Building capacity for mainstreaming fisheries co-management in Indonesia

Course book

Custom Training Courses (CTC) Project

Global Partnerships for Responsible Fisheries

DEPARTEMEN KELAUTAN DAN PERIKANAN

FAO FIAT PANIS

Building capacity for mainstreaming fisheries co-management in Indonesia

Course book

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Preparation of this document

This course book has been prepared for the delivery of the Custom Training Courses (CTC) project on building capacity for mainstreaming fisheries co-management in Indonesia. The CTC project's short course on fisheries co-management was delivered twice in April 2007 in Mataram (Lombok) and has trained 50 provincial and district fisheries officers. The CTC Project is part of the FAO's FishCode Programme and supports trainers in developing countries to develop appropriate short-courses in fisheries and to successfully deliver them. This project was developed under a Letter of Agreement between FAO and the Directorate of Fisheries Resources (DKP)[1] (Indonesia). An appropriate policy and legislative structure to accommodate co-management arrangements has been established in Indonesia but training was needed particularly at the level of province and district fisheries officers in order to facilitate the implementation of such arrangements. The course book was tailored for such a purpose, and therefore, it is expected to be used as a reference for other co-management training courses in Indonesia which could also be adapted elsewhere.

The delivery of the training course and the preparation of this course book involved two course-development workshops[2] organized to discuss the needs of governmental officials from Indonesia for developing fisheries co-management in their provinces/districts; to design and develop the course book and course dynamics; and to discuss the arrangements for preparation and organization of the course. The workshops were jointly organized by DKP and FAO FishCode CTC Project as part of the Letter of Agreement (LOA) activity with the participation of the Indonesian course's instructors: Dr Dede Irving Hartoto and Dr Luky Adrianto.

The purpose of this course book is to introduce the participants to the principles and practice of fisheries co-management. It aims to provide participants with the knowledge and skills to successfully develop fisheries co-management institutions in their own region.

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[1] Direktorat Sumber Daya Ikan, Direktorat Jenderal Perikanan Tangkap; Departemen Kelautan Dan Perikanan; Jakarta, Republic of Indonesia (PR 35414).

[2] First course-development workshop took place in Bogor from September 4–6, 2006 and the second took place in Jakarta from February 26–28, 2007.

Abstract

This course book was prepared in support of a training course on fisheries co-management in Indonesia. It introduces the principles and practice of fisheries co-management with the objective of improving knowledge and skills to successfully develop fisheries co-management institutions. The course book is composed of four main modules which specifically address the fundamentals of fisheries co-management, its theoretical structure and the process of starting, planning and implementing fisheries co-management, all with a focus in Indonesia. From the numerous examples provided in this book, it is obvious that fisheries co-management has the potential to contribute to almost every sphere of fisheries management in Indonesia. It has a potential to incorporate the ecosystem approach and has proved to be effective in promoting conservation activities, including the protection, mitigation and rehabilitation of natural resources. There is a discussion of the criteria which may be used to assess a fisheries co-management regime in their relation to the type of aquatic ecosystem, the exploited species, the existing socio-political and economic system, and the prevailing rules and regulations. Attention is given to how the decision-making process takes place and the roles and responsibilities of the main stakeholders in co-managing fisheries, namely the community users of fisheries resources and the government. The book pays particular attention to the theory and benefits of community organization as a basis for successfully implementing co-management on the ground. The process of organization involves education, empowerment, developing or revitalizing values and ethics systems, developing notions of independence and partnership, developing organizational and leadership skills, and assisting the community to take action. The participatory action research approach methodology applied to fisheries co-management is outlined. Co-management assessment through monitoring and evaluation procedures is described in detail. Finally, the main aspects of how to develop a fisheries management plan are elucidated using examples from rural areas in Indonesia where fisheries co-management has successfully been implemented.

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MODULE 1

Fundamentals of fisheries co-management in Indonesia

Introduction to fisheries co-management
by *Luky Adrianto and Dede Hartoto* 3

Introduction to fisheries co-management

The concept of fisheries governance and fisheries management

Kooiman *et al.* (2005) define governance as the interaction between the public and private sectors to solve societal problems and create social opportunities. In the context of fisheries, governance can be defined as the sum of the legal, social, economic and political arrangements used to manage fisheries. It has international, national and local dimensions and includes legally binding rules as well as customary social arrangements (FAO, 2001).

Therefore, fisheries governance may be defined as a process of interaction between the public and private sectors that endeavours to solve fisheries problems and create social opportunities in the fisheries sector. These opportunities might include creating jobs, generating income or conserving fisheries resources. Generally, public sector involvement means the participation of government, whereas private sector involvement means the participation of fishing communities including traditional fishers, fisheries entrepreneurs, fish farmers, fish processors, the fishing industry and fish traders, etc.

Fisheries management can be defined as the integrated process of information gathering, analysis, planning, consultation, decision-making, resource allocation, formulation and implementation that is followed by the enforcement of rules which govern all fisheries activities in order to ensure the continued productivity of the resources (FAO, 1995) (Box 1.1).

BOX 1.1

Important elements of fisheries management

1. Define fisheries goals.
2. Identify a strategy to achieve fisheries goals.
3. Consult with stakeholders around the strategy to achieve fisheries goals.
4. Monitor and evaluate the implementation of the defined strategy in partnership with stakeholders.
5. Convey reports to the government and stakeholders about the condition of fisheries.

Sources: FAO, 1995

During the past few decades there has been a global shift in approach to fisheries management to one that recognizes the importance of fishers' participation and shared decision-making in the management of fisheries. This approach can be defined as co-management, a type of management that is characterized by the pivotal interaction between government and fisheries users, through consensus building and the sharing of different management

roles and responsibilities. In other words, co-management constitutes a promising alternative that seeks to enhance the effectiveness of fisheries management itself.

THE RELATIONSHIP BETWEEN FISHERIES RESOURCES AND HUMAN RESOURCES

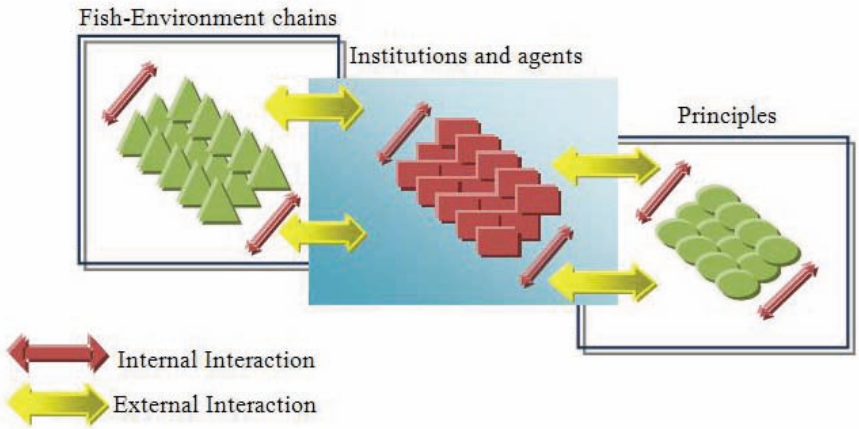
Fisheries management should take into consideration the interconnection between aquatic ecosystems, fisheries resources and human resources. For example, fisheries management cannot exist if fisheries resources are extinct and the ecosystems upon which they depend are degraded.

In this context, the principles governing the interactions between aquatic ecosystems and society need to be understood. By understanding these interactions, we can lay the foundation for fisheries governance and appreciate the importance of achieving equilibrium between the sustainability of fishery resources, ecosystem health and the socio-economic conditions that determine the quality of life of resource users.

Figure 1.1 illustrates the interaction between the ecosystem and fisheries resources, in which the management institution and its principles become the main elements of interface between both components.

FIGURE 1.1

Interaction between the environment, resources and humans. Adapted from Kooiman *et al.* (2005).



WHAT IS CO-MANAGEMENT?

Borrini-Feyerabend *et al.* (2004) define co-management as "a situation in which two or more social actors negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities for a

given territory, area or set of natural resources". Pinkerton (2003) discusses seven aspects that she believes are key to co-management arrangements. They are: (1) government as a co-manager should play a key and desirable role, and ideally should be engaged in the co-management arrangement as a partner rather than as an institution that delegates authorities; (2) co-management, like management itself, involves far more than the control of fisheries effort; (3) sustainable co-management arrangements involve some control by community partners over the terms and condition for selling the fish to buyers; (4) the successful exercise of rights on one level depends on the exercise of rights at higher and lower levels, including communities' right to participate in data collection/analysis and in setting policy agendas at the highest level; (5) co-management will ideally involve multiple horizontal negotiations leading to cooperative activities with other players and potentially greater democratization of civil society; (6) the power to exclude users from some defined territory is optimal; and (7) complete co-management is based more on the collective rights of a group than on individual rights (Pinkerton, 2003).

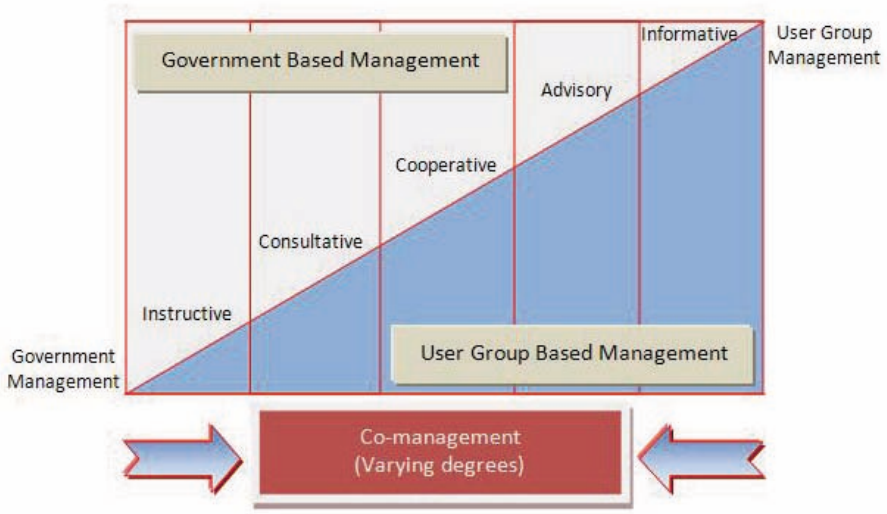
Key words in resources co-management are (1) a pluralistic approach to management; (2) a political and cultural process with the main goal of achieving social prosperity and democracy in natural resource management; and (3) a process that needs basic conditions to develop, including, among many others, access to information on relevant choices and issues, organizational capacity, freedom of speech and a non-discriminatory social environment.

In the fishery context, fisheries co-management is defined as the management arrangement whereby government and the user groups share responsibility for the management and utilization of fisheries resources, with the goal of achieving a balance between economic and social goals, within the framework of preserving the ecosystem and fisheries resources (Nielsen, 1996).

The sharing of responsibility varies, from the instructive to the informative. According to Pomeroy and Rivera-Guieb (2006), there are five major types of co-management according to the role of government and the fisheries user groups, namely (1) instructive; (2) consultative; (3) cooperative; (4) advisory; and (5) informative. Figure 1.2 illustrates the spectrum of co-management based on the distribution of responsibility between government and community.

FIGURE 1.2

Degrees of stakeholders involvement in fisheries co-management



Consultative

There is a mechanism of dialogue between the government and the fisheries user groups, where government consults with fishers but the decision-making process is conducted by the government.

Cooperative

In this type of co-management, the government and the fisheries user groups cooperate in decision-making as equal partners. Nevertheless, it is still very useful to identify the level of "equal" between users and government especially in terms of powersharing.

Advisory

In this type, the fisheries user groups advise government in the decision-making process and government approves the decisions.

Informative

The government delegates the decision-making process to the fisheries user groups, which will inform government of the results.

The difference between "collaboration" and "cooperation" in co-management should be noted. Lessons learned revealed that the term "co" in co-management means sharing not only responsibilities but also power between users and government. In order to share responsibilities, both users and government should understand their capacity as well as their authority in fisheries governance and management. Power-sharing means that both parties should have a common and acceptable balance of power to enable fisheries management to work effectively.

WHY IS CO-MANAGEMENT NECESSARY?

Historically in Indonesia, local peoples' traditional/local ecological knowledge (see Box 1.2) has been embedded into customary laws. For example, customary laws such as *Sasi* in Maluku, *Admiral Laot* in Aceh and *Awig-Awig* in Bali and West Nusa Tenggara, have been included in fisheries management in Indonesia. A detailed explanation of traditional/local ecological knowledge can be seen in Module 2, Topic 2.2.

BOX 1.2

What is traditional/local ecological knowledge?

Berkes (1999) define traditional/local ecological knowledge as a cumulative body of knowledge, practice and belief about the relationship among individuals in a community or between a community and its environment that evolves by adaptive processes and is transferred through generations by cultural means.

For example, based on traditional/local ecological knowledge management decisions were devised by Gambus Villagers in Asahan District, North Sumatra Province to determine when crabs may be caught using *jaring pinggir* (edge net) and *jaring hanyut* (drift gillnet). *Jaring pinggir* is used between the sixth and tenth day of every month, while *jaring hanyut* is used on the eleventh to twentieth day, and so on. The use of fishing gear is based on the Islamic calendar.

Nevertheless, over time, the practice of using local people's traditional/local ecological knowledge in fisheries management was replaced by command and control management regimes, especially between 1966 and 1998. This change was not only experienced in the fishery sector, but also in other sectors that depend on natural resources, such as the forestry and agriculture sectors. During this period, everything was determined by the state. This included the change in the concept associated with the name of a "village". For instance, as government started to use the term "*desa*" to define villages for all regions throughout the country instead of using the local names that had existed for a very long time such as *Meunasah* in Aceh, *Nagari* in West Sumatra and so forth. As a result, the role of the local community in management was reduced. It became the object of development rather than the subject of it.

The decline in the role of the community in fisheries management created inefficiencies in the system. As a result of centralization, conflicts between fishing communities and government officials erupted and a depletion of fisheries resources was observed. The imbalance between the role of the state and the role of the community in fishery management became an important topic of discussion. It highlighted the importance of collaboration between all the stakeholders in fishery management.

Literature suggests that the emergence of co-management systems is often associated with a crisis in fisheries resources, usually as a consequence of open access regimes. Obviously, depletion of fisheries resources and their ecosystems becomes the main feature of the tragedy of the fisheries commons (see Box 1.3

and Box 1.4).

BOX 1.3

The tragedy of the commons

Hardin's theory claims to demonstrate how free access and unrestricted demand for a finite resource ultimately dooms the resource through over-exploitation. This occurs because the benefits of exploitation accrue to individuals, each of whom is motivated to maximise his/her own use of the resource, while the costs of exploitation are distributed between all those to whom the resource is available (this may be a wider class of individuals than those who are exploiting it).

Hardin's example refers to the grazing of animals in communally owned land used by individuals. As Hardin sees it, the utility to each individual of adding a single animal to the common herd is, more or less, the value of that animal; while the cost to the individual is the consumption of the resources by that animal divided by the number of communal owners of the common. That is, the benefit to an individual of "hogging" a resource inevitably outweighs the cost where communal resources are concerned. All economically rational herdsman in the community will add as many animals as they can to the herds and as quickly as they can (before other herdsmen do), meaning that the finite resources of the communal land will quickly become exhausted.

> "Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit – in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all."

Controversy

Hardin's essay, the Tragedy of the Commons is a source of controversy. Some of the controversy stems from disagreement about whether individuals will always behave in the selfish fashion proposed by Hardin.

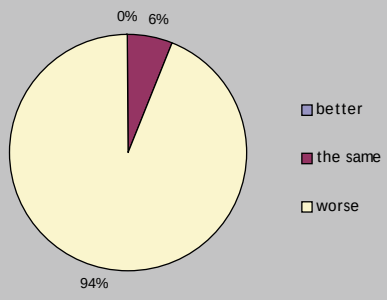
The common property theory counter attacks the arguments associated with Hardin's tragedy of the commons, arguments that attribute little value to the community's organization, their knowledge and ability to deal with the use of natural resources by developing management systems embedded in their own environmental and social context. This theory offers a set of principles, present in some locally-based institutions, that help determine the success of managing common pool resources over time. According to Ostrom (1990) the following seven design principles are key to explaining most of the robust institutions that successfully manage common pool resources:

1. Group boundaries are clearly defined.
2. Rules governing the use of collective goods are well matched to local needs and conditions.
3. Most individuals affected by these rules can participate in modifying the rules.
4. The rights of community members to devise their own rules is respected by external authorities.
5. A system for monitoring members' behaviour exists; the community members themselves undertake this monitoring.
6. A graduated system of sanctions is used.
7. Community members have access to low-cost conflict resolution mechanisms.
8. For common pool resources that are part of larger systems: appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.

BOX 1.4

Perception of the tragedy of marine resources in Indonesia *

What is your opinion about the condition of marine waters at Panggang Island in the present time, compared with their condition in the past?

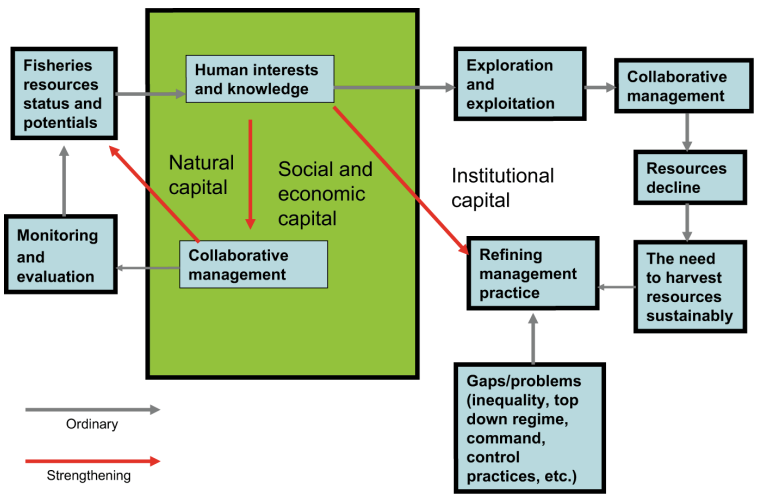


* Perceptions of the community at Panggang Island on the damage to marine resources at Panggang Island, Seribu Island Administration District, Jakarta Province.

As is shown in Figure 1.3, the status of fishery resources and the potential for their exploitation is a complex matter. Human involvement in the use of, and demand for, fish resources leads to fisheries exploration and exploitation. In situations where fisheries management is lacking, exploitation may lead to the collapse of the fishery resource. This may raise awareness within the fishing community of the importance of using fisheries resources sustainably. On the other hand, improved awareness may trigger action towards the restoration of fisheries resources through the establishment of a fishery management system. Fisheries co-management is an alternative model for restoring the condition of resources and resolving issues of fishing rights. The involvement and partnership of all stakeholders in the fishery management process is key.

FIGURE 1.3

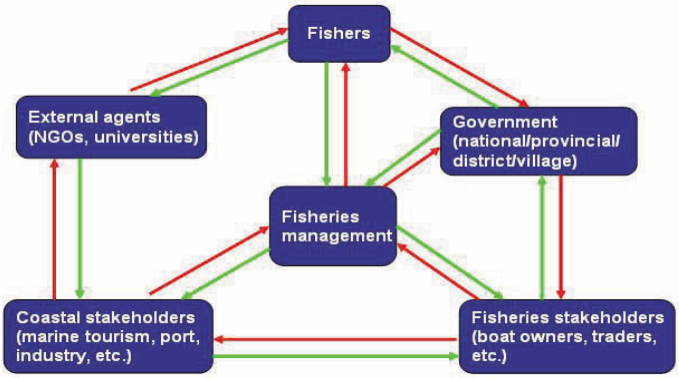
The functional flow of fishery co-management (Adrianto, 2006)



As we can see in Figure 1.4, fisheries management involves many parties, such as fishers, government, non-governmental institutions, academics and other fisheries user groups (traders, boat owners, etc). An understanding of their needs and interests is crucial. Co-management is an approach that encourages links between different parties and between human and natural systems. It recognizes the need for a management approach that addresses these links, as well as the needs of various fisheries stakeholders.

FIGURE 1.4

The involvement of many parties in fisheries management (adapted from Berkes *et al.* 2001)



CO-MANAGEMENT IS A PROCESS

Co-management should not be viewed simply as a tool for fisheries management, but as a fisheries management process that is adaptive to changing conditions over time. Co-management is a process that involves democratization and decentralization mechanisms through collaboration and powersharing between resource users and government officials (Pomeroy and Rivera-Guieb, 2006). Co-management is not a regulatory tool; nonetheless regulation is part of the implementation of co-management systems, i.e. regulations that are devised according to agreements made among stakeholders (e.g. government and fisheries user groups). The planning and implementation of a co-management process can be complex, costly and time consuming and varies according to the context in which it is established (Pomeroy and Rivera-Guieb, 2006). Accordingly, it should be noted by the initiators that co-management is a process and all parties should define a strategic plan which includes ways to deal with the dynamics of developing and implementing a fisheries co-management process.

WHO SHOULD GET INVOLVED IN FISHERIES CO-MANAGEMENT?

Fisheries stakeholders can be defined as individuals, groups or organizations that have interests and/or can influence positively or negatively the management of fisheries resources. In a co-management regime, a balance of representation among stakeholders is a key factor for the success of its implementation (Adrianto, 2005; Pomeroy and Rivera-Guieb, 2006). Consequently, a pertinent question is which stakeholders should be involved and how should they be chosen when initiating and implementing a co-management arrangement? This question will be answered by using the stakeholders' analysis which is explained in Module 4. Nevertheless, an aspect that must be emphasized at this point is that co-management should involve a variety of stakeholders representing different needs and interests.

In general, four types of key stakeholders may be identified in fisheries co-management. They include (1) resource users, including fishers and fish farmers; (2) government, including central and local government; (3) other stakeholders, including other community members, fishing boat owners, fisheries traders, fish processors, among others; and (4) change agents or community organizers including non-governmental organizations, universities, research institutions, among others. Table 1.1 summarizes the role of the four key stakeholder groups discussed above.

