A MANUAL FOR THE CO-MANAGEMENT OF COMMERCIAL FISHERIES IN THE PACIFIC

Secretariat of the Pacific Community
A manual
for the co-management
of commercial fisheries in the Pacific

by
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Fish stocks are resources that are common to everyone. As fishers do not individually own the fish in the sea, they may have little incentive to conserve fish stocks. Fishers will generally compete with each other to catch as many fish as possible unless there are regulations that restrict their effort. In order to ensure sustainability, access to common resources, such as fish stocks, must be controlled in some way, or the use of the resource must be regulated.

Before establishing regulations to manage common resources, it first must be determined who holds the property rights over the resource, or who should ultimately control the fishery. The question who has the right to control common property resources? can be answered differently by three basic management regimes:

1. state governance, where government agencies exclusively control the rights to the resource on behalf of all citizens;
2. communal governance, where a community of users holds the resource with power to exclude others and regulate how the community itself uses the resource; and
3. a middle course between pure state governance and pure communal governance, where the responsibility of management is shared between government and local resource users. This middle course is commonly referred to as co-management.

Fisheries managers now recognise that it is essential to involve all stakeholders in fisheries resource management. Fisheries cannot be managed without the cooperation of fishers and related groups. It is now thought to be more effective to delegate the authority to manage fisheries resources to local fishers and other stakeholders than to government agencies that are often distant, understaffed and underfunded. In an attempt to manage fisheries resources in a more effective and efficient manner, some countries have recently implemented co-management systems. These systems combine the experience and interests of local fishers, boat owners, fish traders and relevant business people with the ability of government to enact legislation, enforce regulation and resolve conflicts.

This manual is about the co-management of commercial fisheries. It complements the manual on the community management of subsistence fisheries, Fisheries Management by Communities (King and Lambeth 2000). Although there are numerous models that have been adopted by countries for co-managing fisheries resources, the majority of information presented in this manual is taken from the co-management system that Samoa established for its offshore fisheries, in particular the tuna longline fishery.

The guidelines and suggestions that are presented in this manual are intended to assist government agencies and fisheries resource user groups to promote and facilitate stakeholder involvement in the development and management of commercial fisheries in the Pacific region.
2. Economic importance of commercial fisheries in the Pacific Islands

Commercial fisheries play an extremely important role in the economies of the Pacific Island countries. The total value of commercial fisheries in the Pacific Islands is approximately USD2.2 billion. Tuna exports alone are approximately USD1.9 billion, almost half of the value of all exports from the region (Van Santen and Muler 2000). Inshore commercial fisheries, on the other hand, contribute only about USD82 million in revenue to the economies of the Pacific Islands (Dalzell et al. 1996). Commercial aquaculture, in particular the black pearl industry, contributes an estimated USD175 million in revenue to the region (Sims in Tisdell and Poirine 2000).

Approximately one-third of the 3.6 million metric tonnes of tuna landed in the world comes from the Pacific Island region (Joseph 2000). In terms of specific markets, the region supplies 60 per cent of all tuna for canny purposes and 30 per cent of the tuna for the Japanese sashimi trade (Gillett et al. 2000).

The gross domestic product (GDP) of all the Pacific Island countries is approximately USD17 billion (SPC 1998). Eleven per cent of the combined GDP of all the nations in the region comes from commercial fisheries.

One of the major financial benefits to the Pacific Islands is access fees paid by foreign fishing vessels to fish in the EEZs (Exclusive Economic Zones) of the Forum Fisheries Association (FFA) member countries. In 1999, approximately USD60.3 million was received for fishing licences. This represents a sizable portion of the government revenue for many nations in the region. In Tuvalu for example, access fees amounted to about 40 per cent of the government revenue in 1999 (ADB 2000).

There are about 303 industrial-scale tuna vessels based in the region including 26 purse seiners, 32 pole-and-line vessels and about 203 longliners. The annual expenditure, e.g., on food, fuel, ice and transport, by these locally based vessels, approaches USD150 million (Gillett et al. 2000).

Between 21,000 and 31,000 people are estimated to be either directly or indirectly employed in the tuna industry in the Pacific region, i.e., between five and eight per cent of all wage earners in the region (Gillett et al. 2000). It is difficult to determine the number of people employed in inshore commercial fisheries as many only work part time or seasonally.
3. Why co-management of commercial fisheries?

With increasing fishing pressure, it is now necessary to manage fisheries resources effectively to ensure sustainability. Fishers do not always easily accept the restrictions imposed by government to control their effort. The rewards of being their own boss may have attracted people to the fishing industry in the first place. If in turn what they are told does not make sense in terms of their own experience, knowledge of their industry and the way they see their problems, fishers may be even less likely to accept any restrictions imposed.

For regulations to be effectively applied, they must be fair. To ensure equity requires detailed knowledge of local circumstances in the fishing industry and the ecological conditions that exist in the fishery to be regulated. Government agencies may not always have the knowledge that is needed. Fishers and other resource users, on the other hand, are likely to possess knowledge based on their experience that can contribute towards remedies and solutions that are more enlightened, effective and equitable in making decisions for management.

The involvement of government, however, has the benefit of contributing unbiased views and opinions concerning fisheries management issues, whereas fisheries resource users are likely to be capable of making more equitable regulations than government. Fishers are intimately involved in the industry and they are in a better position to respond to the special needs, demands and interests of individual fishers and other user groups.

There is little chance that fisheries regulations will succeed unless fisheries resource users actively support them. If not, they will find ways to bypass government regulations, and governments will incur exorbitant costs in monitoring and surveillance. If fishers are involved in making the rules and regulations in a fishery, they are more likely to respect them.

