increase fish production and export, Myanmar is building a relatively complete industrial infrastructure and systems integrating aquaculture, fishing, processing, marketing, technology, fishing port, fishing vessel dockyard, net factories, etc; thus fisheries is going to play a key role in national economic development. Myanmar is also taking international affairs seriously. Bound by the international agreements and conventions she has signed, Myanmar is responsibly fulfilling its obligations in order to fully participate in global and regional fisheries development activities.

Besides the national effort to support small-scale fisheries development, we need assistance from international fisheries-related agencies such as FAO, NACA, BOBP and SEAFDEC. Apart from the government's efforts in fisheries development, international or regional collaboration is needed in the following areas:

a. assessment of fisheries resources,
b. development of appropriate technology,
c. training of skilled manpower,
d. establishment of extension services,
e. identification and preparation of projects,
f. pilot or pioneering fishing operation and
g. funding schemes for commercial operation.

CURRENT STATUS OF SMALL-SCALE FISHERIES IN THE PHILIPPINES

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Introduction

Small-scale fishing is synonymous to artisanal, municipal, coastal and subsistence fishing. In the Philippines, however, we normally call it municipal fisheries.

More specifically, 'subsistence fisheries' refers to fisheries wherein fishing units catch marine products mainly for household consumption. 'Coastal fisheries' are defined as fisheries by fishing ground or area. In the Philippines, we use the range from 0 to 15 km to describe coastal fisheries. Countries differentiate their definition by water depth (SEAFDEC 2000).

Municipal fisheries is defined as small-scale fisheries with boats of less than 3 GT that are allowed to operate in Zone 1, from shoreline to 15 km, and Zone 2, from 15 km to the EEZ limit (SEAFDEC 2000). In this sub-sector, the persons involved are referred to as municipal fisherfolk who are directly or indirectly engaged in municipal fishing and other related fishing activities (BFAR 2001). These fisherfolk use *bancas* (a type of boat) with a capacity of 2-5 persons, usually without engine, and fishing gear like hook and line, gillnet and others (BFAR 1987).

By area of operation, municipal fisheries can be classified into two types, namely: marine municipal fisheries in coastal waters and inland municipal fisheries for freshwater areas such as lakes, rivers and streams.

According to the BFAR Fisheries Profile 2000, this sector has contributed 943 951 tonnes or 32.91 percent of the country's total fish production, valued at Peso32.5 billion, which is equivalent to 34 percent of the value.

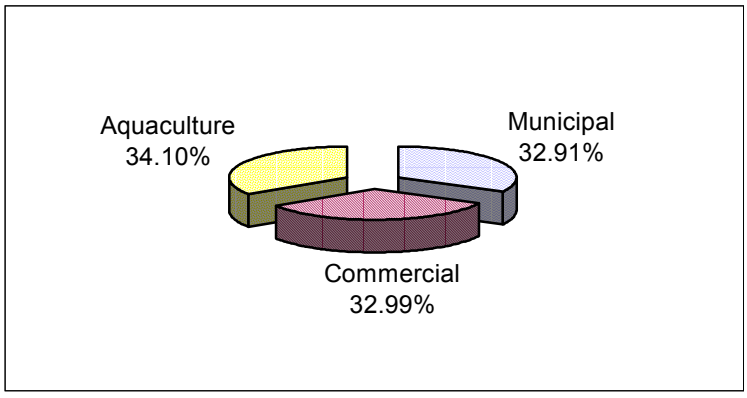

Figure 1. Fisheries production by sector, 2000

Based on the National Statistics Office 1990 Census of Population and Housing, the number of municipal fisherfolk employed totalled 374 408 or 46.40 percent of the 806 929 fisherfolk.