TABLE 1.1

The role of key stakeholders in fisheries co-management

No	Key stakeholder	Role
1	Resources users	Identify the issues related to the community;
		Lead and mobilize activities in co-management;
		Participate in required research activities, data gathering and analysis in a co-management framework;
		Conduct monitoring and evaluation;
		Advocate the community's interests in decision-making.
2	Government	Provide legislation to ensure the community's right to participate in a co-management framework;
		Define the form and process of decentralized management;
		Provide legitimate tools for the existing management system in the community;
		Provide technical assistance, financial access, and an extension programme to initiate co-management;
		Provide the mechanisms for conflict resolution among stakeholders;
		Provide the mechanism for monitoring and evaluation based on local capacity;
		Facilitate training and education for local communities;
		Coordinate a local forum for stakeholder partnership in the co-management regime.
3	Other stakeholders	Identify issues in the community, particularly issues that emerge outside the fisheries community;
		Participate in planning and implementation of co-management;
		Disseminate information;
		Conduct conflict resolution;
		Conduct facilitation with the community.
4	Change agent/community organizer	Become a facilitator for stakeholders in the planning and implementation of fisheries co-management;
		Organize the community in the initiation and implementation of fisheries co-management;
		Provide the consultation service for the planning and implementation of fisheries co-management;
		Provide data and information required for planning and implementation of fisheries co-management.

Source: Adapted from Pomeroy and Rivera-Guieb (2006)

CO-MANAGEMENT AND PROPERTY RIGHTS REGIMES

The theory of fisheries co-management is drawn from a set of literature that deals with common-pool resources in which the exploitation by a given user directly affects the availability of the resources to other users who are difficult to exclude.

In the literature that deals with common property rights, four types of property rights regimes are identified (1) state property, where the resources are owned by the state and only the government has the right to regulate the utilization of the resources; (2) private property, where the resources are owned privately through enterprise institutions; (3) communal property, whereby the resource is controlled and managed by an identifiable community of users and regulations are made and enforced locally; and (4) open access, where there is an absence of property rights.

In reality, fisheries resources are generally held through a combination of two or more property rights regimes. In the case of fisheries co-management in Indonesia, the combination of sharing management rights between the state and communities represents the ideal.

Box 1.4

Property rights in Indonesia

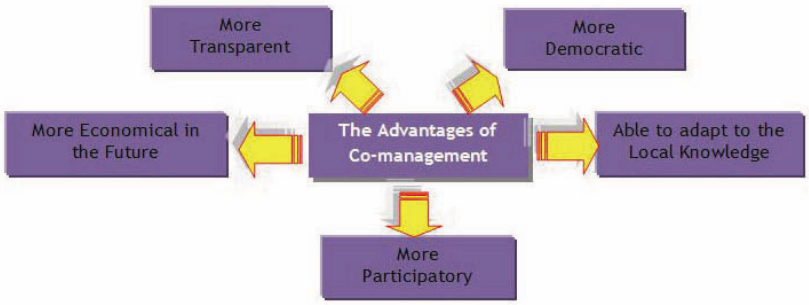
In Indonesia, the ownership of fisheries resources rests with the government (state property). However, through the provision of article No. 18 of the regional government law No. 32/2004, management rights for resources which occur within 12 nautical miles of the coast are delegated to the provincial government, while management rights for resources that are found up to four nautical miles from the coastline are delegated to the district/municipal government. Thus, Article No. 18 does not constitute a property right but rather a management right.

ADVANTAGES AND DISADVANTAGES OF CO-MANAGEMENT

Pomeroy and Rivera-Guieb, 2006 highlight the following as potential advantages and disadvantages of co-management. The advantages of co-management, are (1) co-management may lead to a more transparent management process between the government and the fisheries user groups; (2) it may lead to a more democratic and participatory governance of fisheries resources; (3) in the future, it has economic advantages compared to centralized management, since it reduces the administration cost and enforcement of rules and regulations that usually become the biggest cost components of centralized management; (4) through the involvement of the user groups, resource users become more responsible; and (5) co-management maximizes the contribution of local knowledge and scientific information to resource management. The advantages of co-management can be seen in Figure 1.5 below.

FIGURE 1.5

The advantages of co-management arrangement (Berkes *et al.* 2001; Pomeroy and Rivera-Guieb, 2006)

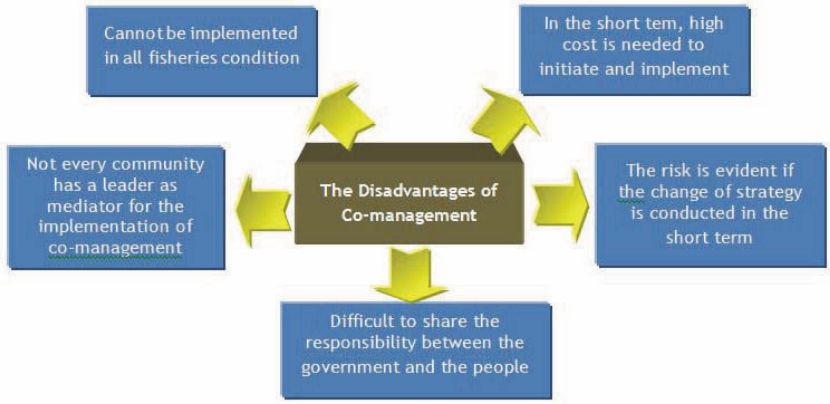


However, there are also disadvantages associated with co-management, namely (1) co-management may not be suitable for all fishing communities because there is a wide range of capabilities among the user groups; (2) initiating a co-management approach requires a substantial investment in the form of time and human resources in the short term; (3) poor leadership and a lack of community organization may reduce the effectiveness and sustainability of co-management; (4) changes in fisheries management strategy can be high risk for some of the fisheries stakeholders; and (5) in some areas, it is difficult to share responsibility between the government and the local people.

The disadvantages and important problems pertaining to co-management can be seen in Figure 1.6 below.

FIGURE 1.6

The disadvantages of co-management (Berkes *et al.* 2001; Pomeroy and Rivera-Guieb, 2006)

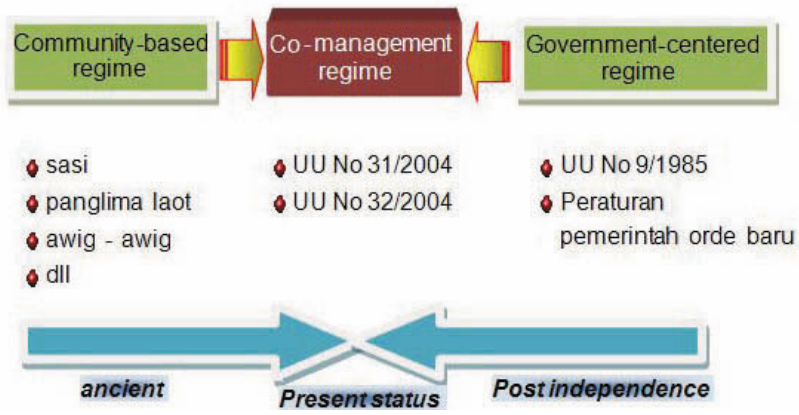


THE STATUS OF FISHERIES CO-MANAGEMENT IN INDONESIA

Since 2004, when Fisheries Law No. 31 came into effect, a shift in the fisheries management regime has occurred in Indonesia. This shift has changed the emphasis from a top-down, centralized management regime to a bottom-up, decentralized regime (examples of community-based management systems include *Sasi*, *Panglima lao*, *Awig-awig* and *Dll*), as stipulated in articles No. 2 and 6 of the Fisheries Law. These articles set out the principles of co-management and acknowledge the role of local/traditional ecological knowledge in managing fisheries. As a result, Fisheries Law No. 31/2004 (see Box 1.5 and 1.6) is the fundamental law pertaining to the implementation of fisheries co-management in Indonesia. The others (UU No. 9/1985 and Peraturan pemerintah orde baru) refer to centralized regimes (Figure 1.7).

FIGURE 1.7

The figure shows the shift in the fisheries management regime in Indonesia.



BOX 1.5

Article No. 2 of Fisheries Law No. 31/2004

Fisheries management is carried out under the principles of benefit, equality, partnership, equal distribution, integration, transparency, efficiency, and sustainable preservation.

The principles stated in Article 2 are essentially the fundamentals of fisheries co-management objectives, particularly those pertaining to partnership, equality and integration.

In the empirical context, fisheries co-management in Indonesia has moved towards the process of implementation through the initiation of several fisheries co-management projects. For example, the fisheries management regime based on local law (*awig-awig*) (Box 1.7) has been implemented at Taman Wisata Alat Laut Gili Indah in West Nusa Tenggara province.

Box 1.6

Article No. 6 of Fisheries Law No. 31/2004

Fisheries management for capture fisheries and fish-culture should take into account *adat* law (custom) and indigenous knowledge, including community participation.

From the perspective of Article 6 (2) above, the adoption of *adat* law and local knowledge constitutes one of the imperatives for strengthening fisheries co-management in Indonesia.

Box 1.7

***Awig-Awig* in fisheries management**

On Lombok Island, co-management may be implemented by using the system of customary law called *awig-awig* as a management tool. *Awig-awig* is a customary law that is applicable to anybody within a defined region; for example in a village or management area. *Awig-awig* is an agreement within local communities about social values. It is a way of controlling behaviour in order to achieve a harmonious society. *Awig-awig* is traditionally aimed at reducing conflicts in the community. Although the concept of *awig-awig* was originally imported from Bali during the colonial era, most villages in Lombok Island have their own *awig-awig*s. The *awig-awig* is usually concerned with regulations pertaining to marriage and security. Some villages, however, may also have an *awig-awig* relating to traditional ceremonies, for instance. The *awig-awig* was traditionally formulated by a community of an island, village, or sub-village; and the *awig-awig* only applied to them. Many villages, however, have the same or similar *awig-awig*. This applies particularly to the *awig-awig* that deals with marriage ceremony. Using *Awig-awig* to implement coastal resource management is not new for Lombok Island. Similar strategies have been adopted in Maluku and Sulawesi. In the district of Lombok Barat, several villages in two sub-districts (Kecamatan Bayan and Kecamatan Gangga) applied an *awig-awig* to fisheries management in the colonial era. This particular *awig-awig* prohibits fishing for one month every year, although it is unclear whether the rationale for this law is to protect the fisheries resource or to protect the safety of fishers. However, as the authority of formal institutions gained strength in the decade between 1960 and 1970, this *awig-awig* slowly disappeared and it declined more quickly than the *sasi* of Maluku. Since 1998, modern *awig-awig*s have been made for coastal resource management in the west and east of Lombok Island. Most of the *awig-awig*s are made by external intervention through government projects, such as the Co-fish project in the district of Lombok Timur (east Lombok) and the COREMAP and MCRMP in the district of Lombok Barat (west Lombok). Some *awig-awig*s are also independently made by local communities through community organization. Several *awig-awig*s show very positive results, while others have failed.

ETHICAL AND NORMATIVE ASPECTS OF CO-MANAGEMENT IN INDONESIA

According to the consensus reached by the founding fathers of the modern Indonesian state on a set of principles which were incorporated into the 1945 Constitution of the Republic of Indonesia, the country is governed in accordance with five fundamental principles or *Pancasila* (Box 1.8). It should be noted that there are a number of similarities between the principles of *Pancasila* and the principles underpinning the co-management of fisheries.

For instance, in the co-management approach, the government shares authority and responsibility with the users of aquatic resources which is consistent with two principles of *Pancasila*, namely that "democratic life led by wisdom of thoughts in deliberation amongst representatives of the people, and achieving social justice for all the people of Indonesia"[3] [sic].

Box 1.8

The five principles of Pancasila

The Preamble of the 1945 Constitution of the Republic of Indonesia states the following:

"Subsequent thereto, to form a government of the state of Indonesia which shall protect all the people of Indonesia and all the independence and the land that has been struggled for, and to improve public welfare, to educate the life of the people and to participate toward the establishment of a world order based on freedom, perpetual peace and social justice, therefore the independence of Indonesia shall be formulated into a constitution of the Republic of Indonesia which shall be built into a sovereign state based on a belief in the One and Only God, just and civilised humanity, the unity of Indonesia, and democratic life led by wisdom of thoughts in deliberation amongst representatives of the people, and achieving social justice for all the people of Indonesia."

Fisheries management must be viewed as human activities interacting with natural resources, particularly fisheries resources. Therefore, in order to create a balanced interaction between people, and between people and their natural environment, fisheries management requires an ethical component that should be jointly devised with stakeholders. Therefore, it is important to develop an ethical and moral system as a basis upon which fisheries co-management in Indonesia may be built (Box 1.9)

[3] Unofficial translation the Preamble of the Constitution of the Republic of Indonesia found at: (www.indonesia.nl/articles.php?rank=2&art_cat_id=22)

BOX 1.9

An ethical and moral basis for fisheries co-management in Indonesia

1. **Recognition of the ownership of the universe:** fisheries resources are common pool resources. Humankind must exercise great care in the stewardship of these resources.
2. **Recognition that nature has a certain "perfection":** we cannot regard the vast set of inter-related complex natural systems that make our natural world as faulty.
3. **Need for a system of rights and duties towards natural resource use:** people have the right to use natural resources for their prosperity and have the responsibility to ensure that current use will not jeopardize the rights of future generations to benefit from these resources.
4. **The obligation to work towards equitable use of natural resources:** so as to provide for many as opposed to the greed of a few and to avoid the dilemmas in which people, following their own short-term interests, produce outcomes that are not in anyone's long-term interest.
5. **Learning from nature**: understanding nature is the basis of the science and technology that underpin fisheries management.
6. **The entrepreneurial spirit:** managing fisheries to obtain sustainable economic and social benefits from resources and to improve the long-term development status of Indonesia's fisheries.

Note that according to FAO (2005) fisheries ethics deals with the values, rules, duties and virtues of relevance to both human and ecosystem well-being. Fishing policies and practices affect fishing livelihoods, the living conditions and interests of fishing communities, as well as the well-being of the ecosystem.

THE PURPOSE OF FISHERIES MANAGEMENT IN INDONESIA

One of the purposes of fisheries management in Indonesia, as mandated by the Fisheries Law No. 31/2004, is to improve the living standard of small-scale fishers and fish farmers (Box 1.10).

Within the framework of fisheries co-management, the nine purposes of Indonesian fisheries management can be broadly aligned with the current socio-economic and cultural system. All fisheries management purposes (Box 1.10) have a relationship with government, as well as communities using natural resources. Therefore, in the long term, co-management will be a more effective way of achieving these purposes, especially when compared with the other management systems that have been implemented in Indonesia.

THE LEGALITY OF FISHERIES CO-MANAGEMENT IN INDONESIA

Fisheries Law No. 31 of 2004 provides a new framework for fisheries management in Indonesia (Box 1.10) and a mandate to implement fisheries co-management.

BOX 1.10

Purposes of fisheries management in Indonesia

1. To enhance the living conditions of small scale fishers and fish farmers.
2. To increase the government's income and foreign exchange.
3. To drive the growth of job opportunities.
4. To enhance the supply and consumption of fish protein.
5. To optimize the management of fisheries resources.
6. To increase productivity, quality, added value, and competitiveness.
7. To increase the supply of basic commodities for the fish processing industry.
8. To achieve the optimum utilization of fisheries resources and aquatic environments.
9. To ensure the preservation of fisheries resources, areas for fish culture, and spatial management.

Source: Article 3 of Fisheries Law no. 31/2004

The development of fisheries co-management in Indonesia is also encouraged by Law No. 32 of 2004 on regional government, which delegates the majority of governmental issues to the district or regency level (*Kabupaten*). This law provides for public services to be closer to the people. According to Law No. 32 of 2004, the government institutions that handle fisheries matters in the districts or municipalities are acting as partners of the people and to conduct fisheries co-management.

BOX 1.11

A new paradigm in fisheries management in Indonesia as per Fisheries Law No. 31 of 2004

1. Sustainable farming (Article 6, Chapter 1).
2. An important goal is to improve the living standards of fishers and the small-scale fish farmer(Articles 65 and 67)
3. Fishery management must be democratic (Articles 65 and 67) and co-management principles must be implemented (Article 6, Chapter 2).
4. Implementation of the ecosystem conservation principles in natural resource management for the prosperity of human beings (Article 13, Chapter 1 and 2; Article 14, Chapter 1 to 4; Articles 15 and 16).
5. Implementation of conservation principles, including protection, mitigation and rehabilitation, in the utilization of natural resources (Article 7, Chapter 1).
6. Utilization of the best information available in the fields of science and technology (Article 46, Chapter 1 and 2; Articles 52 and 53), as well as the state of local ecology (Article 52).
7. The existence of strict sentences and clear jurisprudence where regulations are violated and crimes are committed against the fishery (Articles 72-109).

Fisheries co-management will develop strongly and rapidly provided there is cooperation between fisheries resource users and the government. The cooperation will be adaptive, depending on the balance between people's capacity to grasp knowledge and government's willingness to delegate responsibility and authority for fisheries management.

Fisheries co-management is also essentially a realization of sustainable development principles, which are characterized by the existence of three facets (Hartoto, 2002). These are economic viability, socio-political acceptability and ecological compatibility. Economic viability means that fisheries management must create activities that provide economic benefits. Socio-political acceptability implies that fisheries management must be applied and adapted within the existing social, cultural, legal and political systems in Indonesia. Ecological compatibility implies that management decisions should not compromise the sustainability and ecological continuity of fisheries resources (Hartoto, 2000b).

CODE OF CONDUCT FOR RESPONSIBLE FISHERIES: A WISE INTERNATIONAL AGREEMENT

Prompted by the poor state of the world's most valuable fisheries, the FAO developed the Code Conduct for Responsible Fisheries (CCRF). The CCRF was agreed to in 1995 by the FAO's member countries. It was designed to encourage responsible fishing practices, for the purpose of ensuring that future generations may also enjoy the benefits of fisheries activities. The objectives of the CCRF are to enhance the institutional and legal frameworks of the member states, thereby ensuring the effectiveness of conservation activities, fisheries management and the development of aquatic resources.

The detailed objectives of the CCRF are outlined in Box 1.12. The Code is voluntary and not enforced by international law. However, its scope and impact are far wider than the legal instruments that were negotiated through the UN Fish Stocks Agreement.

Fisheries co-management is an example of the Code's implementation plan for capture fisheries activities and inland aquaculture (Hartoto 2003). This is especially true for the principles relevant to capture fisheries activities such as participation of users in ecosystems with multiple activities (hydroelectric, aquaculture, harbour, etc), implementation of sustainable development principles, transparency in the decision-making process, support from the government to assist in resolving disputes and support to conduct training on responsible fisheries activities.

In managing aquaculture, the CCRF advises consultation around potential culture species, monitoring the impacts of aquaculture production, ensuring the involvement of stakeholders and developing aquaculture so that it supports the rural community.

BOX 1.12

Ten objectives of the FAO Code of Conduct for Responsible Fisheries

1. Establish principles, in accordance with the relevant rules of international law, for responsible fishing and fisheries activities, taking into account all their relevant biological, technological, economic, environmental and commercial aspects.
2. Establish principles and criteria for the elaboration and implementation of national policies for responsible conservation of fisheries resources and fisheries management and development.
3. Serve as an instrument of reference to help States to establish or to improve the legal and institutional framework required for the exercise of responsible fisheries and in the formulation and implementation of appropriate measures.
4. Provide guidance which may be used where appropriate in the formulation and implementation of international agreements and other legal instruments both binding and voluntary.
5. Facilitate and promote technical, financial and other cooperation in conservation of fisheries resources and fisheries management and developments.
6. Promote the contribution of fisheries to food security, giving priority to the nutritional needs of local communities.
7. Promote protection of living aquatic resources and their environments and coastal areas.
8. Promote the trade of fish and fishery products in conformity with relevant international rules and avoid the use of measures that constitute hidden barriers to such trade.
9. Promote research on fisheries as well as on associated ecosystems and relevant environmental factors.
10. Provide standards of conduct for all persons involved in the fisheries sector.

Source: FAO, 1995

CONCLUSION

There has been a global shift in fisheries management, to one that recognizes the importance of fishers' participation and shared decision-making in the management of fisheries. This approach can be defined as co-management, a type of management that is characterized by the pivotal interaction between government and fisheries users, through consensus building and the sharing of different management roles and responsibilities.

Fisheries co-management is an approach that seeks to balance economic activities with social justice and the health of the environment. By implementing a co-management approach, the allocation of the roles and responsibilities of the relevant parties can be accomplished with a view to reaching consensus and reducing conflict. In this framework, co-management is expected to encourage efficient and sustainable fisheries.

Since 2004, when Fisheries Law No. 31 came into effect, a similar shift in approach has taken place in Indonesia. This shift changed the emphasis from a from top-down, centralized management regime to a bottom-up, decentralized

regime, as stipulated in Articles No. 2 and 6 of the Fisheries Law. Interestingly, the co-management approach to fisheries management is also aligned to the FAO's Code of Conduct for Responsible Fisheries.

MODULE 2

Theoretical structure of fisheries co-management in Indonesia

Ecological facets in adaptive fisheries co-management in Indonesia
by *Dede Irving Hartoto* 25

Social facets of fisheries co-management
by *Luky Adrianto* 33

Criteria for the successful introduction of co-management practices to Indonesian fisheries
by *Dede Irving Hartoto* 44

ECOLOGICAL FACETS IN ADAPTIVE FISHERIES CO-MANAGEMENT IN INDONESIA

ECOLOGICAL SUSTAINABILITY IN FISHERY CO-MANAGEMENT

Sustainable fishery development strives to satisfy the needs of the present generation without sacrificing the needs of the next generation. In Indonesia, sustainable development should maintain equal interactions between the facets of economic viability, socio-political acceptability and ecological compatibility (Figure 2.1). Furthermore, to be accepted on a socio-political level as a form of sustainable development, all fisheries management activities must also be ecologically compatible. Fisheries co-management should also reinforce the principles of the ecosystem approach to fisheries that was agreed to during the Fourth Meeting of the Conference of the Parties to the Convention on Biological Diversity (Bratislava, Slovakia, 4-15 May 1998, UNEP/CBD/ COP/4/Inf.9).