While management arrangements made by government agencies often lack the local knowledge and experience of fishers and other user groups, these groups often lack the scientific and legislative knowledge that government agencies can provide to effectively manage commercial fisheries resources. Therefore, managing commercial fisheries resources on a cooperative basis involving all the stakeholders is often a preferable alternative to government or local-level management systems.
The co-management system established in Samoa

The commercial fishery in Samoa has expanded rapidly since 1995, when horizontal longline gear was introduced to capture large tunas, albacore, yellowfin and bigeye, for export. Exports of tuna have increased from 2092 metric tonnes, valued at USD4 million in 1996, to 4505 metric tonnes, valued at USD13 million, in 2000. The industry employs over 500 people and is the major export earner of the country. However, although the tuna fishing industry has contributed substantially to the economy of Samoa, its rapid expansion has created many problems for both the private and the public sectors. Thirty-three lives were lost at sea between 1997 and 2000 due to the lack of seamanship skills, lack of basic safety equipment, and poor vessel construction. Considerable quantities of fish were rejected due to poor on-board handling of the catch and lack of adequate onshore facilities to process and store the catch properly. The mooring facilities were inadequate to deal with the considerable increase in the number of fishing vessels.

The Government of Samoa, in an attempt to address some of these problems, developed a national radio communications system for mariners and imposed regulations concerning construction, safety equipment and manning requirements for fishing vessels. But the government wanted to involve the industry in the process of making decisions towards managing the tuna fishery, as the fishers and other user groups had a better understanding of the needs and concerns.

In September 1999, Samoa, with assistance from an AusAID-funded project, established a co-management system. The aim was to achieve closer consultation with the stakeholders and greater awareness of fisheries resource management issues, and to provide the opportunity for all stakeholders to have direct input into the fisheries management decision-making process. As a result of this interaction and consultation with the stakeholders, greater awareness, acceptance and ownership of fisheries management arrangements have been achieved.
4. Involving the stakeholders in fisheries management

Although traditional management systems have a long history in the Pacific region, the majority of these systems have now been weakened or have disappeared. This is often because national governments have taken over the responsibility of fisheries resource management, or, in some cases, because the traditional systems have been unable to accommodate commercial situations. Only a few localized traditional management systems still exist in the region. While many fishing communities maintain some level of traditional management, fisheries management is now mainly a function of government.

To involve fishers and other user groups in the fisheries management process can sometimes be a challenge. Government resource managers are often reluctant to share authority. They may resent the infringement by local fishers and other user groups upon what they consider their professional responsibilities.

Fishers, fish traders, processors, and consumers are some of the stakeholders affected by management decisions and they each have a legitimate role in the process. Government agencies other than fisheries departments, such as departments of treasury, environment, transport, and trade, and port and airport authorities, also play a major role in fisheries management. Other groups, such as environmental organisations, non-governmental organisations, and sports fishing associations, may also have an interest in commercial fishery management. In order for co-management systems to work effectively, all key public and private stakeholders must be consulted and involved in the fisheries management process.

Generally, it is insufficient for governments to simply call for more private sector and community involvement in the fisheries management decision-making process. Government must also establish legal rights and authorities and devolve some of its powers. It is not enough only to foster conditions for fishing industry participation; this participation needs also to be sustained.

The arrangements for implementing co-management can vary from country to country. In one case, a government may install a licensing system for a fishery and issue a number of licences to a fishing cooperative to distribute among its members at its own discretion. In another, the government may give rights of ownership over fishing territories to fishers’ organisations. In other cases, the government may give quotas to fishermen’s organisations to distribute as they see fit.
Fishers’ involvement in managing Norway’s cod fishery

The Lofoten Islands in Norway have supported a major cod fishery since ancient times. This fishery is seasonal, starting in early January and finishing in late April. It provides the main income for many small-scale fishers. High numbers of fishers have historically been attracted to the area, causing problems of crowding and conflicts with fishing gear. During the 19th century, the government tried various regulatory systems without success. In the 1890s, the Norwegian government implemented a co-management arrangement through the Lofoten Act, whereby the regulation of the cod fishery was formally given to the fishers. Under the co-management system, representatives from different fishing gear groups formed special district committees, and made rules for fishing times, types of fishing gear and the amount of space allocated for each gear type. Fishers were elected to act as inspectors and a public agency was formed to oversee enforcement. The co-management system has seen a few changes over time, but still continues to operate (Jentoft 1989).

Co-management systems include various partnership arrangements and degrees of power sharing between government and local management systems. Co-management should not be viewed as a single management strategy. There is no one model for co-management, but rather a hierarchy of co-management arrangements, ranging from those in which fishermen’s organisations are given the authority to design, implement and enforce regulations with advice and assistance from government, to those in which an advisory board of representatives from the fishing industry is merely consulted before government introduces regulations. The amount of responsibility that the government and local stakeholders have will differ from country to country.
Governments that are intending to establish a co-management system may establish an extension service to support the process of stakeholder involvement. The functions of an extension service for co-management systems differ from local-level or community-based management systems. The main function of a community-based extension service is to assist communities in taking responsibility for managing their marine resources, whereas the primary role for a co-management extension service is to encourage the fisheries resource user groups and other relevant stakeholders to take responsibility for the management of fisheries resources on a co-operative or shared basis with government.

In keeping with this approach, a commercial fisheries extension service (CFES) for a co-management system is required. The extension service will consult with government agencies, fishing industry associations and other relevant groups to determine the needs, identify the problems and assist in the development of solutions to ensure commercial fisheries are managed in a sustainable manner. In addition, the extension service is often responsible for establishing and supporting an advisory board or committee, comprising representatives from the public and private sectors, that addresses development and management issues concerning the fishing industry.

A CFES does not make management decisions; its purpose is to promote and sustain the co-management process through consulting with the stakeholders, facilitating and supporting meetings with fishing industry stakeholders and responding to requests and directives from the fishing industry and government.

**Samoa’s commercial fisheries extension service**

The Fisheries Division of Samoa established a commercial fisheries extension service (CFES) in 1999. It consists of two local fisheries officers and an adviser. The AusAID-funded Samoa Fisheries Project supported the CFES by providing an adviser for three years to manage the programme and train two local fisheries officers in commercial fisheries extension skills. The CFES is based in Apia as over 70 per cent of the tuna longline fleet, the four fish exporters and all the government departments are based there.
Historically, extension staff are required to have appropriate technical knowledge, and an ability to train people and transfer skills. However, if co-management is the goal, facilitating skills are more important. The word facilitate means ‘to make easy’; in other words the extension officer as a facilitator ‘makes it easy’ for the fishing industry stakeholders to achieve their own objectives by their own actions. In this role, the extension officer is more of a listener than a teacher. Facilitation refers to the process of encouraging people to give their own views and take their own actions.