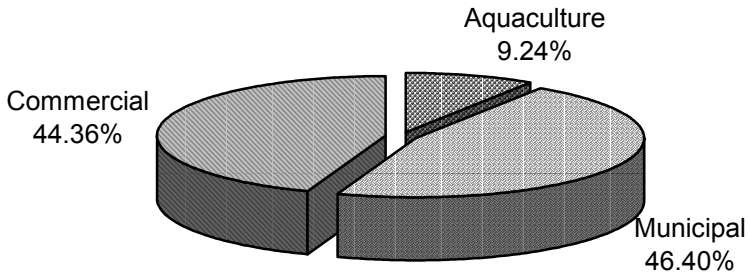

Figure 2. Fisheries employment by sector

Municipal fisheries structure

Fishing units

The municipal fishing *bancas* for the year 2000, categorized as motorized and non-motorized, totalled 177 627 and 292 180 units, respectively. The estimated fish production of these *bancas* were 289 131.84 tonnes for motorized *bancas* or 37.81 percent, and for non-motorized *bancas* 475 595.16 tonnes or 62.19 percent. (BFAR 2000)

The *bancas* used by the municipal fishermen have a relatively narrow hull, the base of which is a dugout made of tropical hardwood, and the walls are of plywood. The size ranges from 7 to 9 m in length, and if motorized, they are powered with 6 to 16 HP petrol engines. Most of them are equipped with outriggers for stabilization; those without outriggers only use sails and paddles. Small-scale fishermen also use bamboo rafts to carry their small fishing gear in shallow waters of the coast where *bancas* cannot operate. (BFAR-RFTC Project Coordinating Staff 1981)

Fishing gear

The main municipal fishing gear types in the Philippines are gillnet, hook and line, fish corral, beach seine, baby trawl, ring net, Danish seine, spear, long line, purse seine, fish pot, bag net, crab lift net, troll line, jigger, push net, round haul seine, filter net, drive-in net, lift net, fyke net, pole and line, drift filter net, cast net and others.

Fishing grounds

In 1995, there were at least 13 fishing grounds considered as major production areas for the municipal sub-sector. The top four highest producing areas were the Visayan Sea with 11.28 percent, followed by the Moro Gulf with 9.41 percent, the East Sulu Sea with 9.01 percent and the Bohol Sea with 9.10 percent (Table 1).

Table 1. Marine municipal fisheries production by main fishing grounds, 1995, BFAR Fisheries Profile 2000

Fishing ground	Total [tonnes]	% of total
Visayan Sea	88 616	11.28
Moro Gulf	73 938	9.41
East Sulu Sea	71 486	9.10
Bohol Sea	70 756	9.01
Guimaras Strait	51 332	6.54
Leyte Gulf	49 901	6.35
West Palawan Waters	46 948	5.98
South Sulu Sea	42 019	5.35
Lamon Bay	41 862	5.33
Samar Sea	40 236	5.12
Davao Gulf	33 743	4.30
Cuyo Pass	25 587	3.26
Tayabas Bay	17 498	2.23
Other	131 447	16.74
Total	785 369	100.00

Regional municipal production

In terms of production by region, Region IV contributed 257 835 tonnes or 27.31 percent, followed by Region VI with 134 227 tonnes or 14.22 percent and Region IX with 122 479 tonnes or 12.97 percent (Table 2).

Table 2. Municipal fisheries production by region, 2000 (in tonnes), BFAR Fisheries Profile, 2000

Region	Marine	Inland	Total	% of total
NCR	3 982	0	3 982	0.422
CAR	0	1 075	1 075	0.114
I	22 844	548	23 392	2.478
II	13 809	3 228	17 037	1.805
III	8 867	2 309	11 176	1.184
IV	153 004	104 831	257 835	27.314
V	73 247	556	73 803	7.819
VI	132 838	1 389	134 227	14.220
VII	47 424	58	47 482	5.030
VIII	37 199	4	37 203	3.941
IX	122 225	254	122 479	12.975
X	16 840	239	17 079	1.809
XI	47 197	922	48 119	5.098
XII	6 295	13 378	19 673	2.084
XIII	63 709	2 890	66 599	7.055
ARMM	44 344	18 446	62 790	6.652
Total	793 824	150 127	943 951	100.000

Fisheries management schemes for small-scale/municipal fisheries

The fisheries resource management project (FRMP)

FRMP is a project executed by the Department of Agriculture through the Bureau of Fisheries and Aquatic Resources and each Department of Agriculture regional office. It is co-financed by the Asian Development Bank (ADB) and the Overseas Economic Cooperation Fund of Japan (OECF) and is implemented in six years from 1999 to 2004.

The project financing comes from the loan proceeds under the ADB Loan No. 1562 PHI (SF); ADB Loan No. 1563 PHI and OECF-JBIC PH-P197. Table 3 shows the total project cost per financing agreement.