THE ECOSYSTEM APPROACH AND FISHERIES CO-MANAGEMENT

Fisheries management is essentially a way of managing natural resources and biodiversity. Therefore, it should incorporate principles of the ecosystem approach. Principles 1, 2, 3, 9, 11, and 12 in Box 2.1 show that to achieve the noble purposes of an ecosystem approach to fisheries management, cooperation between government and users of fisheries resources is required. Cooperation and sharing responsibility between government and local users is the main characteristic of fisheries co-management.

FIGURE 2.1

Three facets of sustainable development

BOX 2.1

Adaptation of 12 principles of the ecosystem approach to fishery co-management

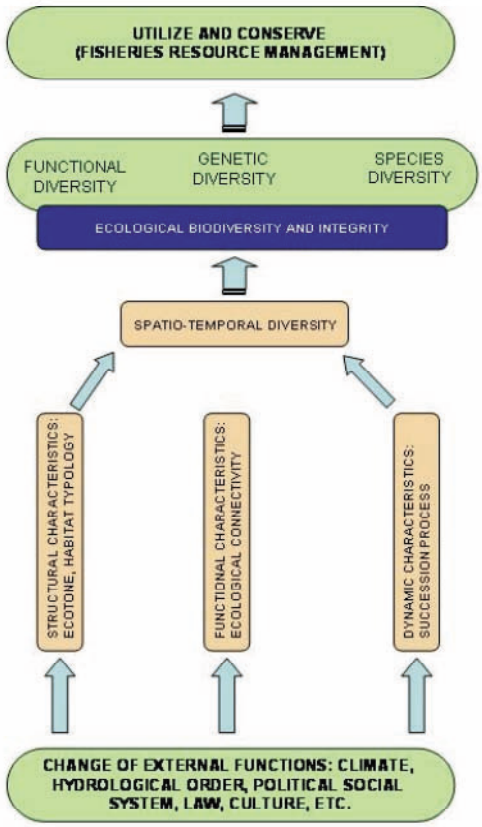
1. The goal of fishery management must be agreed to by the society.
2. Management must be decentralized to the lowest possible level.
3. Ecosystem management must consider the impact of an activity on the adjacent ecosystem or on another ecosystem.
4. In order to appreciate the potential benefit of any fishery management action, it is necessary to understand the ecosystem in an economic context, considering for example, mitigating market distortions, aligning incentives to promote sustainable use and internalizing costs and benefits.
5. One of the key characteristics of the ecosystem approach is the conservation of the structure and function of the ecosystem.
6. Ecosystems must be managed within the limits of their functioning.
7. The ecosystem approach must be applied at an appropriate level.
8. Ecosystem characteristics change over time. Therefore, recognizing the varying temporal scales and lag effects, objectives should be set for the long term.
9. Fishery stakeholders should be convinced that change is something that must occur.
10. An ecosystem approach to fishery management must find equilibrium between conservation and exploitation.
11. An ecosystem approach must consider all forms of relevant information, including innovation and scientific practice, original knowledge and local wisdoms.
12. Fishery management with an ecosystem approach must incorporate all sectors of the community, as well as scientific discipline.

Source: Malawi principles for the ecosystem approach. Formulated during a Workshop on the Ecosystem Approach (Lilongwe, Malawi, 26-28 January 1998), and presented at the Fourth Meeting of the Conference of the Parties to the Convention on Biological Diversity (Bratislava, Slovakia, 4-15 May 1998. UNEP/CBD/ COP/4/Inf.9).

Fisheries management is a human endeavour that strives to exploit natural resources while trying, as far as possible, to preserve and maintain ecological integrity and connectivity (Figure 2.2). A fishery system is influenced by external factors beyond the system itself. Among these factors are climate, the hydrology system, legal and cultural systems. Therefore, changes to external factors may lead to several other changes, namely: (1) changes to the ecosystem structure that can change habitat type; 2) changes of functional characteristics, such as change of ecological connectivity; and 3) changes to the ecosystem's dynamic characteristics that may emerge in the form of a succession process. The three forms of changes will subsequently influence the diversity, physical, chemical and biological characteristics of the ecosystem, and possibly its temporal and spatial characteristics. On a different level, spatial-temporal diversity will influence natural diversity and ecological integration and those changes will subsequently affect the fisheries stock; either changing the stock diversity in relation to its function in the food chain, biogeochemistry cycle or other ecological functions. Eventually, all those changes will culminate in the preservation and utilization processes of the fisheries resource that constitutes the focus of fisheries resource management.

FIGURE 2.2

Diagram of fishery management viewed from the perspective of resource use and conservation in the context of maintaining the relevant system of ecological connectivity and integrity



ECOLOGICAL INTEGRITY

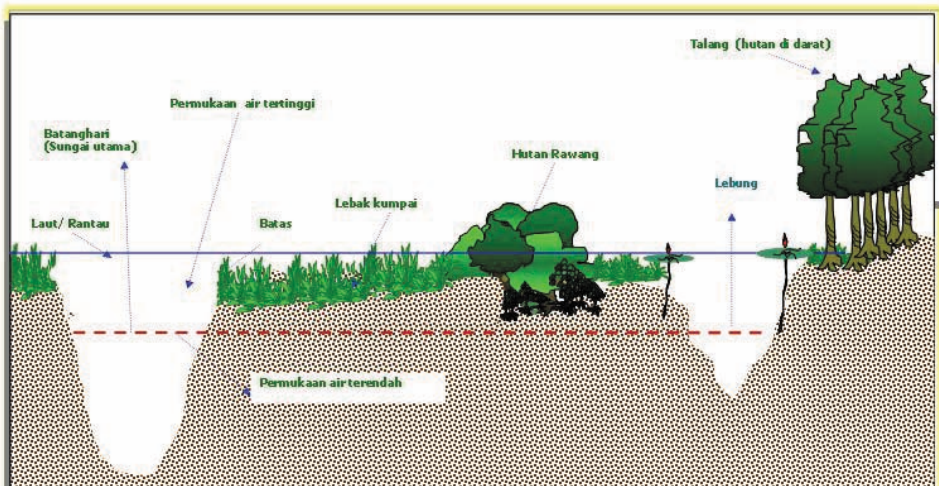
Ecological integrity in an aquatic system means that water continues to show characteristics similar to the type of ecosystem found in a similar geographical area. For example, the aquatic ecosystem of Lebak Lebung in South Sumatra Province can be categorized as having good ecological integrity if there are still habitats commonly found in the same type of water within the same geographical area (Figure 2.3). The organisms living in the mentioned habitats must also have a structure and pattern of behaviour similar to the structure and behaviour of biota in the same type of water ecosystem (film demonstration 2.1). In general, intact water ecosystems have structural and ecological functions and a good state of ecological integrity.

In the context of modern fisheries management, the ecological integrity of an

aquatic system is a characteristic that should be monitored, understood and continuously maintained. Community users of fishery resources are the community members who are dealing with the resources on a day-to-day basis, so they are very well suited to act as the observer. They are sometimes able to recognize naturally occurring phenomena that are not quickly identified by modern science. In a fisheries co-management framework, therefore, the roles of government are to provide a format, institutional framework, and formal organization to store, process and utilize the knowledge and information.

FIGURE 2.3

Types of habitat commonly found in *Lebak Lebung* (flood plain) in South Sumatra (Hartoto, 1992)

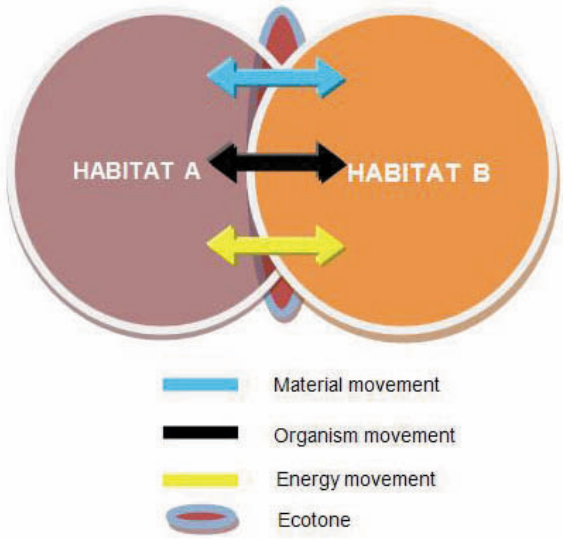


ECOLOGICAL CONNECTIVITY AND CONSERVATION EFFORTS

The habitats in an aquatic ecosystem are adjacent to each other. The ecological characteristics of the site that is adjacent to the border of a neighbouring habitat generally shows some characteristics of each habitat. This site is referred to by the term "ecotone" (Figure 2.4).

FIGURE 2.4

Diagram of ecological connectivity describing interaction of material, energy and organisms moving across the ecotone.



The ecological connectivity in a water ecosystem is easily disturbed by, for example, the construction of a dam in a river, the conversion of mangrove forest to fish/shrimp culture ponds, the construction of a road that crosses a flood plain, and many other causes. Even damaged fishing nets that are not lifted from the water column may cause damage to ecological connectivity because they disturb fish movement. Within the fisheries co-management regime, fisher folk, in cooperation with the government, can play a role and share the responsibility of securing the sustainability of ecological connectivity in a fisheries system.

In line with the mandate of Fisheries Law No. 31 of 2004, fishery management is advised to incorporate mechanisms to support ecosystem conservation, species conservation and genetic conservation. In the past, conservation was understood in a narrow sense as an activity of natural resource preservation, i.e. in the sense that natural resources should not be used at all, should be managed in the unexploited form so as to be preserved in their original condition for as long as possible.

However, in the context of Indonesian fishery management, conservation is defined as the management of water resource exploitation in such a way that we can obtain the maximum sustainable benefit for the present generation, while maintaining the potential of the resource to satisfy the needs and aspirations of future generations. In fishery management, conservation includes the protection, mitigation and rehabilitation of fish resources and their environment (Box 2.2).

BOX 2.2

Definition of protection, mitigation and rehabilitation for the purpose of applying conservation principles to Indonesian fishery management

Protection:	human efforts to prevent further damage to an aquatic resource by limiting development activity.
Mitigation:	human efforts to reduce the impacts of development activity on aquatic systems by way of retaining some natural diversity (physical and biological aspects), by limiting certain activities in the aquatic environment.
Rehabilitation:	an activity that aims to recover the structure and function of physical and biotic diversity by re-establishing the patterns that existed prior to the initiation of development activities.

Source: Hartoto, 2004

THE ROLE OF THE COMMUNITY IN PROTECTION, MITIGATION AND REHABILITATION

In several parts of Indonesia, traditional wisdoms based management in such a way to maintain the ecological integrity and connectivity of ecosystems, as well as protect, mitigate and rehabilitate fishery resources and their environment. In fact, anthropological research suggests that traditional wisdom was used hundreds of years ago to conserve and manage fisheries resources. For instance, at Prambanan temple, the relief on the wall of the temple depicted a big fish with very large scales, which is thought to be of the genus *Tor spp.* According to anthropological information, the fish was only allowed to be eaten by common people after it was touched by the hand of king. This is an example of traditional wisdom related to conservation of fisheries resource in the past. The following chapter describes the application of conservation principles that were implemented in a participatory way between local users of resources and the government.

THE SANCTUARY SYSTEM AT JAMBI PROVINCE: CO-MANAGEMENT IN THE PROTECTION OF FISH RESOURCES

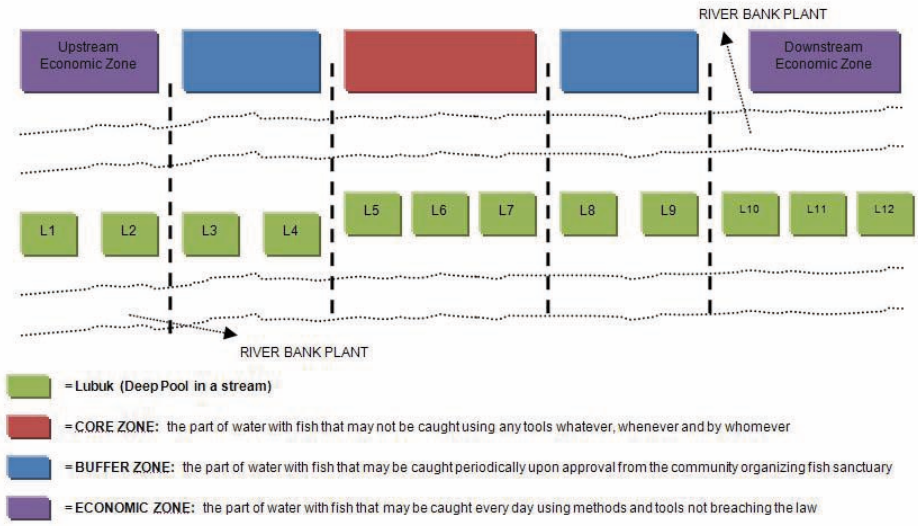
Since 1995, the Fisheries Provincial Services of Jambi Province, together with the local community, have developed a modern terrestrial and aquatic fishery sanctuary system. This system has used broodstock to re-seed fish stocks, generating a buffer population of fish which may be caught by fishers. The sanctuary is zoned for different uses.

The application of the metapopulation concept is realized by the establishment of a zoning system within the fishery sanctuary. A metapopulation consists of a group of spatially separate populations of the same species which interact at some level. Metapopulation theory emphasizes the importance of connectivity between seemingly isolated populations. Although no single population may

be able to guarantee the long-term survival of a given species, the combined effect of many populations may be able to do this.
A diagram of the zoning system that is used in the sanctuary is presented in Figure 2.5. There are four fishery sanctuary systems in Jambi Province. All are managed by a co-management system which has been established between the Fisheries Provincial Services and the local community (Hartoto, 2000).

FIGURE 2.5

Zonal management of a riverine fishery sanctuary in Jambi Province



THE FISHERFOLK OF MINA BADA LESTARI: MITIGATION IN MANINJAU LAKE

Following mediation by the Centre for Limnology Research (LIPI), a fishermen's union, Mina Bada Lestari, has collaborated with the marine fishery office Agam Regency in establishing the Bada Fish (*Rasbora argyrotaenia*) management plan in the 9 800 ha of Maninjau Lake. One aspect of the management activity is the construction of ten units of *Rasau* (an enclosure made of branches which is designed according to the traditional practice of the community) as a kind of fish-attracting device (Figure 2.6). Through meetings with members of the fishing community at Maninjau Lake, agreement was reached that of the ten *Rasau* enclosures, three have been earmarked as core zones where fish may not be caught at all. This is in an effort to protect the stock of Bada fish.

The establishment of the *Rasau* enclosures is a good example of a fishery mitigation activity that has been established through co-management between the government and resource users in order to protect a valuable fish stock (Bada fish realizes a price of US$25 /kg when it is smoked.)

FIGURE 2.6

Members of a fishermen's union at *Mina Bada Lestari* are maintaining *Rasau* as a kind of fish attracting device

REHABILITATION OF KERINCI LAKE THROUGH BIOMANIPULATION

Since 1995, the waters of Kerinci Lake in the Province of Jambi have become nutrient rich and oxygen starved, largely as a result of the fact that 80 percent of the lake's surface was covered by water hyacinths (*Eichhornia crassipes*). This condition resulted in a decrease in fishery production, the loss of indigenous fish and, as a result, many fishers lost their livelihoods. The fisheries provincial services of Jambi Province and the government of Kerinci District, in cooperation with the community around the lake, seeded the lake with thousands of Koan fish (*Ctenopharyngodon idella*) with the objective of clearing water hyacinths from the lake. The fishing community refrained from catching Koan fish, even going so far as to release them if they were unintentionally caught in fishing nets. Initially, the Koan fish ate the roots of the hyacinth until the plant fell into the water. Then the plant itself was eaten by the fish. All that remained was a hyacinth stump. Finally, after only two years, the water hyacinths had been completely destroyed by the fish. The lake waters became fresh and clear and the Koan fish had grown large. As a result, the people of the region have been able to conduct their traditional Lake Festival once more (Figure 2.7).

Figure 2.7

Following the successful rehabilitation process, the Festival of Kerinci Lake, which is beloved by the community, could be conducted once again. The first Festival after the clearing of the Lake was conducted in 1999.

SOCIAL FACETS OF FISHERIES CO-MANAGEMENT

THE IMPORTANCE OF VIEWING FISHERIES AS A SYSTEM

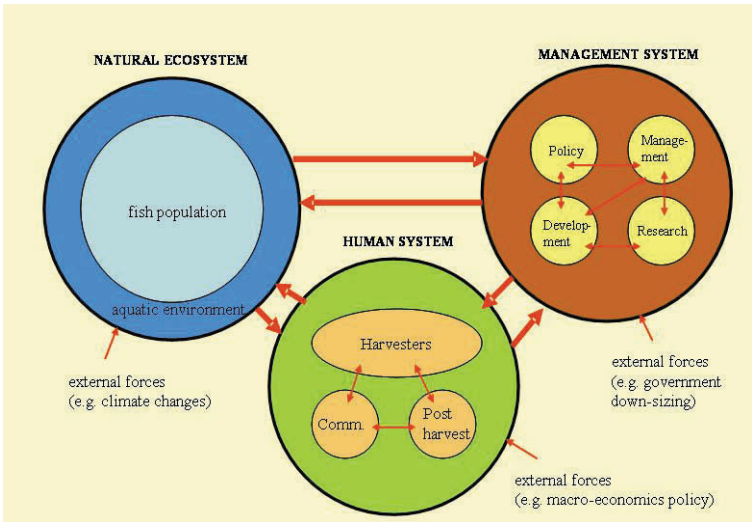
The perception by the public and even academics, that fisheries and marine resources are mere commodities, is flawed. This misconception is closely related to the classical opinion that the primary production sectors of fisheries, agriculture, forestry and animal husbandry are merely commodity producers. History has proved that fishing is an economic activity that is directly related to the ecosystem, the economy, the community and its related institutions. These four dimensions cannot be separated when one deals with the subject of fisheries and the marine environment (Hanna, 1999).

In the comprehensive book entitled "Sustainable Fisheries Systems", Charles (2001) describes the importance of a systems approach to marine fisheries management. Meanwhile, Hall and Day (1977) consider that: "…any phenomenon, either structural or functional, having at least two separable components and some interactions between these components may be considered a system". In this context, fisheries are, by nature, a system comprising many related and interdependent factors and phenomena (Figure 2.8).

Furthermore, Charles (2001) confirms that the fishery system is a union of three main components, namely the natural system comprising the ecosystem, fish and biophysical environment; (2) the human system consisting of fishers or fish farmers, market agents and consumers, fishing communities and coastal communities as well as social, economic and cultural environments related to this system; and (3) the fishery management system comprising elements of policy and fishery planning, fishery development, fishery management and fishery research.

FIGURE 2.8

Fisheries as a system (Charles, 2001)



Fisheries are complex as noted by Walters (1986: p.167) "...most fisheries problems are complex and contain human as well as biological dimensions. Too frequently we see the consequences of trying to deal with complexity in a fragmentary or narrow way. Management plans based on the soundest of biological information fail when it is discovered that fishing pressure cannot be controlled because of unforeseen political or economic constraints. Economic policies fail when unforeseen biological limits are exceeded. In short, fisheries represent dynamic (time varying) systems with interacting components....". In this regard, fisheries have degrees of diversity, complexity, dynamics and scale (Kooiman *et al.*, 2005)

A complex fishery system is characterized by four types of diversity, namely: species diversity, genetic diversity, function diversity and socio-economic diversity (de Young *et al.*, 1999). In practice, there are several sources of complexity in fishery systems (Charles 2001), namely (1) overlapping purposes that potentially raise conflicts between users and governments; (2) the numerous species and interactions between species at the tropical level context: (3) dynamic social and economics interests between the users; (4) the numerous types of catching devices and technology and the fishers' interactions with them; (5) the social structure and its effect on the fishery; (6) the dynamics of fishery data and dissemination of information; (7) the interaction between fishery resources, fishers and the environment; (8) the uncertainty of the respective components of a fishery system; and so on.

Therefore, perceiving a fishery as a mere commodity lessens the importance of the sector which is in fact a complex and dynamic system that plays a key role in supplying food for human beings.

From a co-management perspective we view fisheries as a system that comprises important parts, right from the planning to the implementation stage. The critical dimension in fisheries co-management is compatibility; meaning that the three elements of fisheries resources (a natural system), the public sector (a management system) and the private sector (a human system) constantly interact and cannot be separated from each other. This then, is the crux of fisheries as viewed from the perspective of a fisheries co-management framework (see Topic 1.1).

THE CONCEPT OF A SOCIO-ECOLOGICAL SYSTEM

One of the most important concepts underlying the implementation of fisheries co-management is the social-ecological system (SES). According to Anderies *et al.* (2004), a social-ecological system (SES) is defined as: "…a system of biological unit/ecosystem unit linked with and affected by one or more social systems". In this way, SES deals with ecosystem units such as coastal areas, mangroves, lakes, coral reefs, coasts and upwelling systems including fisheries systems as units

associated with a social process. Berkes and Folke (1998) and Carpenter and Folke (2006) define SES as an: "integrated system of nature and society with reciprocal feedbacks".

In the context of fishery co-management, this concept is very important. In this context, fishery agents provide a link between dynamic aquatic ecosystems and the fishery. In other words, the two dynamic systems need integration through fisheries co-management. It is this integration that provides an example of the social-ecological system in the coastal and marine management areas (Adrianto and Aziz, 2006).

In the context of fishery co-management, this SES approach is expected to increase resilience and better cope with vulnerabilities (for instance in case of natural disasters – Figure 2.9) through certain actions, either in the local or national frameworks. Adger *et al.* (2005) presents some examples of local and regional action scales in the context of enhancing SES resilience in Table 2.1.