Ideally, a commercial fisheries extension officer should have a balance of both knowledge of commercial fishing and fisheries science, and skills to facilitate and motivate. An understanding of biology, ecology, conservation, commercial fishing techniques, seafood handling, seafood safety, sea safety and resource management practices is undoubtedly valuable.

In encouraging fishing industry stakeholders to make development and management decisions, extension staff are required to facilitate meetings. A facilitator needs to unobtrusively encourage groups to define their problems and to propose their own solutions, without imposing his or her own views on the proceedings. Previous experience with using problem-solving techniques would be an advantage.

Some of the most successful extension officers are extroverts, who like people and are good at encouraging all individuals in a group to give their opinions. This may involve joking and cajoling in a friendly way. However, an egotistical bully, who is likely to embarrass people and impose his or her own opinions on the group, is definitely not required.

Whether existing staff are used or new staff are to be employed to develop co-management, the selection of good extension officers is critical to the success of the system. Interviews with prospective candidates are needed, to establish whether or not the person is likely to have the people-skills discussed above. Using experienced staff may not be the best option if their experience is based only on government management methodologies.
Skills and qualifications necessary for a commercial fisheries extension officer

**Minimum skills and qualifications**

- High school leaver (Form 6/Year 13 level of education successfully completed);
- High level of verbal and written skills;
- Confidence in meetings and working with fisher groups;
- Ability to drive a vehicle;
- Ability to use word processor/computer.

**Desirable skills and qualifications**

- Degree or tertiary qualification in one or more of the following areas: Biology, ecology, conservation, fisheries management;
- Commercial fishing experience;
- Ability and desire to work with isolated communities;
- Experience in seafood handling;
- Experience in seafood safety.
There are many different approaches that could be used for involving stakeholders in a co-management system. The process described in this section was implemented in Samoa to involve fishing industry stakeholders. As the Pacific Island countries are quite diverse, this process will require some modifications to suit the specific needs and concerns of each country.

A SESSMENT OF THE AWARENESS, CONCERN AND WILLINGNESS OF THE STAKEHOLDERS (FISHING INDUSTRY, COMMUNITIES AND GOVERNMENT) TO ACT ON A COOPERATIVE BASIS

Following an initial expression of interest from members of fishers’ associations, user groups, community leaders, government agencies and other relevant organisations, extension officers must assess whether the fishing industry stakeholders as a whole are committed to the co-management process. The key determining components are an awareness of the problems with fisheries and the marine environment, a concern about these problems and a willingness to take actions to solve these problems. If the assessment is positive, it is usually appropriate to arrange a meeting with the key stakeholders.

M EETING WITH THE KEY FISHING INDUSTRY STAKEHOLDERS TO DETERMINE WHETHER THE CO-MANAGEMENT PROCESS WILL BE ACCEPTED OR REJECTED

At this meeting, key representatives from stakeholder organisations will be presented with information to allow them to either accept or reject participation in the co-management of commercial fisheries. Some key fishing industry stakeholders may reject the concept, as they prefer to act as a pressure group against government regulations and not be blamed for management decisions made cooperatively with government. Representatives from relevant government agencies may not be willing to share their authority to manage commercial fisheries resources. Leaders from communities may want to manage their own inshore fisheries resources. If the key stakeholders decline to participate, the government will then be required to continue to manage commercial fisheries resources without stakeholder involvement. If the government is still committed to co-management, the extension service can initiate programmes for stakeholders to raise awareness and promote the sharing of responsibility for addressing management and development issues. Hopefully, through this process, the fishing industry stakeholders will eventually become more receptive to sharing the responsibility of commercial fisheries management.
If the meeting decides to accept the process, the stakeholder representatives must agree to arrange separate meetings with their associations and agencies. This separation is necessary to allow particular sectors in the fishing industry to express opinions that they may not express in large groups dominated by industry, community and government leaders.

**APPOINTING FISHING INDUSTRY REPRESENTATIVES TO ADDRESS COMMERCIAL FISHERIES ISSUES**

Meetings should be arranged with fishers and user group associations, communities involved in or affected by commercial fishing activities, government departments and other relevant groups to discuss issues concerning the management and development of commercial fisheries. At these meetings, each group should be encouraged to analyse the problems of the commercial fishery. These might include declining catch rates, degradation of the marine environment, or fishing-gear conflict. The groups should be encouraged to discuss the causes of the problems and propose possible solutions.

The co-management system should be presented as a solution for addressing the issues and concerns brought forward during the meetings. If the groups decide to accept the co-management process, each group should be asked to nominate two or three of its most active members to form a Management Advisory Committee (MAC).

**Meetings with stakeholder groups to explain the co-management concept**

Meetings should be held with:

- **fishing industry stakeholders**, e.g.
  - associations of fishers, boat owners, fish buyers, and boat builders to determine needs and identify problems;

- **communities**, e.g.
  - chiefs and elders, to determine what community management schemes exist to regulate fisheries resources, the persons responsible for enforcing the management schemes, whether conflicts exist between the subsistence fishermen and commercial fishermen, and to identify the needs and problems;

- **government agencies**, e.g.
  - Fisheries, Treasury, Department of Environment, Department of Transport, Port Authority, and Coast Guard, to determine existing management policies and needs, and to identify problems; and

- **other relevant organisations**, e.g.
  - environmental groups, non-governmental organisations (NGOs), fisheries scientists and other groups, to determine the concerns and identify the problems.
**Fisheries Extension Process**

Assess stakeholders’ **awareness** of problems, **concern** about problems, **willingness** to take actions

Hold meeting with key stakeholders

- **Low**
  - Discuss co-management process
  - Raise awareness

- **High**
  - Accept
  - Hold group meetings with user groups, communities and relevant government agencies to determine key problems and causes and propose solutions

Elect members from each group

Set up commercial fisheries management advisory committee to address fisheries management issues
c) Extension staff activities

Extension officers should:

- facilitate and support fishing industry stakeholders' meetings and actions;
- facilitate and support MAC meetings and actions;
- present summaries of commercial fisheries issues (e.g. overview of catch trends);
- address commercial fisheries management and development issues;
- consult with commercial fishing industry stakeholders to determine their needs and concerns;
- monitor commercial fisheries resources (collect, distribute and assess data);
- disseminate information on commercial fisheries management and development; and
- determine and address commercial fisheries sector constraints (e.g. lack of training, and poor infrastructure).
Activities of
the commercial fisheries extension service in Samoa

To meet the needs of the fishing industry and government departments in Samoa, the CFES has:
supported Samoa’s Commercial Fisheries Management Advisory Committee (CF-MAC) by:
• consulting with key fishing industry stakeholders to determine development and management issues that need to be addressed by the CF-MAC. These include a marina for the tuna longline fleet, a tuna management plan, navigation markers for rural fishing ports, and a national seafood-safety monitoring service;
• responding to requests and directives from the CF-MAC; and
• reporting and distributing the minutes of CF-MAC meetings to members.

promoted management strategies to ensure the sustainability of the tuna fishing industry by:
• consulting with key fishing industry stakeholders to determine appropriate management strategies;
• assisting key fishing industry stakeholders in developing and implementing a tuna management plan to restrict the number of fishing boats allowed to participate in the fishery;
• promoting the establishment of a national seafood safety service; and
• responding to requests and directives concerning fishing industry management issues of the CF-MAC, Fisheries Division and other government agencies.

promoted the enforcement of the sea safety regulations for the tuna fishing industry by:
• consulting with key fishing industry stakeholders; and
• assisting government agencies including the Ministry of Transport, Maritime School of Training, Police Department and Fisheries Division in developing strategies to encourage the fishing industry to comply with the sea safety regulations.
facilitated training for the fishing industry by:

- identifying the training needs of the fishing industry;
- conducting training workshops for the fishing industry in fish handling, HACCP, seafood quality, outboard engine maintenance and repair, diesel engine maintenance and repair, fish grading and fish loining; and
- identifying sources to fund and facilitate training for the fishing industry.

identified infrastructure requirements and facilitated their implementation by:

- consulting with key fishing industry stakeholders to determine needs;
- assisting government agencies in developing strategies to meet the infrastructure needs of the fishing industry, including a marina for the fishing fleet, fuel depot, ice machines and navigation markers for rural fishing ports; and
- identifying sources to fund and facilitate the infrastructure requirements of the fishing industry.

disseminated information concerning development and management of the fishing industry through:

- information sheets on fishing handling, navigation, and fishing gear configuration;
- a quarterly fishing industry newsletter; and
- newspaper articles and radio announcements.
6. Management Advisory Committees (MACs) for commercial fisheries

Co-management arrangements enable fisheries resource users to have a say in the decision-making process and thus provide the opportunity for these stakeholders to recommend resource management alternatives to government for consideration. To facilitate such arrangements, a management advisory board or committee that comprises representatives from the fishing industry and other user groups, communities and relevant government departments, can be established to address the development and management needs of commercial fisheries. Management advisory committees (MACs) can be established to address specific commercial fisheries such as tuna, snapper and pearl oyster, or gear types such as longline, purse seine and gill nets, or to address commercial fisheries as a whole. Often MACs are more effective if they address issues concerning specific fisheries or gear types. Tuna fishers, for example, would have a minimal understanding of the issues concerning a black pearl farmer.

Management advisory committees provide a forum where issues concerning commercial fisheries are discussed, problems identified and solutions developed. MACs are the main contact point for the fishing industry, communities and relevant government agencies, to assist in the development and implementation of management policies concerning commercial fisheries.

Commercial fisheries management advisory committee in Samoa

The Fisheries Division of Samoa established a commercial fisheries management advisory committee (CFMAC) in September 1999 to encourage the private sector to become involved in the development of management strategies for the fishing industry on a cooperative basis with government. The CFMAC addresses development and management issues, provides advice and presents recommendations concerning the fishing industry to government for consideration. This committee is made up of representatives from the private sector and relevant government departments. Members of the committee include two elected representatives from each of the fishing industry associations, including the Upolu Fishermen's Association, Savaii Fishermen's Association, Fish Exporters' Association and Boat Builders' Association and an appointed representative from each of the relevant government departments including the Ministry of Agriculture, Forests, Fisheries and Meteorology, Treasury Department, Department of Trade, Commerce and Industry, Port Authority, and Ministry of Transport. The majority of the members of the CFMAC are from the fishing industry.
**Potential Function of MACs**

An MAC provides a forum for representatives from the private sector participating in commercial fisheries, from communities and relevant government departments to meet and address management and development issues concerning commercial fisheries and to provide advice and recommendations for government to consider.

**Potential Objectives of MACs**

An MAC may have the following objectives:

- to achieve greater awareness, acceptance and ownership of commercial fisheries management policies through interaction and consultation with stakeholder groups;
- to ensure the commercial fisheries resources are managed in a responsible and sustainable manner;
- to ensure the community derives maximum benefits from commercial fisheries;
- to minimise the risk of potential seafood safety hazards for domestic consumption and export;
- to promote and facilitate domestic and export sales of fish products;
- to identify infrastructure requirements for the future development of commercial fisheries.

**Membership of the MAC**

All the key sectors of the fishing industry should have representatives in a MAC including fishers and other user group associations, community leaders and relevant government agencies. The size or importance of each sector in the fishing industry may determine the number of members in a MAC. For example, a MAC may have four members from the fisher’s associations as they represent over 500 fishers, while the fish exporters may only have one member as there are only four exporters.
MAC members: requirements and responsibilities

MEMBERS FROM THE PRIVATE SECTOR

Requirements
- Demonstrate expertise and knowledge of commercial fisheries issues;
- Represent a broader view of the stakeholder group;
- Have accepted credibility within the stakeholder group;
- Have the ability and preparedness to participate in discussions in an objective and impartial way;
- Act in the best interest of the stakeholder group; and
- Have fishing industry confidence and authority to be a MAC member.