Table 3. Total project cost per financing agreement

	In original currency	Philippine Peso
Loan proceeds	ADB 1562 PHI - SDR11.022 M	P484 431 000.00
	ADB 1563 PHI - US$20.22 M	556 479 000.00
	JBIC PH-P197 - YEN2.428 M	622 017 000.00
	Total loan proceeds	**P1 662 927 000.00**
Peso counterpart	GOP	P532 249 000.00
	LGU	657 421 000.00
	Total peso counterpart	**P1 189 670 000.00**
Total		**P2 852 597 000.00**

The project is an impetus on the part of the government to shift the sector focus from increasing capture fisheries production to fisheries resource protection, conservation and sustainable management. It is a reflection of the demand of municipal fisherfolk for public assistance to protect their basic livelihood and the national and local governments' concern over poverty and environmental degradation. The objectives of the project are to:

- achieve sustainable development of the fisheries sector and
- reduce poverty among municipal fisherfolk.

The primary objective is to reverse the trend of the fisheries resource depletion in municipal waters.

The project covers 100 municipalities in 18 bays, 11 of which were formerly under the Fisheries Sector Programme (FSP), namely Calauag Bay, San Miguel Bay, Tayabas Bay, Ragay Gulf, Lagonoy Gulf, Sorsogon Bay, Carigara Bay, San Pedro Bay, Ormoc Bay, Sogod Bay, Panguil Bay and seven new gulfs and bays, namely Honda Bay, Puerto Princesa Bay, Davao Gulf, Lingayen Gulf, Gingoog Bay, Butuan Bay and Sapian Bayare.

One of the project components is the coastal resource management (CRM) planning and implementation. This will be done through an information, education and communication campaign that will be launched to elicit the participation of various stakeholder groups, especially municipal fisherfolk in CRM planning and implementation.

Key strategies under this are:

a) Resource and social assessments (RSA) which include rapid social appraisal;
b) Through the RSAs, CRM plans will be developed in the new bays and updated in the old bays after consultation among the stakeholders;
c) Guided by the CRM plans, resource rehabilitation will be implemented to include:
   - establishment of fish sanctuaries
   - mangrove reforestation and
   - management of fish stocks

Accomplishments

FRMP, in line with its approach to reach a more sustainable fisheries management strategy, has prioritized the establishment of marine protected areas and the rehabilitation of damaged habitats. To date, this project has undertaken the establishment and maintenance of 106 fish sanctuaries in 66 municipalities, the rehabilitation of 26 mangrove areas in 26 municipalities and the maintenance of the rehabilitated portion of the Irawan River in Puerto Princesa City.

The community-based coastal resource management programme (CB-CRM)

This project is one of the components under the BFAR programme in the Ginintuang Masaganang Ani. It provides technical assistance and training to coastal communities and local government for managing their coastal resources. This will assist the communities in developing coastal resource management plans through a participatory process. The main activities include: territorial delineation of the bays, control of fishing effort, law enforcement, management and conservation of marine habitats, resource and ecological assessments, community organizing and involvement of local government units.

Accomplishments

CRM activities follow plans based on scientifically gathered data. Under FRMP, RSAs in priority bays were conducted. RSAs for Lingayen Gulf, Honda Bay, Puerto Princesa Bay and Sapian Bay are being prepared for the final report. RSAs for Gingoog Bay, Butuan Bay, Davao Gulf, Ormoc Bay, San Pedro Bay and Sogod Bay are still ongoing.

Likewise, 59 percent of the project's 1063 coastal *barangays* have prepared their community action plans which serve as inputs to the municipal CRM plans. The CRM plans will include boundaries properly delineated to avoid conflict. Pilot activities have already been undertaken in Davao Gulf, Butuan Bay and Sapian Bay (BFAR-FRMP, 2001).

In terms of the implementation of integrated coastal resource management in Puerto Princesa City, a river/watershed eco-profiling project was conducted. The delineation and mapping of management areas in Honda and Puerto Princesa bays were realized. Planting of forest tree seedlings in the watershed of the Magarwak River in Honda Bay covering 20 ha was also conducted.

The designing of a comprehensive community-based fisheries laws enforcement system is being undertaken. In addition, a model municipal fisheries ordinance is being distributed for adoption through a guidebook. Patrol boats are acquired in order to improve the capability of the Bantay Dagat (law enforcement).