TABLE 2.1

Examples of local action scales in the context of the increase in SES resilience linked with fishery vulnerability

Vulnerabilities	Local Action
Sensitivity to the disaster and damage of natural resources	Maintenance and functionality of the ecosystem through sustainable resource utilization
	Memory maintenance on the pattern of resources utilization, learning process to respond to environmental impact and social linkage
Adaptive capacity	Diversity in the context of an ecological system
	Diversity in the context of a socio-economic portfolio
	Social capital and community institution having legitimacy

Source: Modified from Adger *et al.* (2005).

FIGURE 2.9

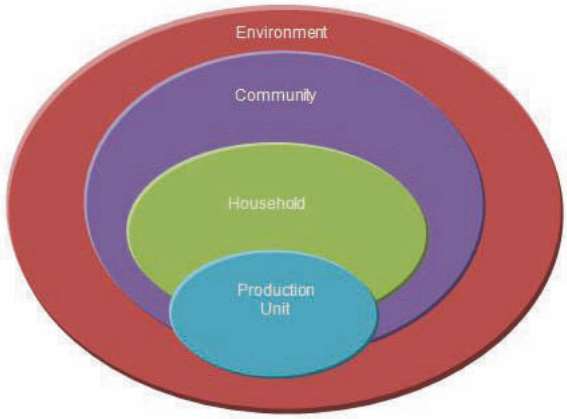
The vulnerability of natural resources to disaster: a case-study of the disaster affected Nanggroe Aceh Darussalam

SOCIAL ASPECTS OF FISHERIES

According to Townsley (1998), a social analysis of resource utilization, including fisheries activities, in the coastal and marine environment may be focused on several key levels. These are presented in Figure 2.10. It may be seen that the smallest unit or level of a fishery community system is the fisher community or production-unit household and that an occurrence at the household level will influence the community dynamics. In the context of fishery aquaculture, Jahncke *et al.* (2002) state that the impact of inappropriate fish diseases and environmental management will finally influence public health directly or indirectly. In the context of Townsley, an effect at the "production unit" level will generally affect the "community" level.

FIGURE 2.10

A framework of social levels in a fishery system (Townsley, 1998)



In most cases, a community is defined as a social group of any size whose members reside in a specific locality, share government and often have a common cultural and historical heritage (Hart, 1998). Nevertheless, Townsley (1998) states that community does not always have a connection with a specific area, but with the concept of livelihood. For instance, and in the context of marine and coastal resource use, a group of fishers or fish farmers who live in different administrative areas may be categorized as a fisher or fish farming community because they share the same livelihood. Therefore, a government that takes responsibility for fisheries management should be able to identify various levels within the coastal community, especially where they relate to the fishery household. Box 2.3 presents other definition of community.

BOX 2.3

Other definitions of community

Pameroy (2006) defines the community geographically, defining it by means of political or resource boundaries, and socially as a community of individuals with common interests.

Source: Pomeroy and Rivera-Guieb (2006)

From this perspective, the social dimension in fisheries co-management includes socio-cultural and economic and institutional aspects. In the following paragraphs, these important parameters are explained in detail. Local knowledge and conflict will be discussed under the subject of the socio-cultural dimension, while transaction costs in co-management will provide an example of the economic dimension. Under the subject of institution, fishing rights will be discussed.

SOCIO-CULTURAL DIMENSIONS

Local knowledge

Local knowledge is one of the socio-cultural dimensions that are important in fisheries co-management. As was mentioned earlier, the fishery co-management framework has two dimensions, namely a government dimension (the regulator and facilitator) and a community dimension (the fishery community as users of fisheries resources). Therefore, the implementation of co-management provides an opportunity for the fishery community to contribute to fishery management in partnership with the government. It is in this context that local knowledge becomes important in co-management systems.

Local knowledge is defined as knowledge derived from local fishing practices and used over generations by a community or fishery community. In the framework of co-management, local knowledge becomes a basis for the community to manage fishery resources (a management right).

BOX 2.4

Characteristics of local fisheries knowledge

1. Local knowledge is long term, empirical and based on local observation.
2. Local knowledge is practical, behavior oriented, and focused on certain fisheries resources.
3. Local knowledge is instructive and may always be validated using systematic evidence.
4. Local knowledge has a dynamic character and adapts to change.

Source: Ruddle (2000)

Conflict and resolution

In the fishery co-management framework, the understanding of conflict and how to resolve it is very important. This is because co-management is a process of sharing authority and responsibility for fisheries resources management which involves more than one actor, i.e. the government on one hand and the stakeholders on the other hand.

In general, conflict is defined as a clash of interest between two or more parties, in which at least one party insists that their interest is met by the other party (Bennet *et al.* 2001). However, conflict does not necessarily have a negative connotation or have to cause harm. Conflict may provide an opportunity for two or more parties, with two or more incompatible goals, to come together to reach a solution that is to the satisfaction or benefit of all.
Bennet *et al.* (2001) expresses theoretically that conflict is formed by various causes. Sociology views conflict as a dynamic of social structure, political views conflict as a function of power relations, while economic views conflict as a result of rational decision-making when the goal of maximizing profit is faced with limited resources. See Box 2.5 for example.

In the context of fisheries, Charles (2001) classifies conflict into four types, namely (1) conflict relating to jurisdiction; (2) conflict relating to management mechanism; (3) conflict relating to internal resource allocation; and (4) conflict relating to external resource allocation. Table 2.2 presents some examples of these four types of conflict.

As explained in the previous module, co-management constitutes a process (not a result) that emphasizes reaching consensus among stakeholders with different interests. In this context, conflict and its resolution become one of the key issues for implementing fisheries co-management.

TABLE 2.2

Typology of fishery conflict

Fishery jurisdiction	Conflict relating to the issue of resource ownership – who has the right of access to the resource
Management mechanism	Conflict relating to the management mechanism and fishery policy, such as the conflict surrounding fish quotas
Internal allocation	Conflict relating to interaction between fishery stakeholders
External allocation	Conflict relating to the interaction of fishery stakeholders with parties outside the fishery

Source: Modified from Charles (2001)

There are at least two matters that need to be considered in conflict resolution, namely: (1) the process of conflict resolution; and (2) the type of conflict resolution that is adopted. Efficiency in the conflict resolution process plays an important role since it determines the type of strategy that is to be adopted. Efficiency will be improved if the conflicting parties conduct the resolution process independently, with or without a mediator. Agreement between the parties is based on the independent satisfaction of each party; even if there is a mediator, his/her role is limited to communicating the interests of one party to the other.

Meanwhile, the type or pattern of conflict resolution that is selected plays an important role in the effective implementation of a co-management framework. For example, a formal system of conflict resolution that is adopted by a government can improve the effectiveness of the conflict resolution process.

BOX 2.5

An accident

From 13 to 14 January 2006, several purse seine fishing boats from Juawa, Central Java entered Balikpapan port in East Kalimantan after catching fish in the waters around Makasar Strait. The fishermen sold their catches in Balik Papan City. On 16 January 2006, traditional fishers from Balikpapan attacked those purse seiners because they thought the boats from Juwana were disrupting their livelihood.

Kinseng (2006) gives this example as a case of class conflict between modern and traditional fishers. Kinseng also determined that the class conflict was not on the level of exploitation, but only on the level of domination.

Source: Kinseng (2006)

ECONOMIC DIMENSION: TRANSACTION COST

The economic aspect of co-management is important, particularly when talking about the effectiveness of planning and implementing fisheries co-management itself. The concept of transaction costs is often used to describe the economic aspect of fisheries co-management (Box 2.6).

Kuperan and Pomeroy (1998) categorize the transaction costs associated with fisheries as (1) information costs; (2) collective decision-making costs; and (3) collective operational costs. Table 2.3 shows the components of these three transaction costs.

TABLE 2.3

Components of transaction costs in fisheries

No.	Kind of transaction cost	Components of transaction cost
1	Information costs	Knowledge sources
		Information gathering
		Information organization
2	Decison making costs	Meeting
		Policy and regulation developments
		Policy and regulation communication
		Coordination between authorities, e.g. central and local government
3	Collective operational costs	Monitoring and evaluation
		Resource preservtion
		Resource distribution

Source: Kuperan and Pomeroy (1998)

Box 2.6

Definition of transaction cost

Transaction cost is defined as the cost that emerges from the development, planning and implementation of institutional arrangements; for example, the establishment of a fisheries co-management institution.

Source: Mburu *et al*. (2003)

In the context of fisheries co-management, there should be a rational relationship between benefit and costs. In other words, the benefit that is derived from initiating a system of fisheries co-management must outweigh the cost of establishing that system. By using this rationale, it becomes feasible to initiate or replicate a system of fisheries co-management.

INSTITUTIONAL DIMENSION: RIGHTS-BASED FISHERIES

One of the key factors in understanding the dynamics between fishers, fish farmers and the economic and social environment is the concept of fishing rights. Prior to introducing a fisheries co-management arrangement, and in order to ensure fairness and sustainability in the management of fishing communities, the rights-based fisheries concept must be considered.
According to Ostrom and Schlager (1996), there are two types of rights that are important in the context of managing and utilizing natural resources, including fishery resources. These are (1) use (operational level) rights and (2) collective-choice rights. The difference between the two is that the former involves merely exercising a right, while the latter involves participation in the definition of future rights.

The operational level rights are associated with the process and dynamics of fishing i.e. rules that govern the course of day-to-day activities. These rights include
(1) access rights – the right to enter the fishing business, either by catching fish or by establishing a fishery business, such as a processing plant; and (2) withdrawal rights – the right to obtain the "products" of a specified resource (e.g. catch fish, appropriate water, etc). The right to gain access to fisheries and the right to harvest fisheries resources are a crucially important element in the sustainability of fishing communities. Without these rights, the goal of establishing new fisheries management arrangements, such as fisheries co-management, cannot be achieved.

The second type of right defined by Ostrom and Schlager is a collective-choice right. Collective-choices are the rights to regulate internal use patterns and transform the resource by making improvements. This type of right is usually assigned to authorities that exist outside the fishing community. In most cases the authority is local government which, in terms of Law No. 32/2004, Article 18, plays an important role in fishery management in Indonesia. In the fishery management context, this second right type is very important. It accounts for the element of "who manages" as opposed to the element of "what is managed" which is described by the first type of right (use rights). Included in the definition of collective-choice rights are the management, exclusion and alienation rights:

- management rights give the holder the authority to determine how and where harvesting of a resource may occur and whether and how the structure of a resource may be changed;

- the holder of a right of exclusion can regulate the access to the resources and how this access right can be transferred;

- the right of alienation gives the possibility of transferring part or all of the collective choice rights to others.

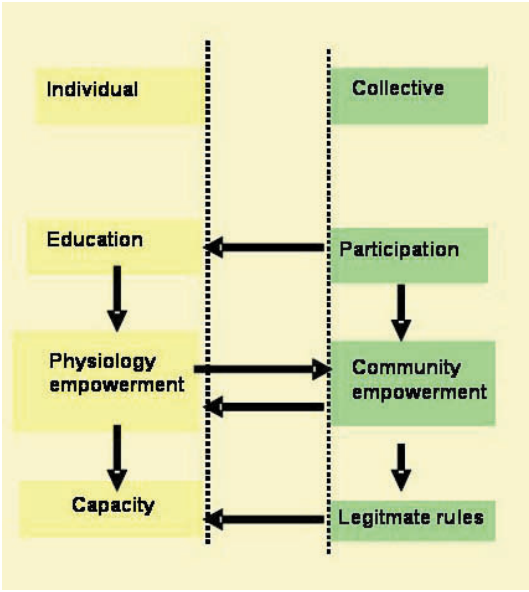
The assignment of the collective right to the fishing communities is a central issue in the implementation of a system of fisheries co-management.

INSTITUTIONAL DIMENSION: THE EMPOWERMENT PROCESS

Quite apart from the question of rights, one of the most important factors in fisheries co-management is the empowerment process as explained by Jentoft (2004). Essentially, co-management strives to ensure that stakeholders are able to participate in fisheries management on an equal footing with government. Diagrammatically, the empowerment process in fisheries co-management constitutes interactions at the individual level, as well as at the collective level. Figure 2.11 shows the empowerment process in fisheries co-management.

Figure 2.11

The empowerment process in fisheries co-management



In the above figure, it can be seen that the empowerment process constitutes a cycle which begins at the individual level with education and reaches a level of capacity which is followed by collective action and participation until a level of legitimate fisheries co-management is achieved (Figure 2.12 and Box 2.7 below).

BOX 2.7

Definition of empowerment

There are several definitions of empowerment. One is proposed by Torre (1986).

Empowerment is a process through which a person is strong enough to participate in and influence the institution that is related to his or her livelihood.

The empowerment process constitutes a key element of fisheries co-management because it relies on the capacity of stakeholders to participate at all levels.

FIGURE 2.12

Training is one example of the empowerment process

CRITERIA FOR THE SUCCESSFUL INTRODUCTION OF CO-MANAGEMENT PRACTICES TO INDONESIAN FISHERIES

MEASURING SUCCESS

A fishery management activity may be considered a success if it achieves its objectives. In the context of fishery co-management, those objectives must constitute a choice on the part of the community. If the community decides on the objectives of the fisheries management activity, and if their decision is conducted jointly with the government, then the decision-making process constitutes a form of fisheries co-management. According to the principles of science and technology, fisheries management should be conducted in such a way that its success can be measured. In a fisheries co-management regime, the objectives of fisheries management must be formulated with due consideration for the ecological and socio-economic dimensions of fisheries resources.

Fishery management in Indonesia is currently implemented in a way that is prescriptive rather than measurable and quantifiable. In order to move towards a more quantitative fisheries co-management system, it may be necessary to implement a "process control approach" (Hartoto, 1992). Almost all fisheries management plans lack the quantitative criteria that would allow for their implementation to be measured against their objectives. As a result, it is difficult to measure the success of these management plans.

The process control approach may be defined as the effort of humankind to manage a system in order that its variables can realize desired values (standards or set points). There are four main factors involved in implementing the process control approach, namely; identification of the system, system monitoring, system evaluation and application of control factors (Box 2.8). The process control approach must be implemented continuously and is best explained by using the process control loop as shown in Figure 2.13.

By utilizing the process control approach, fisheries co-management will be better understood by the users of fisheries resources. It is a method that can help them to contribute to fisheries management. Local users of fisheries resources can play an active role in defining fisheries area boundaries, determining the monitoring system that will be applied, determining the criteria that will be used to measure the success of the fisheries management system and determining the system of fisheries control that will be used.

BOX 2.8

Major elements of fishery co-management using the process control approach

Fishery system: The sets of variables that are characteristic of the fishery (both for capture fisheries and aquaculture).

External Function: The factors outside the fishery system that influence the characteristics of the fishery system. There are two external systems, namely:

1. **Artificial external function:** derived from human activity, such as pollution, deforestation, damming of rivers, etc.
2. **Natural external function**: derived from natural elements such as rainfall, changes in the water level, wind patterns, etc.

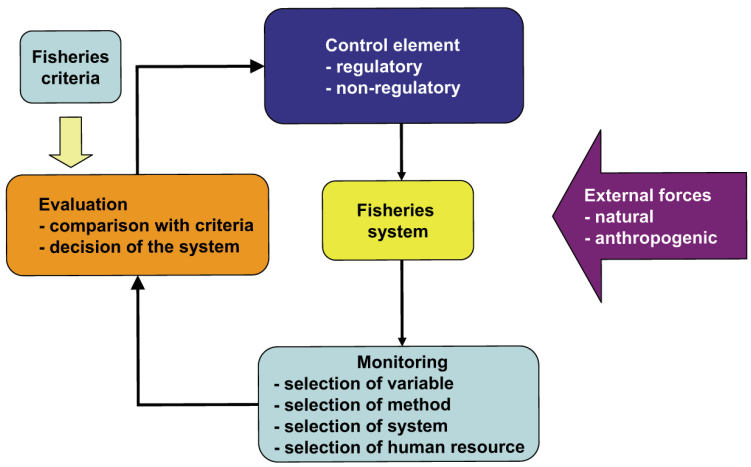
Monitoring: the effort to understand the characteristics of the ecosystem by way of measuring the **fishery indicators.**

Evaluation: the effort to determine the function of the fishery system. Fishery quality control (expected standards) and a logical framework can assist with evaluation.

Control factors: the activities that change the system in order to derive the desired characteristics. For example, control factors can be in the form of **regulatory measures** or direct physical activity (**non regulatory**).

FIGURE 2.13

The process control loop



SUSTAINABILITY OF THE FISHERY SYSTEM

A successfully managed fishery system is not only one that yields good harvests, but a holistic system that performs well with respect to ecosystem health and human wellbeing. There are four steps that must be followed in order to analyze the sustainability of a fishery management system (Box 2.9).

BOX 2.9

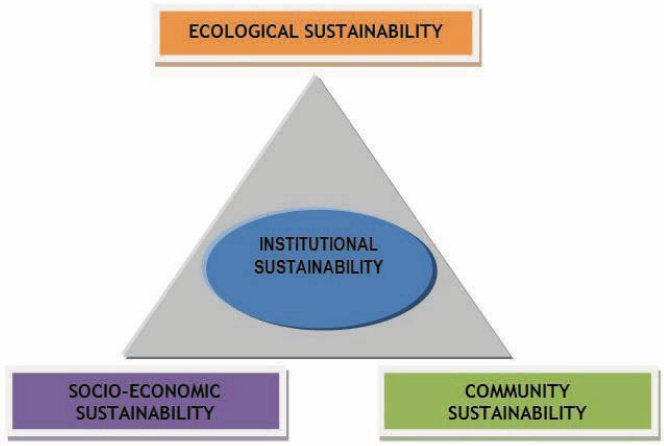
Four steps for analyzing the sustainability of a fishery system:

1. Determine or discuss the factors that may affect a sustainable system.
2. Develop a list of criteria that can be used to analyze the sustainability of the fishery system.
3. Determine the sets of indicators that reflect the sustainability of the fishery system. The indicators allow for each criteria to be measured and to make a comparison between the criteria.
4. Formulate of a way to group the indicators so that they may provide an index of the sustainability of the fishery system.

In fishery co-management, there are four indicators of sustainability, namely ecological sustainability, socio-economic sustainability, community sustainability and institutional sustainability (Charles, 2001; Figure 2.14). These indicators are collectively referred to as Components of Sustainability Indicators. Each of these four indicators has a subset of four components as described below:

FIGURE 2.14

The triangle of sustainability is the logical framework for analyzing the sustainability of a fishery system (Charles, 2001)



Indicators of ecological sustainability

The indicators of ecological sustainability include (a) understanding that fishery production (capture fishery or aquaculture production) will be sustainable in the long term; (b) preserving the current resources, i.e. satisfying current needs and aspirations without jeopardizing future needs; and (c) preserving or building the health and resilience of the ecosystem. Some examples of ecological sustainability indicators are shown in Table 2. 4 and Box 2.10.

TABLE 2.4

Examples of ecological sustainability indicators of inland water fishery management

Sustainability criteria	Indicator	Range	Minimum indicator value
Catch level	(MSY-fishing catch)/ MSY	-∞ to 1	Catch exceeds maximum sustainable yield
Biomass	Biomass (relative to historical average)	0 to 1	Total biomass or spawning stock biomass below a critical level
Biomass trends	Multiyear average annual percentage rate of change	-1 to 1	Biomass declining rapidly (or predicted to do so due to lack of recruitment)
Fish size	Average fish size (relative historical average)	0 to ∞	Average size at capture very low relative to optimal capture size
Environmental quality	Quality (relative to historical average) + (% rate of change)	0 to ∞	environmental quality low and declining
Diversity (harvested species)	[(No. species)/(historical average)] + [(diversity)/(historical average)]	0 to ∞	Number of species in catch and diversity index both low relative to historical average
Diversity (ecosystem)	[(No. species)/(historical average)] + [(diversity)/(historical average)]	0 to ∞	Number of species in catch and diversity index both low and declining
Rehabilitated area	Area rehabilitated as % of total area	0 to 1	A growing closed area due to contamination, etc.
Protected area	Area protected as % of total area	0 to 1	Decrease in areas protected from exploitation
Ecosystem understanding	Level of understanding relative to full knowledge (subjective)	0 to 1	No clear understanding of resources and its ecosystem

Source: Charles (2001)

BOX 2.10

An example of a list of questions used to evaluate the sustainability of a fishery

ECOSYSTEM SUSTAINABILITY

1. Is the level of exploitation of a specific species creating ecosystem resilience?
2. Is the indirect biological impact widely understood?
3. Is the impact on the ecosystem as a whole widely understood so that resilience may be maintained?

SOCIO-ECONOMIC SUSTAINABILITY

1. In the long term, will the activity create jobs?
2. What is the impact of the fishery project on local and regional economic growth?
3. Is the impact of price on inputs and outputs widely understood?

COMMUNITY SUSTAINABILITY

1. Does the fishery contribute to the stability of the community in the long run?
2. Is the access of local people towards the existing resources unhindered?
3. Is the traditional value system preserved?

INSTITUTIONAL SUSTAINABILITY

1. Is the institutional ability maintained in the long run?
2. Is the economic growth receiving support from the community?

Source: Charles (2001)

Socio-economic/community sustainability indicators

The socio-economic sustainability indicators focus on the macro level in order to preserve or encourage long term economic welfare. These indicators are a combination between economic indicators and social indicators that focus on the sustainability of net benefit, the distribution of the net benefit among the fishery user groups, and the long term preservation of economic viability at the local and regional levels. The measurement of socio-economic indicators is carried out individually, but the conclusion must encompass the fishery system as a whole.

In contrast, community success indicators are focused on the micro level, especially the need to maintain the community as a valuable human system, more than just a simple grouping of people. The emphasis here is on the welfare of the human component of the fishery system, through the preservation or improvement of economic and socio-cultural welfare and community cohesiveness. This is important because fishery sustainability must occur together with community sustainability. Examples of socio-economic/community sustainability indicators are shown in Table 2.5.