Responsibilities
- Provide input to the agenda of meetings;
- Attend meetings to ensure quorum is present;
- Actively participate in addressing commercial fisheries issues;
- Read minutes of the meetings and ensure they accurately reflect the events;
- Present issues communicated from the private sector organisations to the meetings;
- Address management and development issues concerning the fishing industry; and
- Present issues addressed in the meeting to the private-sector organisations and obtain feedback.

MEMBERS FROM RELEVANT GOVERNMENT AGENCIES

Responsibilities
- Provide input to the agenda of meetings;
- Attend meetings to ensure a quorum is present;
- Actively participate in addressing commercial fisheries issues;
- Read minutes of the meetings and ensure they accurately reflect the events;
- Present proposed regulations and government legislation pertaining to the fishing industry;
- Address management and development issues concerning the fishing industry; and
- Present issues addressed in meetings to relevant government department and obtain feedback.
Issues MACs are likely to address

- safety at sea;
- training requirements of the fishing industry;
- seafood quality issues;
- allocation issues;
- by-catch issues;
- fishing-gear conflicts;
- fishing industry constraints (e.g. training, infrastructure);
- data requirements for stock assessment, catch statistics and level of exploitation;
- long-term economic viability;
- regulations to manage the commercial fisheries.

Potential responsibilities and procedures of MACs

- address issues communicated by the stakeholders;
- address proposed government regulations and legislation that pertain to the commercial fishing industry;
- address management and development issues;
- present issues addressed in meetings to the private sector, communities and relevant government agencies and obtain feedback;
- submit proposals and recommendations to government or relevant agencies for consideration;
- arrange independent advice (if required).
The major functions of fisheries management systems include:

1) data gathering and analysis, to determine the status of fisheries resources as a basis for management decisions;

2) allocation decisions, to determine who is allowed to fish and what types of gear can be used;

3) harvesting decisions, such as licensing, timing, location, and vessel or gear restrictions, to prevent over-exploitation; and

4) enforcement of regulations.

Substantial costs will be incurred in performing these functions, in some cases millions of dollars, depending on the size and importance of a fishery.

There are three types of costs:

a) costs of monitoring, enforcement and compliance, e.g. monitoring fisheries regulations, monitoring fishing areas, collecting data on catch and effort, and managing and resolving conflicts;

b) costs of maintaining the resource, e.g. stock enhancement activities and resource assessment to ensure the stocks are not over-exploited; and

c) costs of resource distribution, e.g. distributing and administering fishing rights to fishers.

In most countries, these costs are often the sole responsibility of national agencies. Creating and maintaining such arrangements require substantial sums of taxpayers’ money. Therefore alternatives must be found to fund the management of fisheries resources. Sharing costs between government and fisheries resource users can be a viable alternative.

Co-management systems often shift some of the burden of financing the costs of management from government to fisheries resource users. One of the benefits of such arrangements is that the enforcement costs should be lower because users are more likely to comply with regulations they have played a part in creating. Understandably, most resource users will be reluctant to incur some of the costs of fisheries management as the benefits may not be immediately obvious. But for fisheries resources to be sustained over the long term, equitable solutions must be found to encourage user groups to accept some of the costs of management.
As fisheries resources are common property, fishers and other user groups should pay for the privilege of harvesting fish stocks. Resource rents are often imposed on fishers for the right to harvest publicly-owned fisheries resources. Resource rent can be defined as the maximum economic surplus that could be extracted from a fishery while the fishing industry continues to operate efficiently. There are two principal categories of charges that could be applied to fishers: charges made for access to the fishery, and charges made according to the amount of use of a fishery resource. Access charges are the simplest type of charge, and are usually administered in the form of licence fees for access to a fishery. However, as access charges do not take into account how much resource is taken, they may end up being unfair. Access charges tend to have a greater financial impact on smaller vessels, less-skilled fishers and those using less-efficient fishing methods. To counter this effect, annual access charges are often scaled according to size of vessel, capacity of fishhold, type and capacity of fishing gear, or amount of engine power. Use charges are usually taxes charged for the amount of fish that is caught and landed. These landing taxes, charged as a percentage of gross values, should reduce revenues for all fishers by the same proportion and so should be fair. However it is much more difficult, and therefore more expensive, to enforce and collect charges for use rather than access, which in turn is likely to significantly reduce the net revenue raised.

A number of countries around the world have systems in place to recover the costs of management and collect access/use charges. In Australia and New Zealand, fisheries managers currently recover the majority of the costs of management from commercial fisheries. Fishers pay a charge per quota unit or capacity unit depending on the management plan. In New Zealand, separate charges are also imposed for vessels and permits. In both countries, industry has been increasingly involved in management. Because they are required to pay for management, fishers have taken an increased role in determining management plans and monitoring costs on fisheries to ensure value for money. Management advisory committees, comprising government and fishers’ representatives, have played a major role in achieving this.
8. The advantages of co-management for resource management functions

There are a number of resource management functions that are enhanced by the joint action of resource users and government:

- **Data Collection**

  Often fishers are wary of providing information about their fishing practices, efforts and catches, because they fear that this information may be used against them in regulations imposed by government. If fishers and other user groups work together with government to develop management policies, they will soon realise that accurate data is needed to make appropriate management decisions.

- **Logistical Decisions, such as who can harvest what, and when**

  Although government has better access to scientific information concerning fisheries resources, the fishing industry has a more intimate understanding of the players involved, the seasonality of targeted species and distribution of the fishing effort. More efficient and effective management decisions can be made when government and fishing industry knowledge are added together.

- **Decisions about the distribution of fishing effort**

  Fisheries managers use data concerning the catch and the amount of fishing (e.g., number of kg per hook) to determine whether the catch rates are declining or not. Fisheries managers are able analyse this data to determine the maximum effort the industry can impose upon a fishery without reducing the stocks, thus ensuring that the catches can be sustained. Government will often impose regulations to limit fishing effort if there is a decline in catch rates. If key players from the fishing industry are involved in developing these regulations, then the decision as to who has the right to catch, and how much, is likely to be made more equitably.
In Samoa, the tuna longline fishing fleet grew from 25 alias in 1994, to 154 vessels in 2000. This increase in the fishing fleet has resulted in an additional 1–2 million hooks set each year since 1994. It was estimated that 10 million hooks were set in 2000. The increased fishing effort resulted in the catch rate declining from 93.8 kg per 100 hooks in 1994, to 62.2 kg per 100 hooks in 2000. It has been speculated that if the fishing effort continues to increase at the present rate, then the average catch rates could decrease to less than 43 kg per 100 hooks in another three years. Most fishing vessels would not be able to profitably operate at this lower catch rate.