On the Geographic Information System, the ground verification of satellite data, i.e. a base and coastal habitat map, has been completed. The ground validation of Sapian Bay focusing on the assessment of substrate, sea grass, coral reef, mangrove forests and land use was conducted.

In terms of income diversification, FRMP continuously engaged the services of NGOs in organizing communities and fisherfolk for their more effective involvement in bays to include Carigara Bay, Butuan Bay, Gingoog Bay, Ragay Gulf, Honda Bay, Calauag Bay, Puerto Princesa Bay, Tayabas Bay, Lagonoy Gulf, Sapian Bay, San Pedro Bay, Davao Gulf, Lingayen Gulf, Panguil Bay and Sorsogon Bay. The fisherfolk organizations have acquired internal savings and at least 51 micro-enterprises have been pilot tested by a number of cooperatives and fisherfolk organizations (BFAR-FRMP, 2001).

The implementation of the CB-CRM programmes and projects involves one or a combination of the following interventions, such as technology for increased fish production, artificial reefs, mangrove reforestation, policy formulation on environmental protection and resource management, alternative livelihood development and credit support, establishment and operation of protected areas and marine sanctuaries, and institutional capability development (Pomeroy and Carlos, 1997).

*The **SEAFDEC/IDRC community fisheries resource management project***

This project is a development-oriented research project specifically for Malalison Island in Panay, which integrates biology, economics, sociology, engineering and public administration in its studies. It is a two-phase project. Phase I concentrates its activities on community organizing, institution building and introducing alternative livelihoods, i.e. seaweed farming. Phase II implements the territorial use rights in fisheries and tests the deployment of prototype concrete artificial reefs including impact assessments, institutional arrangements in fisheries co-management, ethnographic studies, economics of sea-farming techniques and management of fisheries cooperatives (Agbayani, 1997).

Fisheries administrative orders and regulations applied to small-scale fisheries

As one of the Republic Act (RA) 8550 policies, the government manages fisheries and aquatic resources in a manner consistent with the concept of an integrated coastal area management in specific natural fisheries management areas, appropriately supported by research, technical services and guidance. Thus, BFAR has issued various fisheries administrative orders (FAOs):

- FAO 201 provides the list of active gear types banned for operation in municipal waters, bays and fisheries management areas.
- FAO 202 provides guidelines on the banning of coral exploitation and exportation.
- FAO 203 is on banning of fishing by means of *muro-ami* and the like which is destructive to coral reefs and other marine habitats.
- FAO 204 is on restricting the use of super lights in Philippine waters.
- FAO 206 provides guidelines on the disposal of confiscated fish and other items in fishing with explosives and noxious or poisonous substances.
- FAO 208 regulates and implements the conservation of rare, threatened and endangered fisheries/aquatic species.

- FAO 209 provides guidelines on the production, harvesting, handling and transportation of shellfish for implementation by the local governments.
- FAO 216 provides guidelines on the obstruction to navigation in streams, rivers, lakes and bays.
- FAO 217 provides guidelines on the obstruction to defined migration paths.

Fisheries and aquatic resource management councils

Linked to the implementation of RA 8550, Sec. 68 provides for the development of fisheries and aquatic resources in municipal waters and bays by the fisherfolk and their organizations residing within the geographical jurisdiction of the *barangays*, municipalities or cities with the concerned local government units.

Sec. 69 provides for the establishment of fisheries and aquatic resource management councils (FARMCs) at the national level and in all municipalities/cities abutting municipal waters. The councils will be formed by fisherfolk's organizations/cooperatives and NGOs in the locality and be assisted by the local government units and other government entities. Consultation and orientation on the formation of the councils is also required before they are organized.

At present, there are at least 6 397 Barangay Fisheries and Aquatic Resource Management Councils (BFARMC), 876 Municipal/City Fisheries and Aquatic Resource Management Councils (M/CFARMCs) and 45 Integrated Fisheries and Aquatic Resource Management Councils (IFARMCs) organized countrywide (Table 3).