TABLE 2.5

Socio-economic/community sustainability indicators of inland water fishery management

Sustainability criteria	Indicator	Range	Minimum indicator value if
Community resilience	Index of diversity in employment	O to 1	Lack of livelihood alternatives (low diversity in employment)
Community independence	Percentage of economic activity based locally	0 to 1	Highly dependency on external economic activities
Human carrying capacity (livelihood)	Current (or potential) sustainable employment (relative to population)	0 to 1	Sustainable economic or employment base is substantially below current (or predicted) population
Human carrying capacity (environment)	Natural absorption of capacity/ human waste	0 to ∞	Generation of human waste far exceeds the absorptive capacity of the environment
Equity	Ratio of historical to current Gini Coefficient of income and/or food distribution	0 to ∞	Dispersion in income and/or food supply is substantially above traditional norms
Sustainability of fleet capacity	Ratio of capacity for harvesting at MSY to current capacity	0 to ∞	Current capacity exceeds that required to harvest at MSY
Appropriate investment	Investment/capacity (when stock < optimal)	-1 to 1	Investment above replacement level when stock is fully exploited or when stock is declining
Food supply	Food supply per capita (relative to minimum nutritional needs)	0 to ∞	Food available per person is below minimum nutritional requirements
Long term food security	Probability of sufficient food being available over next ten years	0 to 1	Stability of food supply is low or food supply is declining rapidly

Source: Charles (2001)

Institutional sustainability indicators

The institutional sustainability indicators focus on the capacity to maintain financial ability, administration and organization in the long term. Institutional

sustainability points towards the sustainability of the rules that govern the fishery, the organization that implements the rules and the institutions that implement the management. The main indicator of institutional sustainability is whether the rules concerning the utilization of marine resources can be implemented and managed and whether they match or fit the characteristics of the resources. Examples of institutional sustainability indicators are shown in Table 2.6.

TABLE 2.6

Institutional sustainability indicators of inland water fishery management

Sustainability criteria	Indicator	Range	Minimum indicator value if
Management effectiveness	Level of success of stated management and regulatory policies	O to 1	Existing management structure is insufficient to control exploitation levels and regulate resource users
Use of traditional methods	Extent of utilization	0 to 1	Traditional resource and environmental management methods are not utilized
Incorporating local input	Extent of incorporation	0 to 1	Management activity/planning does not incorporate local socio-culture factors (tradition, community decision-making, ecological knowledge, etc.)
Capacity-building	Extent of capacity-building	0 to 1	Lack of capacity building within relevant organizations
Institutional viability	Level of financial and organizational viability	0 to 1	Management organization lacks long-term financial viability, or there is a lack of political will to support such structures

Source: Charles (2001)

SUPPORT FOR THE SUCCESSFUL IMPLEMENTATION OF FISHERIES CO-MANAGEMENT

There are four pillars that support the successful implementation of fisheries co-management. These are (1) the availability of policies and sets of law that support fisheries co-management; (2) the availability of participants and the strength of the community; (3) effective interaction between fisheries users and institutions; and (4) availability of resources which may be well suited to co-management methods. Fisheries co-management has the potential to contribute effectively if these four pillars are in place. To ensure that these pillars are made available, certain prerequisites are required as shown in Box 2.12.

BOX 2.12

Prerequisites that support the success of fishery co-management

1. An enabling policy and legal framework that support fisheries co-management.
2. The participation and empowerment of communities (and other users) in the co-management arrangement.
3. Effective linkages and institutions.
4. The existence of a resource worth managing and people and money to do it.
5. Fisheries areas are clearly demarcated.
6. Stakeholders have the capacity to implement fisheries co-management through providing information, education and training.
7. A clearly defined hierarchy of fisheries co-management arrangements is available.
8. Research activities support fisheries co-management.
9. Fisheries co-management is related to the community and economic developments.
10. An environment that is suited to community participation is available.
11. Lines of communication between resource users and the government are open.
12. Monitoring methods which provide feedback for fisheries management are available.

CHARACTERISTICS OF A SUCCESSFUL CO-MANAGEMENT INSTITUTION

A society must really value and want to achieve successful fisheries co-management. This condition is the most important element for developing and maintaining
co-management initiatives between fishing communities and government. It is also a prerequisite for enforcing fisheries laws and regulations.

Box 2.13 details a number of characteristics that contribute to the successful implementation of fishery co-management.

BOX 2.13

Characteristics of a successful co-management institution

1. There are problems associated with the sustainability of available resources.
2. There is a legal system in place that recognises the right to manage natural resources and the right to limit the use of resources by communities.
3. The community plays a role in project planning and their participation influences the characteristics of the co-management project.
4. There is good cooperation between local leaders and among stakeholders.
5. There is sufficient understanding of the purpose of developing a co-management regime.
6. There are positive attitudes towards the prevailing fisheries law.
7. There is an enforcement process in place which supports policies, rules and regulations.
8. There is good cooperation within the community.
9. The users of fisheries resources are satisfied with their livelihood.
10. There is strong dependence on fisheries activities as an important source of income.
11. There are tangible benefits associated with the implementation of a co-management regime.
12. Monitoring and evaluation systems are in place.
13. There is an incentive to participate in co-management.

Source: Katon *et al*. (1997)

CONCLUSION

From the examples provided in this chapter, it is obvious that fisheries co-management has the potential to contribute to almost every sphere of fisheries management in Indonesia and to incorporate the ecosystem approach. The examples show that fisheries co-management has proved to be effective in applying conservation activities, including protection, mitigation and rehabilitation.

The criteria which may be used to assess a fisheries co-management regime are determined by many factors, including the type of water ecosystem, the exploited species, the existing socio-political and economic system and the prevailing rules and regulations. However, the most important criterion that is used to measure the success of a co-management system is how the decision-making takes place. The process of establishing a fishery co-management system must be discussed intensively by the main stakeholders in the process, namely the community users of fisheries resources and government.

It must be noted that scientists from the universities and research institutes, as well as non-governmental organizations, only play the role of mediator during the development of a co-management system. During the discussions around the subject of co-management, the mediator must be able to place him or herself in a neutral position in order to provide a true consultation service. Decision-making, its implementation, as well as other matters related to fisheries co-management must be conducted hand in hand by community users of fisheries resources and concerned government representatives.

MODULE 3

How to start fisheries co-management in Indonesia

by *Luky Adrianto* 55

HOW TO START FISHERIES CO-MANAGEMENT IN A LOCAL FISHERIES GOVERNANCE FRAMEWORK

WHAT IS MEANT BY STRENGTHENING LOCAL FISHERIES?

Marine fisheries are expected to be a primary mover of national economic growth in Indonesia. The country is endowed with relatively productive marine resources and so this sector of the economy undeniably has economic potential. Recent statistics reveal that Indonesia's total fisheries production has grown to 4.07 million tonnes per annum; the country's potential production is believed to be in the region of 6.4 million tonnes per annum. The same potential has been identified in the fish farming sector. Although it is estimated that this sector has the potential to produce 4.6 million tonnes per annum, to date it has only realized a total production of 0.7 million tonnes valued at around RP6 billion (US$ 660 000). That the fish farming sector has not yet achieved its full potential is illustrated by the fact that the combined income of the fisheries and biotechnology industries in Indonesia is RP82 billion per year (US$ 9.01 million) and the income from marine tourism may be worth as much as RP1 trillion (US$ 110 million) (Dahuri 2004).

In an effort to improve the contribution of marine fisheries to the economy, the development of the sector must be accelerated. One way of doing this is to position the regions that have a strong tradition in the marine and fisheries industries at the forefront of the national development strategy. We need to identify these regions in order to develop a comprehensive and multilevel (from local to national) fisheries development programme. To achieve this, it is necessary to analyze the fishery dependent regions according to a theoretical framework.

DEFINING THE FISHERIES AREA

In the theory of fisheries policy, the definition of fisheries area refers to the identification of areas with high risks, according to the intensity of fisheries activities and the job opportunities that are generated by the fisheries sectors (Symes 2000). Furthermore, Symes suggests that the fisheries area that is defined by these criteria is called a "fisheries dependent region".

In terms of this definition, there are three obstacles that we need to pay attention to. Firstly, there is no information system that can be used to unequivocally identify an area as a fishery area. The national statistics service, for instance, has not yet generated information about the fishery workforce in a standardized format. Secondly, fisheries data is currently not standardized across the different levels of the fishery which can create a discrepancy between the levels. For example, theoretically it is easier to identify fisheries activities at the local level which makes it easier to identify the level of dependency in a region

where fisheries take place mainly at the local level. Thirdly, in some cases the term "fisheries dependence" can cause problems. The term is intended to identify the important role of the fishery sector in certain areas, but the results can be confusing because the fishery sector is often embedded in the local economy which is complex and pluralistic in nature. In this context, the implementation of an arbitrary threshold index, to classify whether a certain area is dependent on the fishery sector or not, cannot be done.

Nevertheless, the difficulties listed above do not necessarily mean that it would be a meaningless effort to determine whether a certain area is a "fisheries dependent region" or not. It remains important to "define" the fisheries area. Phillipson (2000) focused his definition of the fisheries area on the regional economic structure (regional dependencies), rather than fisheries dependencies. Regional dependencies have a local aspect, while fisheries dependencies have many dimensions, including individuals, households and the community. In this context, the analysis is focused solely on the definition of a fisheries area as a region which depends, from a social and economic perspective, on the fisheries sector.

Additionally, it should be noted that Otterstad *et al.* (1997) argues that in some ways economic dependencies have a more direct correlation with a fisheries area. The social variable plays the role of providing general indicators of the social welfare of a certain region.

Once the fisheries area has been broadly defined, it is feasible to initiate fisheries co-management, a process that is generally implemented in three stages. These are: (1) the pre-implementation phase; (2) the implementation phase; and (3) the post implementation phase (Box 3.1). The first phase will be described in this Module while the other two phases will be described in Module 4.

BOX 3.1

The three stages of fisheries co-management implementation

1. Pre-implementation phase: log frame analysis.
2. Implementation phase: community integration, participatory research, community organizing, strategic plan implementation and evaluation.
3. Post implementation phase: counterpart process to ensure the sustainability of fisheries co-management.

Source: Pomeroy and Rivera-Guieb (2006)

INITIATING FISHERIES CO-MANAGEMENT: THE USE OF A LOGICAL FRAMEWORK ANALYSIS

The pre-implementation phase may be characterized as the beginning – and the planning phase – of a co-management programme. According to Pomeroy and Rivera-Guieb (2006), there are a number of factors that can stimulate the initiation of a co-management programme, such as a conflict, an environmental crisis, or the decision to take advantage of a funding opportunity, among others.

These authors classify two types of "beginnings" for a co-management programme (1) the internal beginning, where fisheries co-management is initiated from within the community and by fishers and or other stakeholders in the community (e.g. fishers decide that a fishery crisis should be resolved through co-management); and (2) the external beginning where fisheries co-management is initiated outside the community, e.g. a NGO, government or research institution decide to address a fishery crisis through co-management (Boxes 3.2 and 3.3).

BOX 3.2

Internal beginning

This pattern is commonly known as a "bottom-up" beginning. Co-management is initiated by the internal community and fisheries stakeholders. This type of beginning has a high prospect of sustainability because the community and fisheries stakeholder are aware of the crisis of resources and have an incentive to institute a process of fisheries co-management with a view to finding a solution.

Source: Pomeroy and Rivera-Guieb (2006)

BOX 3.3

External beginning

Fisheries co-management is initiated externally, outside the community and its primary stakeholders.

This type of beginning may be triggered, for example, by the destruction of fisheries resources. In this case, fisheries co-management may be initiated by NGOs, universities or government.

Another example is provided by the situation where a marine conservation area needs to be defined in order to protect that area. This process requires an external beginning because it takes place in a broader context of fisheries resources conservation.

Source: Pomeroy and Rivera-Guieb (2006)

During the pre-implementation phase of the co-management process, it is useful to make use of a Logical Framework Analysis (LFA). LFA is a tool that can assist with the planning of certain activities (in this instance fisheries co-management), but it does not replace such activities. Briefly, LFA can assist with (1) the design or planning process of structured activities; (2) improving the transparency of the activities planned; (3) improving the participation of all stakeholders in the activities planned; (4) improving the planning strategy; and (5) improving the flexibility of the activities in the planning framework.

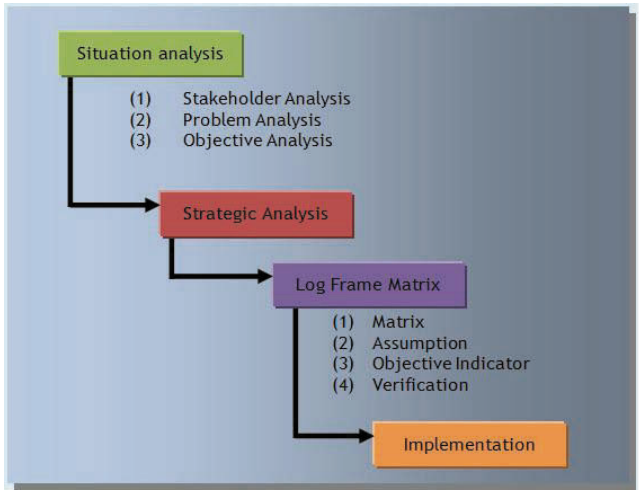
In the LFA, there are two important elements that form the basis of planning, namely the analysis and planning phases. In the analysis phase, there are three types of analysis that provide the foundation of the planning phase, namely

(1) situation analysis, an analysis of stakeholders, key problems and strategies, obstacles and opportunities, and a determination of the cause-and-effect relationship between each of the problems; (2) objective analysis, which develops the objective of the planning activities and the previously identified problems; and (3) strategy analysis, which identifies certain alternative strategies in order to achieve the stated objectives.

In the planning phase, there are three important factors involved, namely (1) log frame, which defines the structure of activities, tests the internal logic related to the structure, and defines the methods and cost of such activities; (2) activity scheduling, which determines the work sequence in the context of activities planning; and (3) resources scheduling, which identifies the budget and source of funding after the activity scheduling is complete. The analysis and planning stages are illustrated in Figure 3.1 below.

FIGURE 3.1

Diagram of analysis and planning stage in the LFA (Adrianto 2004)

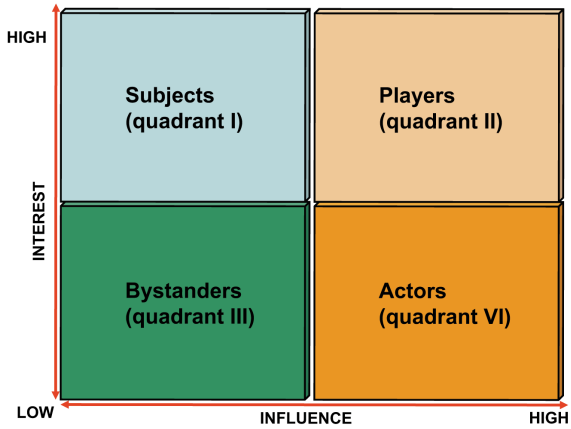


STAKEHOLDER ANALYSIS

In the analysis stage, one of the tools that can be used is the stakeholder analysis. The first step in conducting a stakeholder analysis in a fisheries co-management project is to identify the project's key stakeholders. The next step is to assess their power, influence and interests, and the ways in which they impact or influence the development of the project. Four types of stakeholders may be identified: subjects, bystanders, players, and actors. The relationship between these stakeholders, according to their level of influence and interest is illustrated in Figure 3.2 below.

FIGURE 3.2

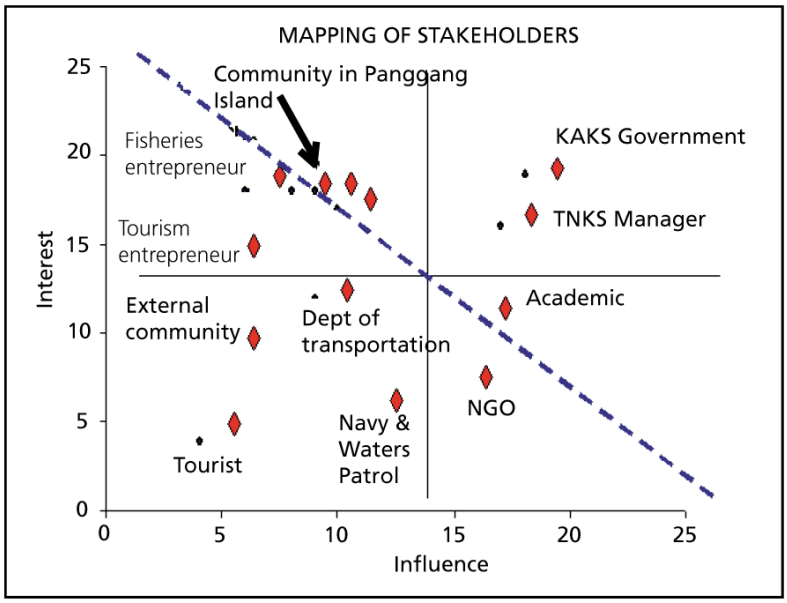
Diagram of stakeholders in the planning phase, based on the Logical Framework Approach



For example, the role of stakeholders in the utilization of fisheries and marine resources on the Island of Pagang (in the Administrative Regency of Thousands Islands, Special Administration Province of Jakarta), is mapped in Figure 3.2 below.

FIGURE 3.2

A stakeholder map for the Island of Panggang in the Administrative Regency of Thousands Islands, Special Administration Province of Jakarta (Source: Haswanto, 2006)



Another example is provided by the relationship map which seeks to identify the qualitative and quantitative relationships between stakeholders, as illustrated in Figure 3.3 and 3.4 below and by a focus group discussion (Box 3.4).

FIGURE 3.3

An example of a relationship map of stakeholders (DSE 2000)

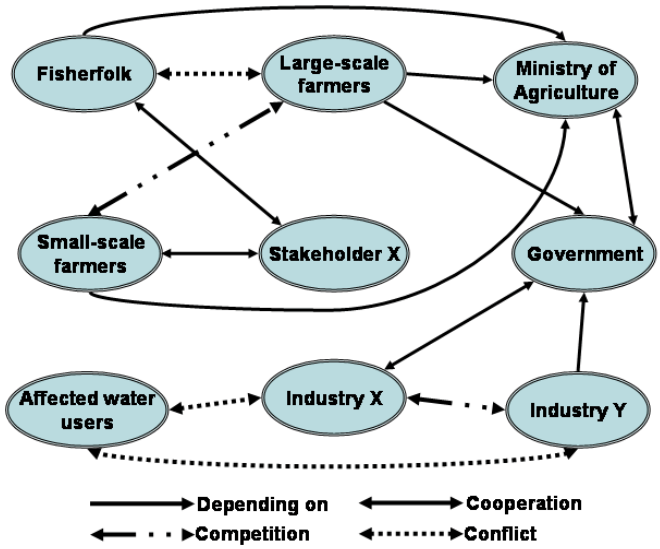


FIGURE 3.4

A fisheries group discussion is conducted at Gambus Laut Village, Asahan District, North Sumatra Province

BOX 3.4

Focus group discussion

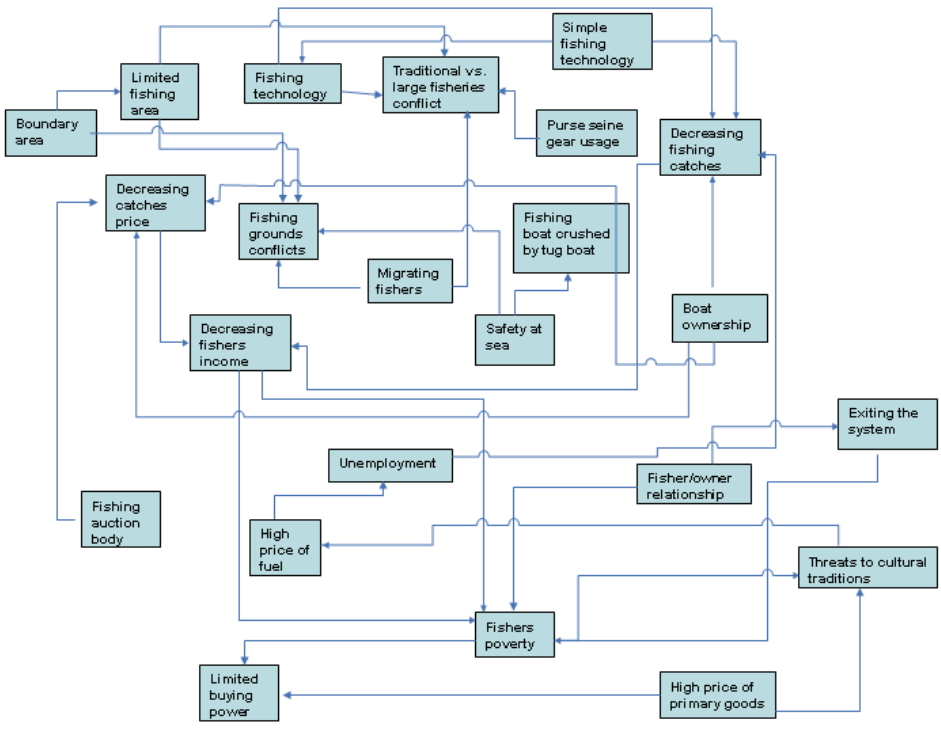
Each process of stakeholder analysis, problem analysis and objective analysis can be conducted by using focus group discussion. This method is effective because it captures the opinions of the key stakeholders who then conduct the next step of the process. Focus group discussion can be done informally at a fisheries co-management planning location (for example in a fishing village).

Focus group discussions may be facilitated by somebody from inside or outside the community.

Apart from the relationship between the stakeholders, one of the most important components of the LFA is the cause-effects map, whereby the logic behind cause and effect relationships is used in the planning stage and mapped as shown in Figure 3.5.