To maintain the economic sustainability of the tuna longline fishery, the Fisheries Division proposed implementing a tuna management plan limiting the number of vessels to 200 longliners. This plan was presented to the CF-MAC for consideration. After three meetings, the CF-MAC developed a new plan that they considered to be a more equitable solution for limiting the fishing effort of the tuna fishery.

Under the new plan, no restrictions were made on the number of licences for small alias (10 metres or less in length) as the number of alias has been declining due to the decreased catch rates and low profits.

However, restrictions were placed on the number of licences for larger vessels. The larger vessels were divided into different classes according to length. Length classes and the recommended number of licences made available were as follows:

- **Class A** vessels up to and including 10m
  - Present number of vessels: 132
  - Licences available: No limit

- **Class B** vessels over 10m and up to 12.5m
  - Present number of vessels: 9
  - Licences available: 25

- **Class C** vessels over 12.5m and up to 15m
  - Present number of vessels: 7
  - Licences available: 15

- **Class D** vessels greater than 15m
  - Present number of vessels: 7
  - Licences available: 8

The Cabinet of the Government of Samoa approved and implemented this plan in September 2000.
**ENFORCEMENT OF REGULATIONS**

Fishers and other user groups are more likely to comply with regulations if they have had a say in the process. If they are involved in the decision-making process, they also become more knowledgeable about the issues concerning fisheries resource management, and more committed to and supportive of regulations imposed by government. Fishers often develop their own rules for managing fisheries resources. In some countries they decide who has access to fishing grounds or what fishing gear can be used. If governments recognise the legitimacy of these rules, fishers may be more efficient in enforcing them.

**ENHANCEMENT OF LONG-TERM PLANNING**

As government agencies are not actively involved in the fishing industry, they may often not properly understand and address the development and management needs of commercial fisheries. Fishers and other user groups may be in a better position to identify the long-term needs of the fishing industry because their livelihood depends upon it.
Future needs of the tuna fishery in Samoa

The tuna longline fleet in Samoa expanded from 25 alias in 1994 to 154 vessels in 2000. Approximately 70 per cent of the entire fishing fleet is based in the Apia area. The increased number of fishing vessels resulted in the fishers’ wharf adjacent to the Fisheries Division being severely congested. The congestion at the port has reached a point where the safety of the fleet would be endangered if Samoa experienced a tropical storm similar to those in 1990 or 1991.

To address this problem, the government initiated a plan to construct a marina at Sogi, next to the fisheries wharf. The marina included a breakwater and three docks that could accommodate approximately 100 alias catamarans. Cabinet approved the plan in 1999; however, the government did not have the funds to begin construction of the marina.

At a subsequent CF-MAC meeting, representatives from the fishing industry stated that the main priority for the tuna fishery was the construction of a marina to accommodate the fishing fleet. The Minister of Agriculture, Forests, Fisheries and Meteorology (MAFFM) stated that government had already approved a plan to construct a marina in Sogi. After lengthy discussions, the majority of the industry representatives concluded that this site was not appropriate because, among other reasons, it did not provide sufficient shelter from high waves during tropical storms, and the seabed could not be dredged to a depth that could accommodate vessels larger than alias catamarans.

A sub-committee, made up of key players from the fishing industry and relevant government departments, was appointed by the CF-MAC to determine the most appropriate site for the tuna fishing fleet. After considering a number of potential sites, the sub-committee recommended the end of Mulinu’u peninsula as the most appropriate site. This site is protected from high waves by an exterior reef, and the seabed is loose coral and sand and could therefore easily be dredged to a depth sufficient for large fishing vessels. Also the area of land and sea is large enough to accommodate the future expansion of the fishing fleet and other on-shore infrastructures, including a slipway, ice-plant facilities, fuel depot and fishing-gear storage huts.

After some debate, the government decided to relocate the proposed site of the marina to Mulinu’u Point.
The co-management of commercial fisheries can be very effective in implementing regulations and other management measures, because all stakeholders are involved in the decision-making process. In fact, it would impossible to implement some regulations properly without the involvement and support of fisheries resource users. For example, before making a regulation to restrict the use of a type of fishing gear such as gill nets in a particular area, fishers would need to be consulted about the appropriateness and effectiveness of the regulation. The measures to address commercial fisheries problems, listed in the table below, can be implemented more effectively through the co-management process.

<table>
<thead>
<tr>
<th>Management and development problems</th>
<th>Co-management solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declining catches</td>
<td>• Limit access to fisheries resources, e.g. limit the number of fishers or fishing vessels, or set quotas, fishing gear restrictions, zoning regulations, or seasonal restrictions.</td>
</tr>
<tr>
<td></td>
<td>• Regulate the size limit of fish caught, set minimum mesh sizes and restrict the capture of females.</td>
</tr>
<tr>
<td>Destructive fishing methods</td>
<td>• Implement regulations to ban destructive fishing methods such as the use of explosives, bleach, chemicals, plant-based fish poisons, and the smashing of coral.</td>
</tr>
<tr>
<td>Fishing-gear conflict</td>
<td>• Manage conflict by making regulations to restrict fishing gear types, issue licences and restrict zones for specific gear types.</td>
</tr>
<tr>
<td>Conflict between subsistence and commercial fisheries</td>
<td>• Manage conflict by zoning fishing activities, issuing quotas, regulating use of types of fishing gear, imposing licensing requirements, or restricting vessel size.</td>
</tr>
<tr>
<td>Bycatch issues</td>
<td>• Make regulations for fishing gear types that catch protected marine species, catch-and-release regulations for protected marine species, and regulations concerning the handling of bycatch species (e.g. finning of sharks and techniques for releasing turtles).</td>
</tr>
</tbody>
</table>
### Management and Development Problems