Table. 3 Number of FARMCs organized by region, BFAR, 2001, National FARMC Programme Management Centre

Region	No. of coastal *brgys*	No. of BFARMCs organized	No. of coastal municipalities/ cities	No. of M/CFARMCs organized	No. of I/FARMCs organized
CAR		2		20	1
I	378	335	53	53	1
II	179	240	25	37	1
III	223	201	37	40	1
IV	1 671	1 054	185	145	13
V	1 067	956	94	91	2
VI	771	398	83	70	9
VII	1 023	318	110	99	3
VIII	1 557	856	122	68	1
IX	605	501	61	60	2
X	292	275	44	41	5
XI	330	299	36	32	3
XII	370	210	34	27	2
XIII	582	389	65	50	-
ARMM	615	363	65	43	1
Total	**9 663**	**6397**	**1014**	**876**	**45**

RA 8550 also provides the legal framework for the role of National Fisheries and Aquatic Resource Management Councils (NFARMC), M/CFARMC and IFARMC. Fisheries Administrative Order (FAO) 196 provides the guidelines creating and implementing FARMCs. The creation of a FARMC will institutionalize the major participation of the fisherfolk and other resource users in the planning and formulation of policies and programmes for the management, conservation, protection and sustainable development of fisheries and aquatic resources.

The NFARMC functions are 1) assisting in the formulation of national policies for the protection, sustainable development and management of fisheries and aquatic resources for the approval of the Secretary; 2) assisting the fisheries department in the preparation of the National Fisheries and Industry Development Plan.

On the other hand, BFARMCs and LFARMCs will serve in an advisory capacity to the local government units, whereas the M/CFARMCs exercise functions such as assisting in the preparation of the municipal fisheries development plan and submit this plan to the Municipal Development Council, recommend the enactment of municipal fisheries ordinances to the *sangguniang bayan* or *sangguniang panlungsod* through its committee on fisheries, assist in the enforcement of fisheries laws, rules and regulations in municipal waters and advise the *sangguniang bayan* or *panlungsod* on fisheries matters through its committee on fisheries, if such has been organized.

The IFARMC functions are as follows:

- assist in the preparation of the Integrated Fisheries Development Plan and submit the plan to the concerned municipal development councils;
- recommend the enactment of integrated fisheries ordinances to the concerned *sangguniang bayan* or *panlungsod* through its committee on fisheries, if such has been organized;
- assist in the enforcement of fisheries laws, rules and regulations in concerned municipal waters; advise the concerned sangguniang bayan or panlungsod on fisheries matters through its committee on fisheries, if such has been organized.

In addition, Executive Order (EO) No. 240 was initially the offshoot of the creation of FARMCs in *barangays*, cities and municipalities. Its implementing guidelines elaborate the function of the FARMCs. Its framework seeks the enhancement of their empowerment through meaningful participation in the management, development and protection of fisheries and aquatic resources for sustainable production. This executive order enumerates the primary functions such as in the preparation and advisory role in fisheries and aquatic resource management policies and plans for integration into the local development plan. It also provides the local government units and special agencies with guidelines including the evaluation of all projects and applications. These guidelines concern the development and implementation of projects and issuance of permits and licenses for the appropriate use of the resources and to ensure that resource use limits and controls are imposed.

Joint Administrative Order No. 2, which implements the rules and regulations of EO 240 issued by the departments of Agriculture (DA), Environment and Natural Resources (DENR), Interior and Local Government (DILG) and Justice (DOJ), provided the specific powers and functions under sections 11, 14, 17 and 20. In addition, Joint Administrative Order No. 3, known as the "Implementing Guidelines on the Granting of Preferential Treatment to Small Fisherfolk relative to the 15-Km Municipal Waters", specified the functions of MFARMC.

These guidelines will determine a definite zone or zones within municipal waters. A registry of municipal fisherfolk and their organization will also be maintained. The FARMCs existing or those to be organized adopt the structural framework illustrated in Figure 3.

FARMCs have carried out significant activities relative to their functions. At the national level, they have organized forums, conferences and workshops to deliberate and review the various fisheries administrative orders. Besides, the councils continuously strengthen the current mechanism addressing specific fisheries issues affecting the small-scale fisherfolk. The formulation of a national FARMC programme of key strategic thrusts has been undertaken.