FIGURE 3.5

An example of a cause-effect map, as utilized by the LFA (PKSPL-IPB 2006)



Logical Framework Analysis plays a role in each phase of the project cycle, from design, through to implementation and evaluation. The logframe summarizes the project and its context in a logical manner, so that the

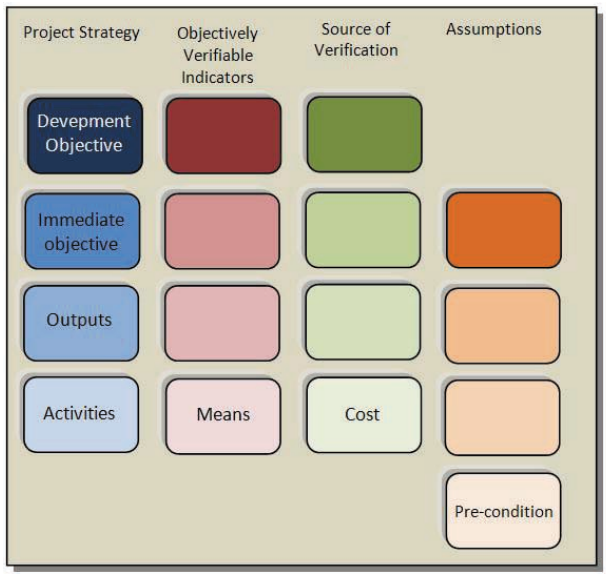
connection between the activities and the expected results may be seen. The framework has both a vertical and a horizontal logic. Vertical logic consists of a hierarchy of objectives, outputs and activities. Horizontal logic consists of indicators (used to measure the extent to which the different components of the objective hierarchy are being achieved); sources of verification (sources of information that will show whether the indicators have been achieved); and risks and assumptions. A risk is an external factor that may negatively influence the realization of objective(s), while an assumption is the underlying hypothesis on which the cause-effect relationship is based. In summary, the vertical logic shows (1) what the project intends to do; (2) the relationships between what will be done and what will be achieved (the "means to the end"); and (3) it specifies the main risks and assumptions. The horizontal logic defines how progress and performance will be monitored and the sources of information for doing this.

HOW TO DEVELOP THE LOGFRAME FOR FISHERIES CO-MANAGEMENT

As mentioned previously, a logical framework approach constitutes one of the basic tools that can be used to plan a fishery co-management system. In this context, planning can be developed as shown in Figure 3.6.

FIGURE 3.6

Matrix of fisheries planning based on the Log Frame Approach (DSE 2000)



In the context of the Log Frame Approach, the most important component of fisheries planning is to identify the goals of the activities planned. Theoretically,

there are different levels of purpose, measured from the broader picture of long term goals, to the finer details such as the expected output of the project and the physical goods and services that will be produced. Table 3.2 below, explains the criteria for each of level of purpose.

TABLE 3.2

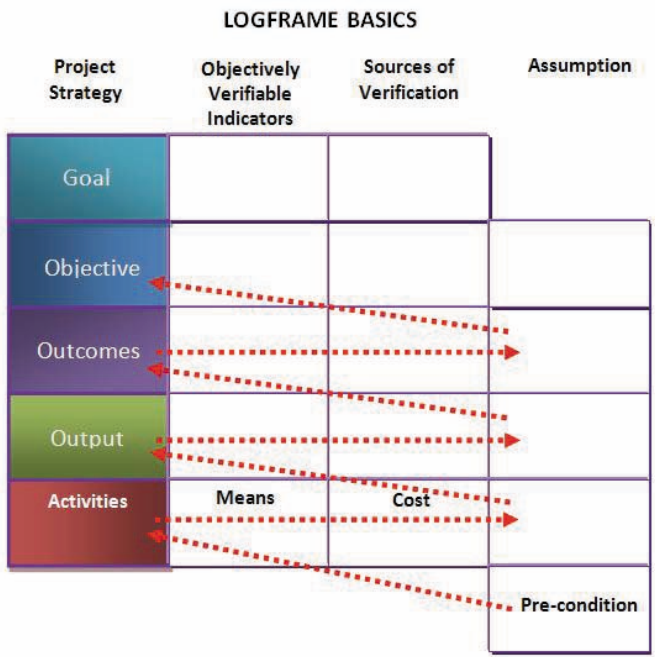
Levels of purpose and criteria in planning activities

Level of purpose	Criteria	Definitions
Long term g*oal*	Harmony with the strategy and development programme	Long term benefit as part of the objectives of the activities
Objective	The reason for the activities	The benefits received by the *beneficiaries* from the outcome of the activities
Outcome	Key components of the activities	Changes in the condition of the development due to the *output*, along with some assumptions
Output	Direct results of the activities	Goods or services directly produced by the activities

From the Table 3.2 above, it can be seen that there is a flow of purposes, starting from the output (the lowest level) up to the long-term goals (the highest level). The flow of such purposes is illustrated in Figure 3.7 below.

FIGURE 3.7

The flow of purposes in the Log Frame Approach (DSE, 2000)



CONCLUSION

As has been demonstrated by this topic, the Logical Framework Approach is well suited to fisheries planning and is one approach that can be used to support the implementation of a system of fisheries co-management. The LFA is particularly suited to participation by stakeholders, which becomes the main aspect of the logical framework.

MODULE 4

Planning and implementation of fisheries co-management in Indonesia

Community entry and integration in fisheries co-management
by *Luky Adrianto* 67

Participatory action-research approach in fisheries co-management
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Community organization
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Monitoring and evaluation of fisheries co-management
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COMMUNITY ENTRY AND INTEGRATION IN FISHERIES CO-MANAGEMENT

WHY IS COMMUNITY INTEGRATION NECESSARY?

In view of the fact that a community is a key stakeholder, the integration of the community in fishery co-management is very important. In several experiential processes, community integration has typically been carried out by a facilitator who acts as mediator between government and the community. The facilitator may originate from a government agency, the community itself or be an external agent.

Generally, the integration of the community in co-management processes comprises a number of important activities, including (1) the formal introduction of a co-management programme, either via the internal community (internal beginnings) or via the external community (external beginnings); (2) providing answers if there are questions about the co-management programme; (3) participating in the life of the community, (4) identifying the roles of other stakeholders in the programme; (5) forming a core group in relation to co-management frameworks; (6) organizing a meeting, training session or seminar with the aim of improving the community's awareness of co-management programmes; (7) gathering basic data and information about the community; (8) identifying stakeholders; (9) holding meetings with local leaders and government officials; (10) getting approval from the government; and (11) initiating programmes together with the community (Pomeroy and Rivera-Guieb, 2006).

COMMUNITY INTEGRATION IN FISHERIES CO-MANAGEMENT

The integration of the community needs to be conducted within each element of co-management, as is described below (Adrianto, 2005):

(1) Social preparation and community organization. The integration process begins with the identification and analysis of the parties involved in the fisheries co-management process. In other words, social preparation is accomplished by the identification of the fisheries stakeholders and the design and development of their organization. This organization will not always take the shape of a physical group or a tangible institution, but will rather include the rules, norms and value systems (the "soft" institution) that are applied in fisheries co-management.

(2) Environmental education and capacity building. As was explained in Module 2, Topic 2.2, the process of organizing the community will not be effective without community education and improving the capacity of the fisher people. Given that fisheries resources are dynamic and often site specific, early identification of disruptions to a fishery system are important. Through

education and capacity building, fishing communities are well placed to monitor changes. Figure 4.1 describes a scheme for enhancing capacity in fisheries management.

FIGURE 4.1

Scheme for improving the community's capacity to participate in a fisheries co-management framework

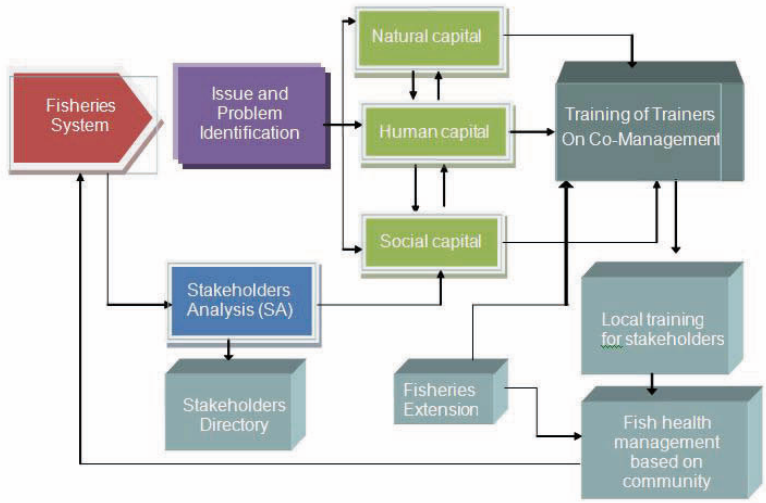


Figure 4.1 illustrates that building capacity is one of the most important elements in the planning and initiation of a co-management process. The capacity building process can be strategic. The community can complete their own assessment of their educational and capacity building needs because they relate to the local system, including its natural, social and human resources.

(3) Fisheries management planning. In this framework, solid planning of the fisheries management process is required to establish synergy between government and people. Community integration is very important for the planning process. Planning is conducted by identifying the role and function of each element of government and community, particularly where it is relevant to fisheries management. The planning process must be able to adapt to the requirements of the people involved. For instance, there may be a need to conduct training for fisheries extension officers in every centre of fisheries production.

(4) Defining an incentive system for the community. It is recommended that the identification of an incentive system is carried out according to the framework outlined in Figure 4.2 below.

FIGURE 4.2

An incentive scheme for people involved in fisheries co-management (adapted from Adrianto, 2005)

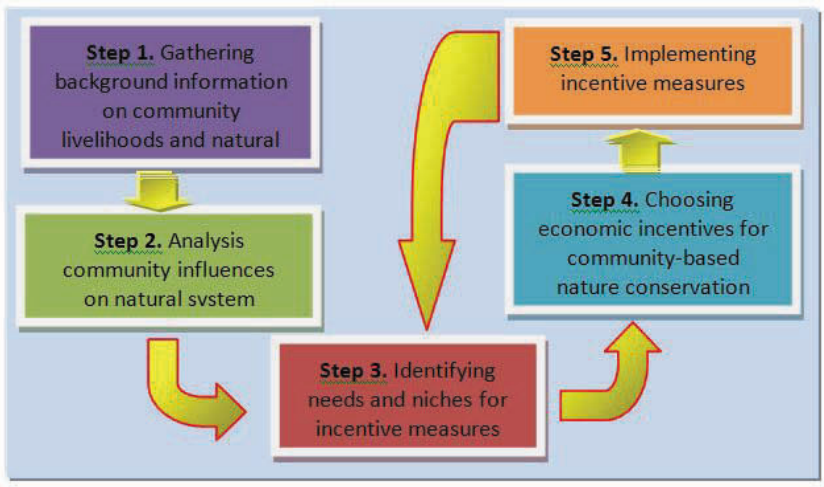


Figure 4.2 above, illustrates that the interaction between the activities of fisheries communities and their environment should be analyzed and any negative impacts that fishing has on the public or the environment should be identified. Thereafter, an incentive scheme, which might encourage better practices can be devised. For example, an incentive on both input and output prices could be offered. A detailed explanation of this incentive system is provided in Module 4, Topic 4.5.

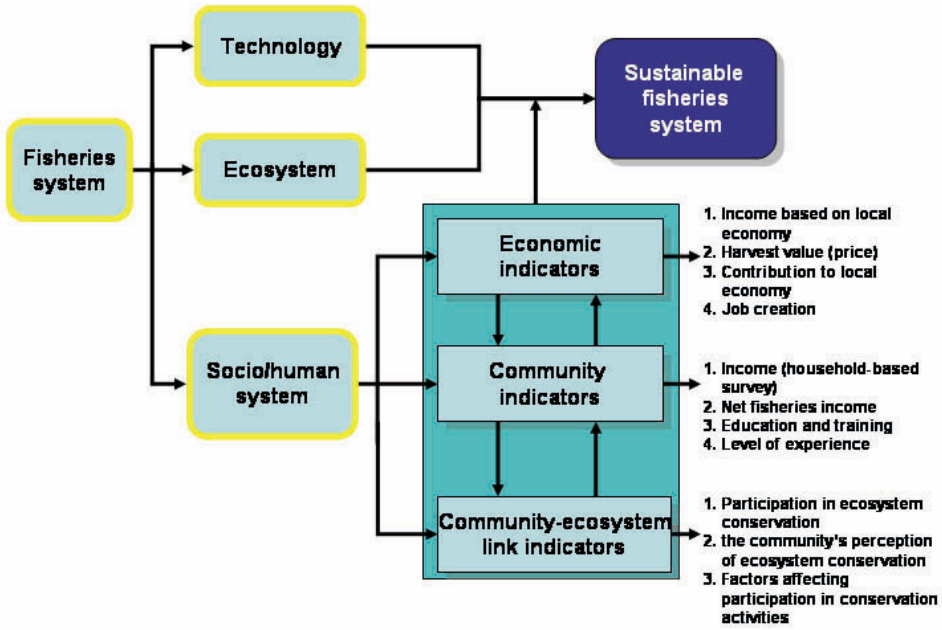
(5) Monitoring and evaluation of fisheries systems. The integration of the community in the process of monitoring and evaluation can enhance the sustainability of a fisheries co-management system. By participating in monitoring activities, a community's reliability or trustworthiness may be enhanced and may eventually determine the effectiveness of the implementation process itself. The design of the monitoring and evaluation framework for a fisheries co-management process is illustrated in Figure 4.3. Meanwhile, a detailed process of monitoring and evaluation is described in Module 4, Topic 4.5.

THE COMMUNITY ORGANIZER

As mentioned previously, a community organizer (CO) plays the role of facilitator during the implementation of the co-management programme. A CO plays an important role, working with people in order to initiate the co-management programme. A CO should live among the community until he or she believes that the community is ready to implement co-management without intensive mentoring.

FIGURE 4.3

Framework for the monitoring and evaluation of fisheries management (adapted from Adrianto, 2004)



According to Pomeroy and Rivera-Guieb (2006), a CO must possess knowledge and skills as listed in Table 4.1 below.

TABLE 4.1

Skills required by a Community Organizer

No.	Expected skills
1	Open-minded
2	Creative
3	Highly respected
4	Good sense of humor
5	Provide guidance rather than giving orders
6	Attentive
7	Able to work in a team
8	Possess good communication and interview skills
9	Sufficient knowledge about fisheries resources and fisheries management
10	Familiar with the concept and process of community organization
11	Good social relationships
12	A clear perspective on when to finish the mentoring process
13	Highly flexible and adaptive

Source: Modified from Pomeroy and Rivera-Guieb (2006)

COMMUNITY INTEGRATION PROCESS

The CO is a frontrunner in the all important process of community integration in co-management programmes. The integration of the CO into community life will make the initiation and implementation of co-management processes more effective. The CO must be able to accept and adapt to local cultures, traditions, and ways of thinking, as well as the social structure of local people. This process will usually take between three and six months. In the co-management framework, this process is known as "social capital" (Adrianto, 2005).

Within the integration process, there are some fundamental elements that need to be attended to. These are (1) a courtesy call to prominent local leaders to discuss the initiation of a co-management system; (2) community meetings, the objectives of which are similar to the courtesy call, but the targets are different; (3) identification of core group(s) and core leaders; (4) formulation of a community profile; (5) identification of the management area and its boundaries; (6) identification of problems, needs and community opportunities in the co-management context; (7) identification of potential local leaders; (8) identification of existing groups or local organizations and their relationship with fisheries co-management; (9) forming a core community group, usually known as the "initiator group", which acts as a driving force for the co-management programme; (10) identification of key stakeholders; and (11) formulation of a working plan related to the implementation of co-management. A brief description of each element is provided in Table 4.2.

TABLE 4.2
Elements of the integration process in fisheries co-management

No	Element	Description
1	Courtesy call to prominent local leaders	The objective of this activity is to provide initial information to the local leaders, from the community or the government, on the implementation of the co-management system. This process involves introducing the CO to the local leaders, introducing the programme, introducing the concept of co-management, to initiate dialogue and request support for the initiation of the co-management programme.
2	Community meetings	The objective is similar to the previous process. The community meeting is intended to introduce the co-management project to the community and discuss it. The CO plays the role of introducing the concept of co-management and discussing it with the community.
3	Identification of core group(s) and core leaders	The CO identifies the core group(s) and core leaders among the community. These are people who will provide authentic information about the implementation of a co-management process.
4	Formulation of community profile	The CO will formulate the initial profile of the community in order to better understand the condition of the community. This profile will include

		social, economic and institutional parameters and their relation to the ecological system. In other words, this profile will use the "socio-ecological" systems approach.
5	Identification of the management area and its boundaries	This process will use the participatory approach to determine the boundaries of the area that will be used as the basis for co-management. The formulation of boundaries will be important to identify and differentiate between the "effective area" and "administrative area". If necessary, it can use a geographical information system (GIS) tool.
6	Identification of problems, needs and community opportunities	By using the meta-plan technique, the needs, problems and opportunities of the community can be identified, based on the local perspective. This process can be conducted together during community meetings through the local media (such as "duekpakat" in Aceh or "Rembug Warga" in Java).
7	Identification of potential local leaders	This process puts emphasis on the ability of the CO to identify the local leaders as the main driving force behind the co-management programme. The capacity building component of the programme becomes important (Please refer to Diagram 1 of this module).
8	Identification of existent groups or local organizations	Community organization is one of the most important elements of co-management. Therefore, the correct identification of community organizations is key for the implementation process. Organizations include formal organization such as an association of fishers, owners of aquaculture ponds, co-operatives, or non-formal organizations such as a women's savings club, etc.
9	Form the core community group	The core group is the group that becomes the primary driving force behind the implementation of the co-management programme. This group will facilitate the sharing of information among the members of the community; facilitate the organization of the community and assist with the decision-making process in both the initiation and implementation phases of the co-management process.
10	Identification of key stakeholders	This process is important for understanding the influence and impact of stakeholders on the co-management project and the impact of the co-management strategy on the stakeholders.
11	Formulation of working plan	This process is important in the strategic planning process. The working plan consists of goals, an action plan and an outline of the required budget. It is usually performed using the technique of LFA (Logical Framework Analysis).

PARTICIPATORY ACTION-RESEARCH APPROACH IN FISHERIES CO-MANAGEMENT

WHY IS A PARTICIPATORY ACTION-RESEARCH APPROACH REQUIRED?

The use of a participatory action-research approach in fisheries co-management is fundamental. It is relevant to the study of the community's problems and the characteristics of the community profile itself. Research will be effective if is conducted in a participatory manner.

The participatory action-research approach constitutes an alternative to the failed "top-down" research approaches, which were standard academic practice for many years and generally hampered the development process. A top-down approach to research has been shown to fail for a number of reasons, namely (1) if researchers are not involved with the community in development planning, development targets may not be achieved because they may be undesirable for the community; (2) when a development intervention is completed and the community is not involved in the monitoring or evaluation process, then the community is in effect an object of the development.
These two weaknesses have become the basis for developing an alternative approach to research which is more participatory at all levels of development, both nationally and locally (at the village level). At the simplest level, the participatory approach constitutes a participative review of the village's problems, or to coin a more common term, a Participatory Rural Appraisal (PRA).

The PRA has at least five important characteristics. The first is empowerment, whereby the local community is encouraged to participate by using its local knowledge to review the problems that affects it. In-so-doing, the confidence of the local community to overcome its own problems is restored. The second important characteristic of PRA is the respect shown for local people's opinions; the idea that the villagers themselves can find solutions to the village's problems. The third characteristic is the local content of the research; local materials are used to make decisions related to the village's problems. The fourth characteristic is enjoyment or satisfaction, whereby either the process of decision-making or identifying problems is the main focus, rather than the period of time that has been set aside for conducting the study. In this respect, interaction with stakeholders in the community is critical. Communicating by using the local language is one strategy that may be adopted; this certainly increases the satisfaction levels of all participants in the study. The fifth characteristic of PRA is inclusiveness whereby all categories of local people are involved in the research. PRA is based on the principles of representation rather than differentiation.

Theoretically, however, there are at least seven participatory categories as shown in Table 4.3 below.

TABLE 4.3

Types and characteristics of participation

Participatory Typology	Characteristic
Passive participation	The community participates by listening to what is going on or what has already happened. It is a unilateral process and the project manager informs without listening to people's responses.
Participation in providing information	The community participates by answering questions. In another words, the community provides information without being able to know or verify the results of the information that is analyzed thereafter.
Consultative participation	The community participates by being consulted and external agents listen to views. These external agents define both problems and solutions and may modify these in the light of people's responses. In this type of participatory process, the community does not participate in the decision-making and there is no obligation to take on board people's views.
Participation for material incentive	The community participates through providing resources, such as man power, in return for incentives such as wages or food. The community works for outsiders. It is very common to see this called participation, yet people have no stake in prolonging the activities when the incentives end.
Functional participation	The community participates through the establishment of a group to meet predetermined objectives related to the project, which can involve the development or promotion of an externally initiated social organization. This group is involved in the decision-making process, usually assisted by a facilitator or outsider. Nevertheless, this type of participation is usually conducted after important decisions have been taken.
Interactive participation	The community participates through common analysis that subsequently enables it to establish a new local institution or improve an existing local institution. This type of participatory research plays a more important role in decision-making. The community takes control over local decisions and has a stake in maintaining structures or practices.
Self-mobilization	The community participates independently and mobilizes itself in the development that is being conducted in their area. The community is in contact with outsiders when they need technical assistance, but they are still in control of their resources.