| Pollution | 1. Make regulations for the proper disposal of wastes from fishing vessels, including plastics, fuels, oils and detergents, and human effluent.  
|           | 2. Make regulations for the proper disposal of sewage from fish processing plants. |
| Sea safety | 1. Make regulations for the training and certification of fishing crews.  
|           | 2. Inspect and certify fishing vessels for seaworthiness and safety equipment. |
| Seafood safety | 1. Monitor, verify and certify the safety of seafood products by implementing a national seafood-safety monitoring programme.  
|           | 2. Make regulations for seafood-safety standards for fish processing plants, fishing vessels and fish handling. |
| Lack of infrastructures (e.g. marinas, air-freight, ice plants, refrigerated transport) | 1. Evaluate the needs, find the funds and expertise, and facilitate infrastructure improvements. |
| Lack of management policies to ensure sustainability | 1. Establish effective management policies through consultation with stakeholders. |
| Lack of catch and effort data | 1. Establish a programme to collect catch and effort information.  
<p>|           | 2. Implement regulations requiring fishers to provide catch and effort information. |
| Government policies that discourage investment in the fisheries sector | 1. Establish policies to encourage investment through consultation with stakeholders and recruiting independent advisers |</p>
<table>
<thead>
<tr>
<th>Management and development problems</th>
<th>Co-management solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of support of management polices from the stakeholders (fishing industry, communities and government agencies)</td>
<td>• Involve the stakeholders in the decision-making process for establishing management polices.</td>
</tr>
<tr>
<td>Lack of skilled labour (mechanics, crew, food processors)</td>
<td>• Evaluate the needs, find the funds and expertise, and facilitate training.</td>
</tr>
<tr>
<td>Lack of access to credit/finances</td>
<td>• Establish polices to allow the fishing industry access to credit and finances, e.g. low-interest loans, subsidies, joint-venture opportunities and grants.</td>
</tr>
<tr>
<td>Marketing difficulties</td>
<td>• Establish links to international markets, initiate alternative marketing opportunities, and implement regulations to meet international quality standards.</td>
</tr>
</tbody>
</table>
| Lack of communication between the fishing industry and government agencies | • Establish a CFES and MAC to provide the opportunity for government agencies to consult with fishing industry stakeholders concerning development and management issues.  
| | • Establish a fishing industry newsletter, produce information sheets, newspaper articles, radio broadcasts and television programmes. |
Impacts of issues related to bycatch on the Hawaiian longline fisheries

Catches of dolphin by purse seiners in the eastern tropical Pacific and the use of drifting gill nets for the capture of albacore were previously publicised extensively as major effects related to the bycatch associated with tuna fishing in the Pacific. Both these issues have now been addressed: dolphin mortality in purse seines has been cut by over 95 per cent as a result of changes to gear and techniques, while oceanic gillnetting with long drift nets has been banned at an international level.

Concern over the impact of tuna fishing in the Pacific has recently resurfaced, particularly in the case of Hawaiian longline fisheries. In Hawaii, interactions between pelagic longlining and seabirds, turtles and monk seals have led to a range of management measures being introduced, some incorporating mitigation strategies (strategies that seeks to reduce an effect of fishing, e.g. turtle mortality, by modifying factors such as type of gear and technique used). More recently, in 2000, a case brought by an environmental non-governmental organisation (NGO) resulted in a court judgement that introduces a further series of restrictions to the Hawaii-based longline fishery. Among the measures taken are the ban of longlining for swordfish (shallow sets) in Hawaiian waters, seasonal closures of certain areas for tuna longlining, specified levels of observer coverage, the banning of shark finning and additional mitigation measures for turtles and seabirds.

While the Hawaiian situation is different from that of most Pacific Islands, it does demonstrate the growing concern of conservation groups and the general public in western countries, over bycatch and other adverse environmental impacts of pelagic longlining. It is likely that lobby groups will continue to intervene and may have a negative impact upon emerging fishing industries in the Pacific. Given the economic importance of the tuna longline fishery, fisheries administrators and resource users in the region need to learn from the Hawaiian experience and increase priority for dealing with bycatch issues (SPC 2001).
10. Difficulties in promoting and facilitating co-management

- Co-management is often seen as a last-resort method, and has been referred to as ‘crisis management’. Government agencies do not give up control easily and it is often only when a particular resource has become threatened and existing policies have been found to be ineffective, that governments seriously consider getting input from fishers and other user groups.

- Some fisheries managers tend to regard co-management practices as remnants of traditional management systems from the past that are not applicable to modern settings. Thus they believe that in an extremely competitive, industrialised and increasingly globalised fishing industry, co-management arrangements will not be effective.

- In most countries, including the Pacific region, fishers tend to have lower levels of formal education than the general population. Therefore, some resource managers are sceptical about the ability of fishers and other user groups to manage fisheries for long-term sustainability due to lack of knowledge and skills.

- Politicians and government administrators may be unwilling to give up all or even part of their authority, wishing to protect their power and positions.

- Co-management may entrench the power of an administrative elite and be as impersonal, insensitive and indifferent to local concerns as management by government.

- The fishing industry comprises many stakeholders, including fishers, fish traders, fish processors, boatbuilders, consumers and fishplant workers. There is also a public interest in fisheries management, particularly where the fishing industry is important for the economy. With such a large number of groups involved in the co-management process, it may be more difficult to maintain the quality and ideals of sustainable resource management.

- Internal conflicts may arise amongst members or groups involved in a co-management system, as some stakeholders may have differing views concerning the rules for managing the fishery.
### Conflicting goals of user groups

<table>
<thead>
<tr>
<th>Fish trader</th>
<th>To buy as much fish as possible</th>
<th>To have many boats supplying fish</th>
<th>To have the highest catch possible from the fishery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fisher</td>
<td>To have high catch rates</td>
<td>To moderate the number of boats</td>
<td>To have the highest catch rate per trip</td>
</tr>
</tbody>
</table>

- Fishers’ organisations may be reluctant to carry out the responsibility of fisheries management. They may prefer to act as a pressure group in relation to government authority. Inevitably, someone will be blamed when fisheries regulations are implemented and enforced; to have the government to blame is often preferred, as it lessens the local pressure on fishing industry representatives involved in the co-management process.