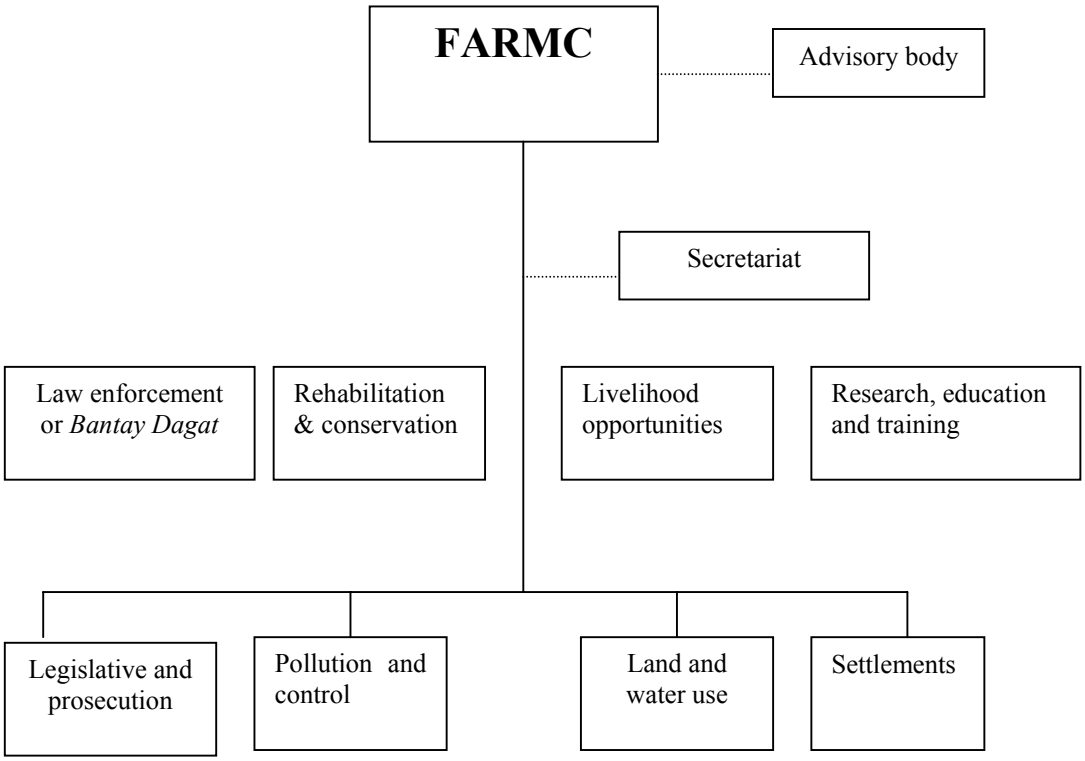

Figure 3. Structural framework of the Fisheries and Aquatic Resource Management Council (FARMC)

The FARMC secretariat was pledged to be revitalized to serve as the link between local fisherfolk, the bureaucracy and the FARMC leadership. In addition, activities are being organized such as the formulation of an effective management scheme for the fisherfolk mariculture parks project and fisherfolk-BFAR-PNP project on networking coastal communities for fisheries laws enforcement, the Coastal Information Network. The signing of a memorandum of agreement for an effective surveillance and community-based law enforcement programme has been accomplished. The government, through the DA Secretary, has vowed to ensure the broad and meaningful participation of the fisherfolk sector in the execution of RA 8435 and RA 8550.

Republic Act (RA) 7160, also known as the Local Government Code of 1991, had made some structural changes in terms of the devolution of functions related to the transfer of basic

services and technology to the fishing communities. This code intends to give greater autonomy to local government units in the management of their aquatic resources.

In relation to this, a memorandum of agreement between DA and DILG would authorize the devolution of fisheries regulatory functions within municipal waters. The jurisdiction over the municipal waters has been transferred to the local government units concerned. The functions include the following:

- Enforcement of fisheries laws in municipal waters including the conservation of mangroves [Section 17 (b), (2), (i)];
- Issuance of licenses for the operation of fishing vessels of three tons or less [Section 149, (b), (3)];
- Granting of fisheries privileges to erect fish corrals, oyster, mussel or other aquatic beds or *bangus* fry areas [Section 149, (b), (1)];
- Granting privileges to gather or catch *bangus* fry, prawn fry or fry of other species of fish [Section 149, (b), (2)];
- Enactment of the ordinance penalizing the use of explosive, obnoxious or poisonous substances, electricity, *muro-ami* and other deleterious methods of fishing. The *sangguniang bayan* concerned shall also have the authority to prosecute any violation of the provisions of applicable fisheries laws [Section 149, (b), (3)];
- Protection of the marine environment and imposition of appropriate penalties for acts which endanger the environment such as dynamite fishing and other activities which result in pollution or ecological imbalance [Section 447, (a), (1),(vi)];
- Authorization of the establishment and operation of ferries, wharves and other structures. Also included are marine and seashore activities intended to accelerate productivity [Section 447, (a), (5), (iii)];
- Regulation of the preparation and sale of fish for public consumption [Section 447, (a), (5), (iv)]; and
- Approval of measures and adoption of quarantine regulations to prevent the introduction and spread of diseases [Section 447, (a), (5) (xii)]

The other functions, which were devolved and had caused the exercise of general supervision of local government units are:

- Issuance of permits to construct fish cages within municipal waters
- Issuance of permits to gather aquarium fishes within municipal waters
- Issuance of permits to gather *kapis* shells within municipal waters
- Issuance of permits to establish seaweed farms within municipal waters
- Issuance of licenses to establish culture pearls within municipal waters
- Issuance of auxiliary invoice to transport fish and fisheries products, and
- Establishment of closed season in municipal waters

Section 3 (f) indicated that local government units might group themselves, consolidate or coordinate their efforts, services and resources for purposes commonly beneficial to them. "The local government units 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 RA7160 and national policies."

Section 17 on the Basic Services and Facilities: "local government units shall endeavour to be self reliant and shall continue exercising the powers and discharging the duties and functions currently vested upon them. They shall exercise other powers and discharge such other

functions and responsibilities as are necessary, appropriate or incidental to the efficient and effective provision of the basic services enumerated such as 1) agricultural support services, infrastructure facilities and maintenance of *barangay* roads and water supply systems as well as satellite or public market; 2) extension and onsite research services and facilities related to agriculture and fisheries activities; and 3) assistance in the organization of farmers' and fishermen's cooperatives and other collective organizations as well as transfer of appropriate technology".

Under Section 447 (a) (1) (vi), "the *sangguniang bayan* shall enact ordinances, approved resolutions and appropriate funds for the general welfare of the municipality and its inhabitants and in accordance the local government unit shall protect the environment and impose appropriate penalties for acts which endanger the environment such as dynamite fishing and other forms of destructive fishing … and smuggling of natural resource products and endangered species of flora and fauna, and …. such other activities which result in pollution, acceleration of eutrophication of rivers and lakes or of ecological imbalance".

Under Section 458 (a) (1) (vi), "the *sangguniang panglungsod* shall enact ordinances, approved resolutions and appropriate funds for the general welfare of the municipality and its inhabitants and in accordance the local government unit shall protect the environment and impose appropriate penalties for acts which endanger the environment such as dynamite fishing and other forms of destructive fishing … and smuggling of natural resource products and endangered species of flora and fauna, and such other activities which results in pollution, acceleration of eutrophication of rivers and lakes or of ecological imbalance".

Under Section 465 (a) (3) (v), "the provincial governor shall adopt measures to safeguard and conserve … marine, forest and other resources of the province, in coordination with the mayors of component cities and municipalities … protect the funds, credit and other properties of the provinces thereof".

Under Section 468, (a) (1) (vi), "the *sangguniang panlalawigan* shall approve ordinances and pass resolutions necessary for an efficient and effective provincial government and in this connection shall protect the environment and impose appropriate penalties for acts which endanger the environment such as dynamite fishing and other forms of destructive fishing … and smuggling of natural resource products and endangered species of flora and fauna, and …. such other activities which results in pollution, acceleration of eutrophication of rivers and lakes or of ecological imbalance".

Problems of the small-scale fisheries industry (FIRM and DAP 1987)

The problems and needs of the municipal fisheries industry are classified into industrial, socioeconomic, political and institutional.

1. **Industrial**
   - low fish production
   - underutilization of fisheries resources
   - mal exploitation of some fishing grounds
   - proliferation of illegal fishing
   - lack of ice plants and cold storage facilities
   - lack of effective organizational and extension machinery