Source: Pretty (1994)

INITIATING A PARTICIPATORY RURAL APPRAISAL (PRA)

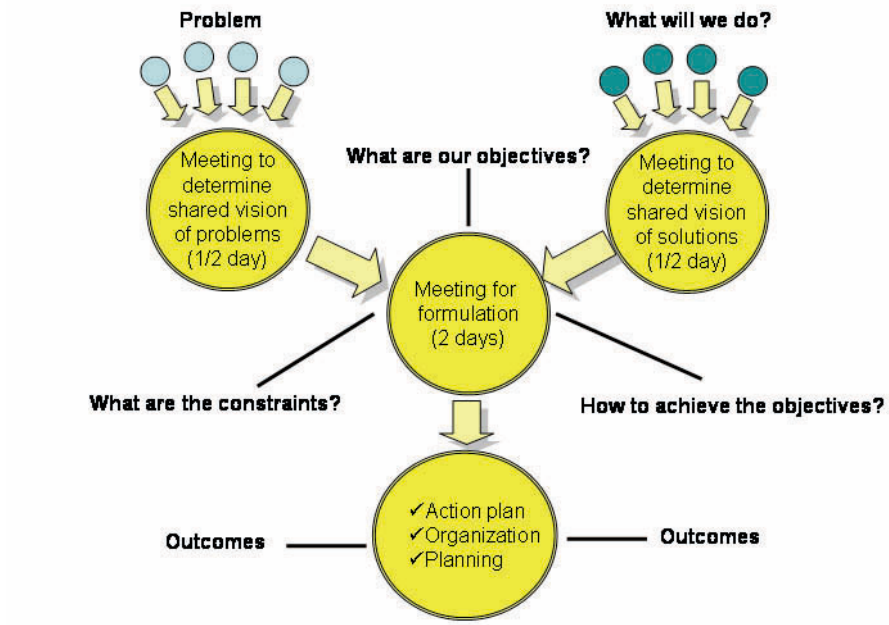
The process of performing a review of the coastal village's problems needs to start from a shared identification of problems which is followed by the formulation of a shared vision for solving the problems. In this context, conducting meetings with stakeholders or members of the community becomes one of the most important ways of sharing opinions and knowledge.

The next stage is to conduct a meeting to design plans for solving the identified problem. Questions like "what is our goal?"; "what exactly is preventing us from reaching our goal?" or "how can we achieve the goal?" are very important at this stage. This stage is complete when an action plan or strategy has been prepared.

Figure 4.4 illustrates the process of conducting socio-economic research using a PRA.

FIGURE 4.4

The process of conducting socio-economic research using a PRA.



Mohen and Stokke (2000) describe the important stages of implementing socio-economic research using a PRA, as shown in Box 4.1 below.

BOX 4.1

Important stages within Participatory Rural Approach (PRA)

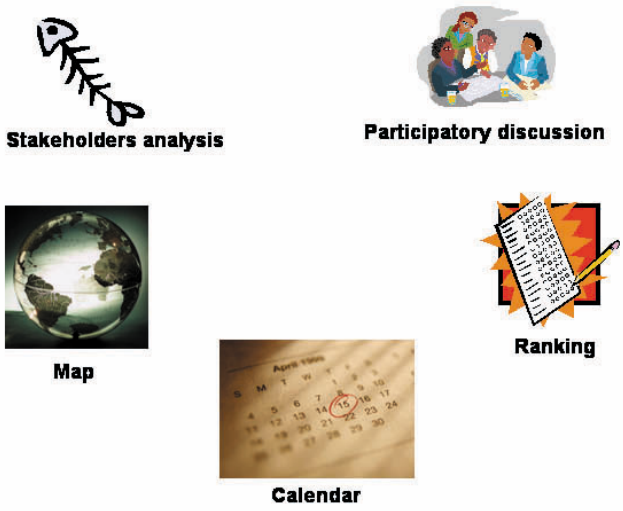
- Identifying the related parties (stakeholder analysis).
- Identifying and accommodating peoples' needs.
- Identifying the expectations of people.
- Identifying the indicators required for evaluation.
- In consultation with the community, approving the method to be used.
- Collecting data together with the people.

Methods and tools for PRA

Some of the tools and methods that are required to conduct a PRA of a coastal village's problems are illustrated in Figure 4.5.

FIGURE 4.5

Examples of tools and methods required for conducting a PRA



A discussion of each of these tools is provided here:

Map

The map provides a spatial description of the distribution of resources and community activities, including the study area. The map is also useful for providing basic information and is normally produced at the first meeting of the village when using a participatory approach. In other words, the map is

prepared in a participatory way, by accommodating local knowledge. The broader objectives of developing a map are outlined in Box 4.2 below.

BOX 4.2

Objectives for developing a participatory map for a PRA

- A map locates and classifies the distribution and use of resources at the present time, in the past and in the future.
- It provides visual information on peoples' activities when utilizing resources in the present, past and future.
- It illustrates local people's knowledge.
- It illustrates socio-economic conditions of local people in the study location.
- It identifies degraded areas and/or a crisis in natural resources as a result of, e.g. contamination, overexploitation, etc.

There are different types of participatory maps. Firstly there is a "history" map that describes change and trends in the state of the community, resource or resource exploitation. After the prevailing conditions have been mapped in a participatory way, it is possible to map the conditions of the past or the future and thereby draw attention to the changes that have taken place, or will take place, in the community. An example of a "history map" is provided in Figure 4.6 below.

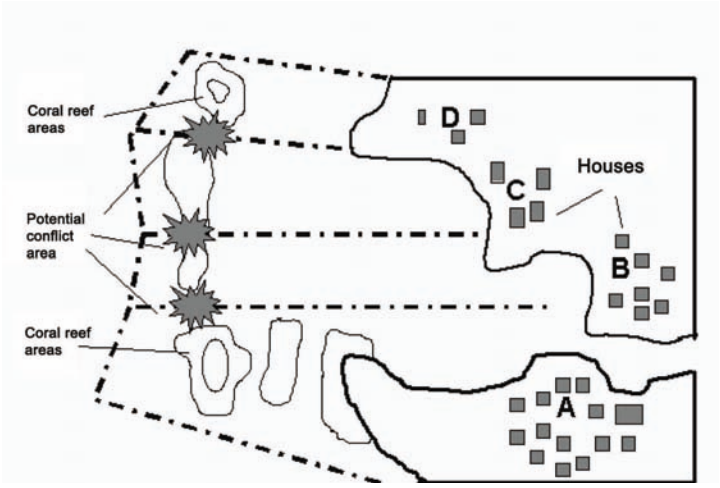
FIGURE 4.6

An example of a "history map", as used in a PRA

The second type of map is the "resource exploitation map". This map describes the condition of resources utilized by the coastal village, such as the condition of inter-community fishing grounds which are incorporated into the study area. By introducing the basic map that has been prepared in a participatory manner, the community is asked to describe the condition of resource exploitation (Figure 4.7 below).

FIGURE 4.7

An example of a resource exploitation map used in a PRA



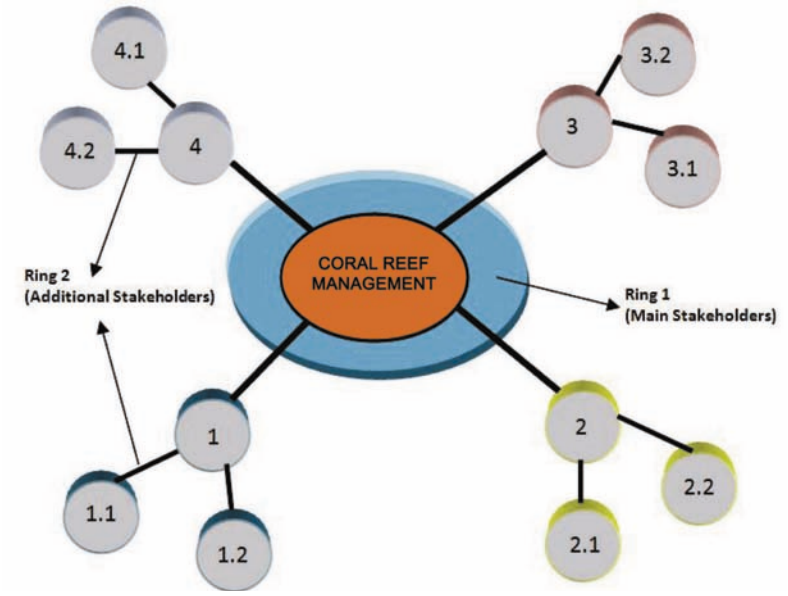
Stakeholder analysis

The most important factor when utilizing a PRA to study the problems of coastal villages, is to determine the stakeholders involved in or affected by the problems. As a result, the technique of stakeholder identification is very important.

The first step in the process of stakeholder analysis is to identify the activities that are related to the problems being studied. For instance, activities associated with the management of coral reefs are fishing operations, marine ecotourism, marine conservation and so on. The second step is to determine which parties are directly related to these activities (who are the main stakeholders?) and which parties are indirectly related to these activities (who are the additional stakeholders?). Figure 4.8 illustrates an approach to conducting a stakeholder analysis.

FIGURE 4.8

An approach to stakeholder analysis, as used in a PRA



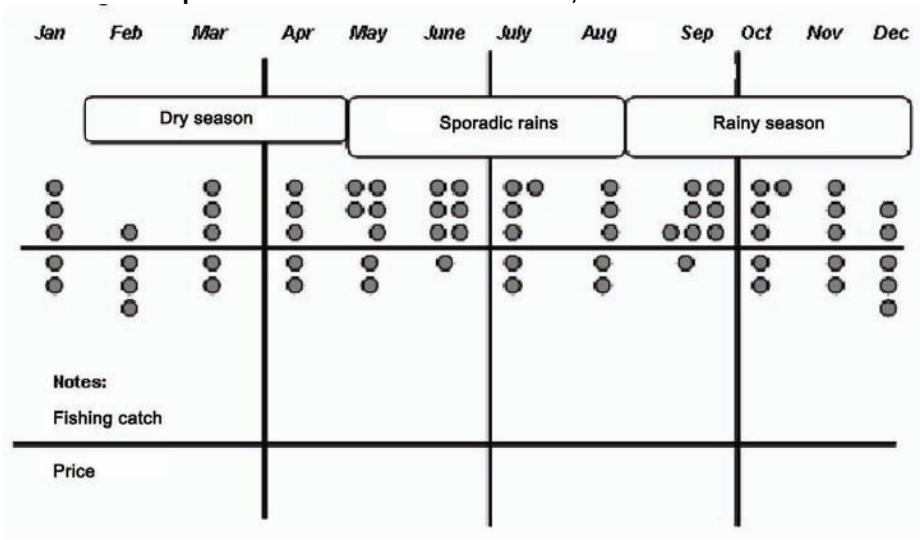
The two types of stakeholders may be identified by asking whether the parties are directly affected by the problems being researched, or not. The stakeholder analysis may be conducted by using the fishbone method. This is a cause-and-effect analysis that is organized by categorizing causes. It helps teams to brainstorm about the possible causes of a problem; accumulate existing knowledge about the causal system surrounding the problem, and group the causes into general categories.

Calendar of activities

Another tool that may be used when conducting a PRA is to provide the community with an opportunity to "map" their activities and in-so-doing, prepare a local community calendar. The purpose of this exercise is to reveal the pattern of the activities undertaken by local people, in particular, those activities that are related to natural resource use. An example of how to prepare a calendar of activities is provided in Figure 4.9 below.

FIGURE 4.9

Preparation of a calendar of activities, as used in a PRA



Ranking

This tool is quite important because it provides a means for comparing and evaluating a given condition; for example for determining which party is most affected by the existing rules on coral reef exploitation. The cases to be compared are normally listed on a table and the local people are asked to rank the cases in accordance with the prevailing criteria (Figure 4.10).

FIGURE 4.10

Using the ranking tool in PRA research

Coral reef stakeholders	Number of people	% of men	% of women	Activities that impact the coral reefs
Traditional fishers	75	95 %	5 %	
Driftnet fishers	40	80 %	20 %	
Women cockle collectors	30	0 %	100 %	

COMMUNITY ORGANIZATION

THE THEORY AND BENEFITS OF COMMUNITY ORGANIZATION

In Indonesia, local resource users are government's most important partners in fisheries co-management. However, the centralized fisheries management regime of the past has weakened the position of fishers and fish farmers in Indonesia and limited their ability to participate meaningfully in co-management arrangements.

In order to take up their rightful role in fisheries co-management, fishers and fish farmers need to be organized. Pomeroy and Revera-Guieb (2006) propose that the process of community organization is not simply about developing the institution, but should also include education; empowerment; developing or revitalizing values and ethics systems; developing notions of independence and partnership; developing organizational and leadership skills; and assisting the community to take action.

The long-term benefits of community organization are to:
- smooth the process of institutional strengthening, either from the ethical, information technology or management points of view;
- build a culture of transparency and accountability into fisheries management;
- provide a meaningful contribution towards controlling corruption, collusion, and nepotism in fisheries management;
- simplify the formulation of local fisheries plans which reflect the societal choice;
- simplify the gathering of information and the monitoring of compliance with fisheries rules, regulations and conservation activities.

PROVIDE THE CORRECT SIGNAL: SHARE RESPONSIBILITY AND AUTHORITY

For Indonesia, the concept of fisheries co-management represents a substantial change. It represents a shift from a centralized, inflexible government dominated system to one of partnership with fishing communities. In order to achieve this shift, it is necessary to change the mindset of all stakeholders in the process, particularly government officials. This shift requires a willingness from government officials to share responsibility and authority for some aspects of fisheries management. In another words, government officials are required to treat fishers and fish farmers as a subject rather than an object. To achieve this, the government hierarchy needs to send the right signals with respect to sharing responsibility and authority. Some of the signals that can be projected by government are explained in Box 4.3.

BOX 4.3

Signs of willingness to share responsibility and authority

1. Develop the fisher's identification card and thereby implement the "politics of identity".
2. Inform people that fishery co-management is in accordance with the national, democratic political system.
3. Always tell people that government officials are willing to share authority and responsibility.
4. Help to erase a lack of confidence or a lack of independence on the part of fishers and fish farmers. Do this by developing the habit of making their decisions count, especially decisions that have an impact on their lives and livelihoods.
5. Celebrate the birthdays of fishers or fish farmers.
6. Facilitate a visit to the community by a representative of the people (e.g. a member of the national or regional parliament).

THE THEORY OF COMMUNITY ORGANIZATION

In order to participate meaningfully in co-management, certain stakeholders need to form an organization that will achieve the objectives and goals of the co-management process. An organization is needed to support people who intend to participate in the process and form a dynamic partnership in the fisheries co-management project.

In some parts of Indonesia, traditional organizations, such as religious or cultural organizations, have been able to encourage their members to participate directly in a fisheries co-management project. But in other parts of the country, it has been necessary to develop or strengthen community organizations. In both cases it is necessary to have a person elected by all the members of the organization as the key individual. This person's role is to orientate the members of the organization towards the activities of co-management.

Although fishers' co-operatives or fishing associations may exist in the community, they may not be suited to playing a leading role in a co-management project. This is because these types of organizations typically have as their major objective the extension of fisheries utilization, the improvement of members' income or the improvement of the fish marketing system. It would be necessary to change the objectives of these organizations if they are to play an important role in the management of fisheries resources. Changing the objectives of such organizations may be difficult, especially if the members are determined to maintain the original objectives of organization (Pomeroy 2005).

IMPORTANT COMPONENTS IN ORGANIZING THE COMMUNITY

There are some important components in the organization of the community. These are detailed in Box 4.4.

BOX 4.4

Components of community organization

1. Preparation, involving the following activities:
   a. Appoint the core groups and leaders.
   b. Analyze the conditions of the area.
   c. Conduct discussions to determine the vision of the organization.
   d. Determine the mission of the organization.

2. Leadership development: A leader usually develops from within the community and generally becomes a role model for the members of the organization. According to Pomeroy (2005) effective leaders have certain characteristics, such as:
   a. They possess a pioneering spirit, are always looking for opportunity, are willing to experiment and take a risk.
   b. They generate ideas for the vision of an organization and dream of the future.
   c. They practice the local knowledge and provide examples.
   d. They train and show appreciation for the achievement of the members of organization.
   e. They are open to criticism.

3. Mobilize the community organization towards certain activities, such as:
   a. Gather the support of the people.
   b. Organize meetings to discuss the vision and mission of the organization.
   c. Develop the organizational structure, objectives, goals and work plan.
   d. Appoint the organizational representative.
   e. Perform training on environmental issues, capacity building and social communication.
   f. Develop organizational networking.
   g. Ensure the sustainability of the organization by focusing on membership and financial resources.

4. Evaluation: Evaluation is used to measure the success or failure of the organization in achieving its objectives and goals. Therefore, it is important to monitor the performance of the organization by gathering information about its management. The members of the organization should be involved in the evaluation and monitoring process. Evaluation should bring modification and improvements to the organization.

TECHNIQUES FOR MOBILIZING THE FISHERIES USER GROUP

If a fisheries user group is already established, it must be strengthened or mobilized in order to play a meaningful role in fisheries co-management. Mobilization techniques include:

1. After the core group within the organization is formed, this group should seek community support by collecting individual inputs or suggestions on the mission and activities of the organization.
2. The members of the organization should be encouraged to discuss their reasons for participating in the organization, possibly by raising related topics such as costs and the benefits of joining the organization. This process has the added advantage of providing an opportunity to gather information about the perceptions and needs of stakeholders which may finally be identified as the general needs and reduce the potential for conflict.
3. It is necessary to hold meetings to discuss the objectives of the organization,

reach agreement about the organization's development and the reasons for joining the organization. The core group within the organization should organize these meetings with the stakeholders to discuss the organization's mission and share their views on the mission.

4. Certain individuals should be encouraged to join the organization and understand the purpose of the organization. It is important to understand that sometimes the power structure of the community and the organization may prohibit stakeholders from providing contributions. Therefore, the role of facilitator is very important. Meetings can be successful if they are well run by facilitators who provide stakeholders with ample opportunity to listen to inputs and appreciate them.
5. After organizational agreement is reached, it is necessary to conduct special purpose meetings related to the objectives, goals and structure of the organization, its leadership, funding, work plan and so forth.
6. Organizational structure is a working framework which shows the members how the leaders are elected and decisions are made. There are some aspects required to form an organizational structure, namely:
   a) a governance system and a system of decision-making;
   b) rules for the organization's management;
   c) distribution of tasks.
7. Good organizational structure is determined internally through critical thinking and a thorough discussion process. According to Pomeroy (2005), successful implementation of organization structure is usually determined by:
   a) elected leadership;
   b) routine meetings;
   c) routine news or information on the organization;
   d) sharing of duties and responsibilities;
   e) trainings new members;
   f) allocating time for social gatherings;
   g) conducting a proper planning process;
   h) fostering good working relationships between decision makers and the organization's resources.

When an organization is involved in a negotiation process leading up to the implementation of a co-management system, the organization should appoint one or more of its members to act as negotiator. Their appointment can be based on criteria such as honesty, knowledge of the local area, negotiation skills, personality and status in the community.

TECHNIQUES FOR STRENGTHENING THE COMMUNITY ORGANIZATION

In order to achieve sustainability, it is necessary to strengthen the organization and its members. Strengthening may be needed to improve knowledge about resources, identify attitudes towards the utilization of resources and hone skills required for managing resources. Strengthening an organization may be achieved by providing training or environmental education, capacity building and social communication activities.

Training and environmental education could be provided through modules on, for instance, environmental conditions of a watershed, its ecology, bio-diversity, resources, resource, conservation, etc. Other topics that might be added to a training course include:

- sustainable utilization of resources;
- improvement and maintenance of fishing habitat;
- relationship between land and the marine environment;
- relationship between humans and natural resources;
- environmental laws or regulations;
- implementation of regulations;
- conflict management.

When providing environmental training, there are some points that should be considered. These points are explained in Box 4.5.

BOX 4.5

Points to be considered in the provision of environmental training

These are some general guidelines for providing environmental training or education:

1. Allocate time, a venue and nominate those who will participate in the training.
2. Appointment a facilitator to administer the training.
3. Produce comprehensive documents on the training and its expected results.
4. Local participants must be given an opportunity to discuss and facilitate certain topics during the training.
5. Information about the marine environment should be presented in language that is easy to understand.
6. The training can use the local knowledge of the participants as a starting point and add to it by offering scientific knowledge.
7. Participants must be given an opportunity to share knowledge in order to explain the ideas and new concepts that can be used in the daily community life.
8. The training can be done formally, via the presentation of materials, and informally, via discussions, exchange visits, etc.
9. Sharing of local knowledge can play an effective role in the informal educational program.

Other training methods include allowing the stakeholders to become involved in research activities, using television programs, videos, radio programs, posters, story books and site visits, etc.

METHODS OF CAPACITY BUILDING

The capacity of individuals within the organization to participate effectively in fisheries co-management must be enhanced. Some strategies that can help to strengthen capacity include:

1) Understanding co-management.
2) Understanding how to organize and participate.
3) Communicating information about business administration to stakeholders.
4) Understanding how to participate in the negotiation process.

5) Determining mission and strategy.
6) Developing the organizational culture and structure (management methods, organization structure, and competence).
7) Developing the organizational interaction process (communication, planning, building consensus, research/development of policies, monitoring and evaluation, etc).
8) Developing the management of human resources (relationships between staff and members).
9) Understanding the source of information, understanding infrastructure and finances.
10) Developing techniques in conflict management.

CAPACITY BUILDING IN A COMMUNITY ORGANIZATION

Capacity building is often conducted with a view to improving organizational performance. In a system of co-management, capacity building can be undertaken at the individual, organizational and system (or enabling environment) levels. Capacity building can include:

1) dissemination of information;
2) training to develop knowledge, skills and attitudes;
3) development of networks through the exchange of information and learning about the experiences of other people who have similar duties and by practicing communication skills;
4) facilitation by experienced external organizations.

CRITERIA FOR STAKEHOLDERS' ORGANIZATIONS TO BECOME INVOLVED

Using the lessons learned through the implementation of fisheries co-management projects in Indonesia, several criteria that can assist organizations to get involved in fisheries management have been identified (Box 4.6). In the past, the pattern of fisheries management in Indonesia has been to treat the fishing community as the object of development rather than the subject of development. Fishing organizations or groups of fish farmers have often been established purely for the purpose of assisting government to implement fisheries development projects. As a result, many community organizations in Indonesia have failed to fulfil their function in the framework of fisheries management. An analysis of the failures of fisheries organizations is detailed in Box 4.7.

BOX 4.6

Criteria for fishers' and fish farmers' organizations to get involved in fisheries co-management

1. The community organization already exists. It was elected in a democratic manner and has office bearers such as a chairperson, a secretary, treasurer, etc.
2. There is a list of members containing personal information about the fishers.
3. Each member of the organization has a fisher identity card.
4. Regular meetings are held (when appropriate, but at least once every two months). Minutes are taken at every meeting.
5. The work plan is formulated in a participatory manner.
6. Membership fees are determined, together with a plan for utilizing the fees.
7. The Article of Association is in existence.
8. A process for resolving conflicts between members of the group is in place.
9. The organization has been active for a minimum of two years.