- Representatives from the fishing industry involved in co-management arrangements may not meet with their associations or groups to discuss management and development issues that need to be addressed, nor involve their associations in the fisheries management decision-making process. Therefore, their members do not feel they are part of the co-management system.

- Although delegating responsibility for fisheries management to user groups may improve their compliance, the opposite may result with other groups such as environmentalists or recreational fishermen. Commercial fishers’ organisations are often powerful compared to other groups and giving them the authority to manage fisheries resources would strengthen their power base even further.
What motivates fishers and other user groups to adhere to regulations and other management measures?

If fishers find the regulatory scheme fair and appropriate, there is reason to believe that they will follow the rules. The acceptance and compliance with regulations to manage fisheries is related to the following.

1. **Content of the regulations**: the more the regulations coincide with the way fishers and other user groups define their problems, the greater the compliance;

2. **Distribution of fishing effort**: the more equitably the restrictions are imposed, the greater the acceptance of the regulations;

3. **Making of the regulations**: the more fishers and user groups are involved in the decision-making process, the more favourably they will perceive the regulatory process;

4. **Implementation of the regulations**: the more fishers and user groups are directly involved in installing and enforcing the regulations, the more the regulations will be accepted and adhered to through peer-group pressure.

Government must also establish conditions that are favourable for co-management systems to prosper and that will ensure sustainability. At the very least, government must not challenge fishers' rights to hold meetings to discuss problems and solutions, and to develop organisations and institutional arrangements for management. Fishers must feel safe to openly meet at their own initiative and discuss problems and solutions in public forums. They must not feel threatened if they criticise existing government policies and management methods. Fishers' and users' groups must have access to government and government officials to express their concerns and ideas. Fishers should feel that government officials will listen to them. Fishers must be free to develop organisations on their own initiatives that meet their needs. Too often there are government-sponsored organisations that are officially recognised but ineffective because they do not represent the fishers and user groups and are controlled by government.

Fishers and user groups must be given some responsibility in implementing fisheries resource management arrangements.
Fishers in Japan
managing fisheries resources

One of the most successful and long-lasting examples of fisheries co-management is in Japan. Here, fishers’ cooperatives are, by law, given the authority to regulate fishing rights, and fishers have to be members of a cooperative to engage in fishing. Member fishers who do not abide by the rules established by the cooperative risk being expelled by the members (Jentoft 1989).

If fishers are dissatisfied with the regulations, they must have the right to use their voice and vote against them.

Co-management arrangements that involve small organisations and have a more focused approach are more likely to succeed. A co-management system for regulating a specific fishery such as tuna longlining or pearl farming is more likely to succeed than a broader co-management system that deals with commercial fisheries as a whole. Small organisations allow direct, personal participation, while large organisations must rely on indirect, intermediary representation in the decision-making process. Members also tend to feel a stronger identification with a small organisation than a large organisation.

Effective fisheries management involves the consideration of the many aspects of human behaviour and cultural lifestyles, socio-economic conditions and ecological trends. Each of these components contributes to a more complete picture of an entire fishery and promotes a better understanding of how to develop effective regulations. The aspects are interdependent upon each other and must be studied together for the co-management process to succeed in addressing commercial fisheries management issues.

Lastly, fishing industry stakeholders must trust the co-management process. Trust develops over a period of time and through experience. Management policies may be questioned by the fishers and other users groups, but not the co-management process itself.
Fisheries managers need to determine whether a co-management system is addressing the management and development needs of a fishing industry. An evaluation must assess whether co-management has had a positive or negative effect on the resource and its users. The main indicators for evaluating the effectiveness of a co-management system are:

- a reduction in the number of infringements against regulations;
- a reduction in monitoring and enforcement costs for regulations;
- sustainability (may include an increase in catch per unit effort);
- profitability of the fishery;
- equitable distribution of benefits to all stakeholders;
- representation of stakeholders in the co-management system;
- fisheries resource users sharing the costs of management;
- the number of MAC meetings with representatives from the fishing industry and government agencies;
- infrastructure requirements of the fishing industry being met;
- training needs of the fishing industry being met;
- satisfaction of the stakeholders with the management of the fishery;
- government policies that unreasonably constrain the fishing industry being addressed.
References and related documents


Alia: catamaran-style of vessel used for fishing in Samoa.

Commercial Fisheries Extension Service (CFES): Working with fishers and other user groups, communities and government agencies to promote and facilitate sharing the responsibility of managing commercial fisheries resources on a co-operative basis.

Co-management: Either informal or legal arrangements between government representatives, community groups and other user groups to take responsibility for and manage, a fishery resource on a co-operative basis.

Community-based extension: Working with communities to take responsibility for managing their marine resources.

Community-based resource management: Arrangements under which a community takes, or is encouraged to take, responsibility for managing resources.

Exclusive Economic Zone (EEZ): An area of sea extending out to 200 nautical miles from coastlines or outer reefs, in which an adjacent country has control and responsibilities.

FFA: Forum Fisheries Agency.

GDP: Gross Domestic Product.

HACCP: Hazard Analysis Critical Control Point.

Joint venture: A partnership between foreign and local fishers.

Minimum legal size: A regulation that states that captured individuals smaller than a prescribed minimum size must be returned to the sea. The size is usually set above the size at which individuals are mature, thus ensuring they can reproduce to replenish the stock. Also the size is set based on the grounds that if smaller individuals are allowed to grow bigger, there will be more biomass to harvest.

Minimum mesh size: The smallest size of mesh permitted in nets and traps that allows individuals under a certain determined size limit to escape unharmed.

Over exploitation: The situation where so many fish are removed from a stock that reproduction cannot replace the numbers lost.

Property rights: A degree of resource ownership by an individual fisher, group, or community.

Quota: A limit on the weight/number of fish that can be caught in a particular stock or area.

Resource rent: The maximum economic surplus that could be extracted from a fishery while the fishery continues to operate efficiently.

SPC: Secretariat of the Pacific Community.

Stakeholders: All the different people, groups, communities, and organisations that have an interest in a particular activity, resource or area.