Source: Hartoto (2006)

BOX 4.7

The cause of failure in fishery organizations

1. The organization's objective is not properly formulated and the organization is not operated cooperatively by all members.
2. The organization was established for the purpose of facilitating certain government implemented projects.
3. In the process of developing the organization, the government played the dominant role, especially with respect to managing the organization's finances.
4. The organization failed to develop a system for generating its own funding, i.e. it failed to become self sustaining.
5. The selection and/or replacement of members is not conducted democratically.
6. There is a poorly developed mechanism for resolving conflicts within the organization.

CONFLICT CAN TRIGGER THE DEVELOPMENT OF A FISHERIES CO-MANAGEMENT REGIME

In Indonesia, history has taught us that conflict over access to resources can trigger the development of a fisheries co-management regime. An example of this kind of experience is detailed in Box 4.8.

BOX 4.8

Conflict related to illegal fishing can trigger the establishment of a co-management regime

Background

Ever since the colonial era, the 2500 ha Rawa Pening Lake, situated in Central Java, has attracted the attention of government. The Lake was polluted and destructive fishing practices, such as the use of poison and small mesh fishing nets, was pervasive. As a result, the lake's fisheries production dropped steadily from 531 kg/ha/year to 17 kg/ha/year. In addition, serious conflicts occurred between about 300 people who fished illegally on the lake and the 1 400 fishers who used legal fishing methods to land their catch.

The establishment of co-management

The legal fishers finally established a fisher group called *Sedyo Rukun*, meaning "willing to live peacefully". The local government fisheries structure gave the authority to this organization to patrol the lake every night using about 50 boats. The government subsequently issued a local regulation prohibiting illegal fishing. To enforce the regulation, *Sedyo Rukun* was given the authority to confiscate illegal gear and take the perpetrators of illegal fishing to the police. The conflict reached a peak one night when 150 illegal boats were prevented from fishing by about 500 boats affiliated to *Sedyo Rukun*. There was no violence between the two groups and eventually, after a period of two years, all illegal fishing practices in Rawa Pening Lake were stopped.

Lessons learned

Some lessons were learned from this case. These were, *inter alia*:

1. A co-management organization can grow quickly and become well established if it grows out of conflict in the community.
2. The willingness of government to share responsibility with the co-management organization is a critical requirement for settling problems in fisheries management.

Source: Hartoto (2007)

MONITORING AND EVALUATION OF FISHERIES CO-MANAGEMENT

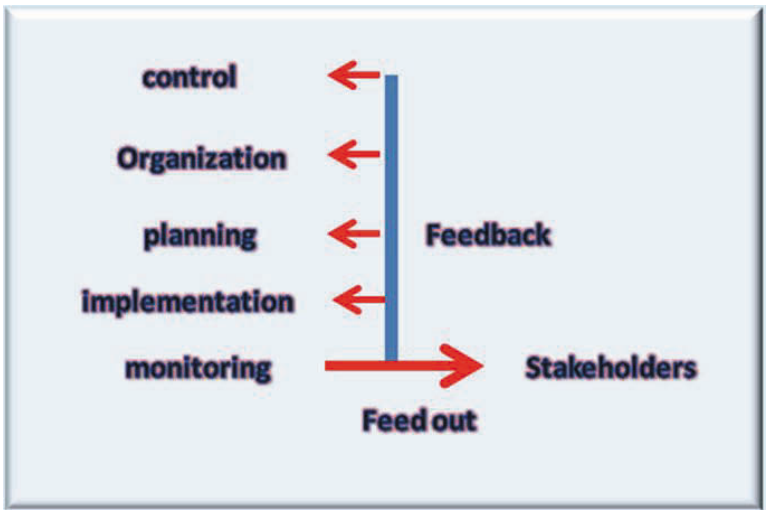
WHAT IS MONITORING AND EVALUATION?

Fisheries co-management is interactive, adaptive and participatory and consists of a set of inter-related duties that should be conducted in order to achieve the stated objectives (Pomeroy and Rivera-Guieb, 2006). In this context, the process must be monitored and evaluated so that lessons are learned (from past and current successes and failures) and may inform the current system. Monitoring and evaluation (ME) processes consequently form an important part of fisheries co-management.

Jacoby *et al.* (1997) stated that, within the fisheries co-management process, monitoring and evaluation (ME) is a sustained effort which creates the "feedback" and "feed out" for the fisheries stakeholders. Jacoby's framework emphasizes that the management process takes place in an ordered sequence and that each stage of the process creates feedback and eventually, feed-out to the stakeholders. Figure 4.11 below, explains the framework of ME according to Jacoby *et al.* (1997).

FIGURE 4.11

The role of monitoring and evaluation within the framework of fisheries co-management (adapted from Jacoby *et al.*, 1997)



What is monitoring?

Monitoring is defined as the sustainable process of reviewing positive indicators (progress) or negative indicators (lagging behind) during the implementation of co-management (adapted from UNDP, 1999). The purpose of monitoring is to study and measure the implementation of the co-management process in order to effectively manage the output and outcomes.

In order for constructive monitoring to take place, there are some key principles to observe, such as (1) focus on the results and follow-up; (2) ensure good design; (3) conduct regular field visits; and many others. UNDP (1997) explains the key-principles of monitoring in Figure 4.12 below. Explanations are provided in Table 4.4.

FIGURE 4.12

Key principles of monitoring

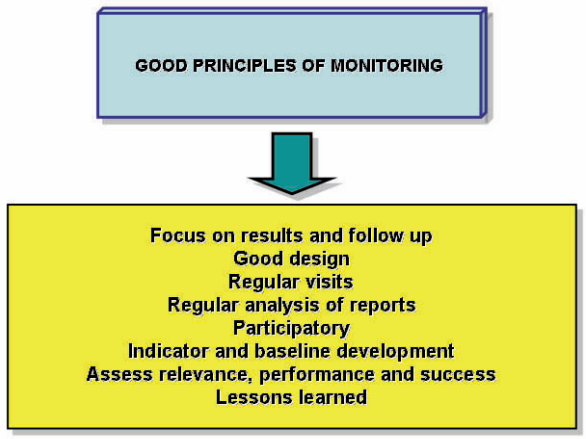


TABLE 4.4

Key principles of monitoring

No	Principles	Particulars
1	Follow up on the results	The emphasis is on the analysis of results and a process of following up so that the analysis becomes input for future management activities
2	Good design	Monitoring is based on good operational design
3	Regular visits	Monitoring is conducted regularly, not in a sporadic or partial way
4	Regular analysis of reports	The monitoring report is produced and analyzed regularly, according to a set schedule
5	Participatory	Monitoring is designed and conducted in such a way that all stakeholders participate in the monitoring process
6	Development of indicators and data base	Monitoring involves the development of measurable indicators
7	Identify the performance, success and failures	Monitoring is focused on assessing the performance of the system, through the gathering of stories of success and failure
8	Lessons learned	Monitoring is conducted with the purpose of achieving future objectives through lessons learned

Source: Adapted from Adrianto (2005)

A good monitoring process will make it easier to move a fisheries co-management regime from the planning and strategy phase to the point where it is making a difference to the environment and to human beings. Monitoring can become the basis for measuring performance and judging whether fisheries management has been conducted well.

As explained by Pomeroy and Rivera-Guieb (2006), the monitoring process is conducted to ensure that the programme that has been initiated is running according to plan. There are two reasons why it is necessary to have a monitoring plan; firstly, to assure stakeholders that the planned activities are implemented and measured in a systematic way; secondly, to learn whether the action taken is based on stated objectives. Corrective actions can be taken if the activities are not proceeding according to the plan.

What is evaluation?

In general, evaluation means reviewing whether the actions that take place within the framework of fisheries co-management achieve the stated objectives. Evaluation is a routine activity for the planning and implementation of fisheries co-management.

According to UNDP (2007), evaluation is defined as a selective process which determines the progress of implementing a programme in a systematic way.

Evaluation consists of a range of parameters, namely (1) outcome status, which gauges the major impact of the activities, not the output; (2) factors that influence the performance of the system; (3) the contribution of the organization to the implementation of the system; and (4) partnership strategy.

Evaluation may be categorized into two different types. Formative evaluation is conducted during the implementation of the programme, whereby the performance indicator is identified and compared with the results of the programme. The result of this evaluation will become the basis for the future corrective actions. Summative evaluation is the evaluation conducted after the co-management programme is implemented. The objective of this type of evaluation is to conduct in-depth analysis of the results and outputs of the programme and to determine the level of success that has been achieved with respect to the objectives of the programme. The results of this type of evaluation will be used in future planning.

According to Pomeroy and Rivera-Guieb (2006), there are a number of evaluation approaches that may be taken. These are performance evaluation; process evaluation; management capacity evaluation; and outcomes evaluation. Table 4.5 describes each of these approaches.

TABLE 4.5

Different approaches to evaluation

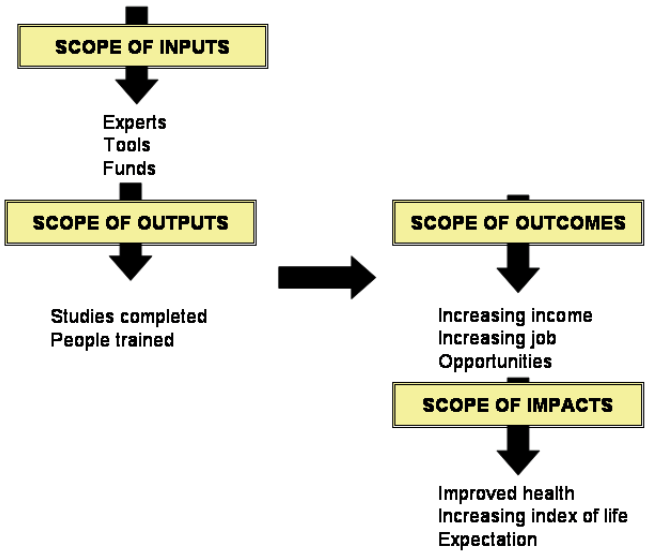
No	Approach	Details
1	Performance evaluation	This evaluation is designed to determine the quality of implementation of certain activities. Accountability, quality control and terms of reference are the focus of this approach to evaluation.
2	Process evaluation	This evaluation focuses on the achievement of the stated objectives in the fisheries co-management project. For instance, the clarity of the objectives statement, the legislative mandate, the analysis of the organization's structure, and many others.
3	Management capacity evaluation	The focus of this evaluation is whether the implementation of the plan is adequate from the point of view of the framework and institutional policy. The management process, policy tools, management election and strategy are also a focus of this evaluation.
4	Outcomes evaluation	The evaluation of the environmental and socio-economic impact of the fisheries co-management project.

Source: Pomeroy and Rivera-Guieb (2006)

The two elements of monitoring and evaluation are connected during the reporting process. Reporting provides a connection between the level of output and the level of outcome. Reporting is conducted periodically, according to a schedule that has been agreed to by all the stakeholders. Therefore, the tasks of monitoring and evaluation are conducted according to a well defined schedule. This schedule is illustrated in Figure 4.13 below:

FIGURE 4.13

The chain of performance based monitoring and evaluation



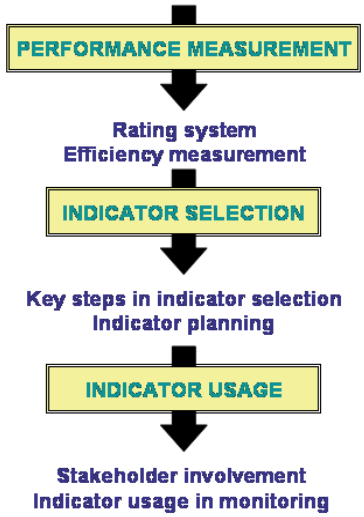
What is the performance measurement?

In a fisheries co-management project, the concept of performance measurement has three main elements, namely (1) performance measurement; (2) selection of indicators and (3) usage of indicators. Figure 4.14 below, illustrates the process of performance measurement and some of its important elements, within the framework of monitoring and evaluation.

As is evident in Figure 4.14, performance measurement is conducted using the rating system which is connected to the selection and planning of the key indicators. The use of indicators involves the stakeholders (monitoring and evaluation is participatory).

FIGURE 4.14

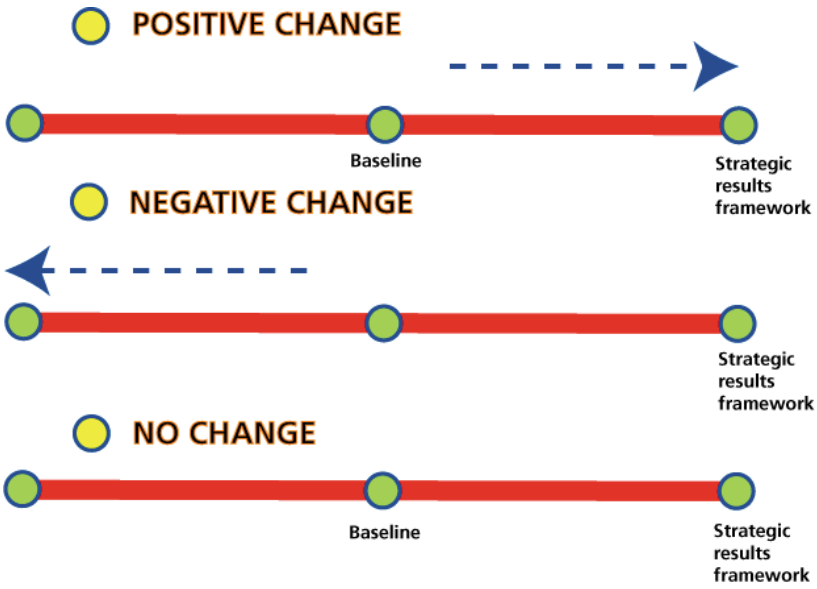
Performance measurement in the framework of monitoring and evaluation



Theoretically, performance measurement has three important characteristics, namely (1) positive changes; (2) negative changes; and (3) no change (please refer to Figure 4.15).

FIGURE 4.15

Important elements in performance measurement



The positive change moves from the baseline point to strategic outcomes, whereas the negative change moves away from the baseline point to the non-strategic outcomes. The *status quo* is maintained when the system does not move towards the strategic outcome or away from the baseline point to the non-strategic outcomes.

A critically important aspect of performance measurement is whether the objective has been achieved, i.e. whether it is completely achieved, partially achieved or not achieved at all. This concept is illustrated in Figure 4.16 below.

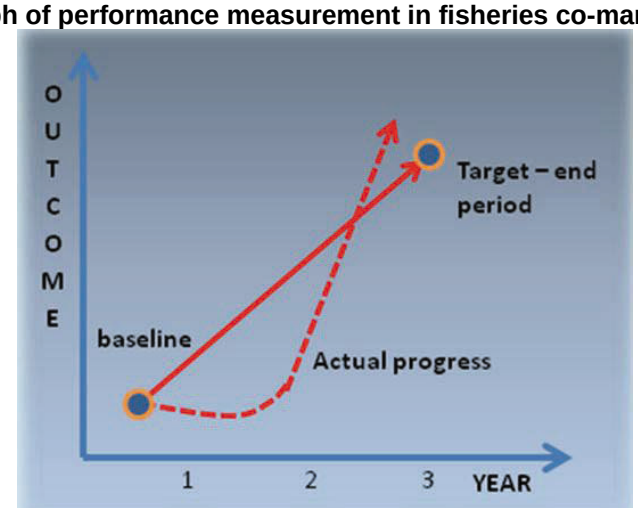
FIGURE 4.16

Possible outcomes in the context of monitoring and evaluation

Achievement occurs when the whole plan is achieved through the outcomes. Partial achievement occurs when only some parts of the plan are achieved. Non-achievement occurs when the overall plan is not achieved through the outcomes. Another way of looking at performance measurement is illustrated in the performance graphic in Figure 4.17 below.

FIGURE 4.17

The graph of performance measurement in fisheries co-management



As shown in Figure 4.17 above, performance measurement can be conducted by way of tracking actual progress, which is subsequently compared to the plan. In the beginning of the project, few outcomes will be shown on the graph, but after the learning process is underway, it is expected that the outcomes will become more obvious.

HOW TO IDENTIFY INDICATORS

An indicator is defined as a tool or a way to measure, indicate or refer to something with more or less accuracy. According to Hart Environmental Data (1998), an indicator is used to measure progress; explain the continuity of a system; provide lessons learned to the stakeholders; motivate stakeholders, focus on the activities; and show links between the activities.

In the context of fisheries co-management, an indicator is regarded as a good indicator if it is able to fulfil some criteria such as (1) show ecosystem improvement; (2) support the objectives of co-management; (3) be understood by all the stakeholders; (4) be useful for monitoring and evaluation purposes; (5) provide a long-term view; and (6) show the relationship within the fisheries co-management system (Hart Environmental Data, 1998).

Pomeroy and Rivera-Guieb (2006) identify a good indicator as one that fulfils the following criteria:
1. Measurable: noted and analyzed quantitatively and qualitatively;
2. precise: equal definition by all stakeholders;
3. consistent: stays permanent over time;
4. sensitive: changes as a response to changes in the society.

In some of cases, the selection of indicators is related to the objectives that will be achieved by the process of monitoring and evaluation. When an indicator is selected, the next process is to select the method that will be used to measure this indicator. On the whole, the selection method should be (1) accurate and reliable, meaning that it is possible to minimize the level of error during data collection; (2) cost effective; (3) feasible, meaning that it is possible to conduct the measurement of indicators; i.e. in terms of human and financial resources; and (4) appropriate, whether the method selected is in accordance with fisheries co-management goals and objectives. Some examples of indicators used in the implementation of the monitoring and evaluation process (in the context of fisheries co-management) are shown in Table 4.6 below.

TABLE 4.6

A sample of indicators used in the monitoring and evaluation of fisheries co-management

No	Indicators	Methods
1	Fish production	Measured by the logbooks of the fishers and farmers in the fisheries co-management area.
2	Fish size	Measured by recording the size of the fish at the fish market.
3	Price of fish in the production area	Measured by recording the price of fish per kilogram at the fish market.
4	Income of fishers and fish farmers	Measured by recording the expenditure and income pattern of the fishers' and farmers' households.
5	Participation by members of the community	Measured by looking into the number of people participating at the stakeholders meetings.

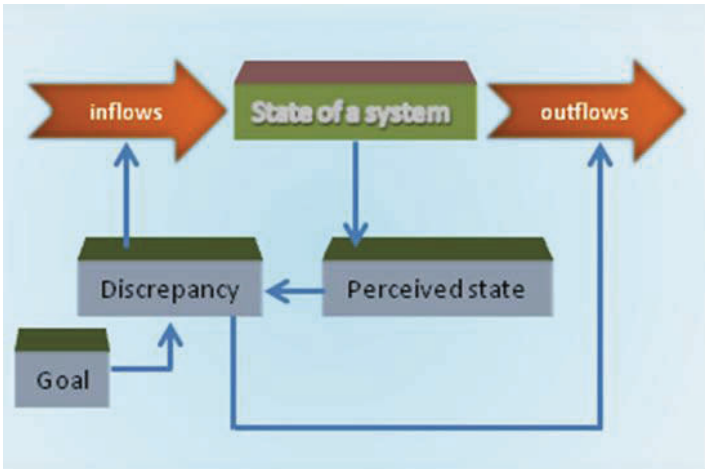
Source: Adrianto (2005)

SUSTAINABILITY INDICATORS IN FISHERIES MANAGEMENT

Hart Environmental Data (1998) generally defines an indicator as a way to measure, indicate, point out, or point to with more or less exactness. Other definitions describe an indicator as something used to visually show the condition of the system. The position of an indicator in a system is described by Meadows (1998) in the following diagram, Figure 4.18.

FIGURE 4.18

Position of an indicator (the perceived state) in a system (Meadows, 1998)

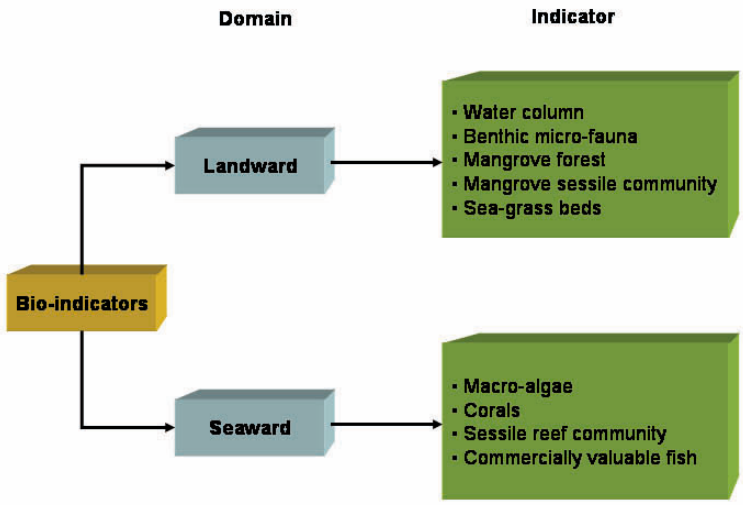


A special edition of the Ocean and Coastal Management Journal (Volume 46, 2003) on Integrated Coastal Management (ICM), discussed in detail the

sustainable indicators of fisheries management. It included in its description, a biological indicator (Linton and Warner 2003), an ecological indicator (Kabuta and Laane, 2003), a socio-economic indicator (Bowen and Riley, 2003) and a governance indicator (Ehler, 2003).
Linton and Warner (2003) define a biological indicator as an important aspect in ocean and coastal management, particularly with respect to monitoring and mitigation actions related to coastal waters pollution. Linton and Warner (2003) identify a total of 11 indicators that are divided into two groups, namely five landward indicators and six seaward indicators. These indicators are illustrated in Figure 4.19.

FIGURE 4.19

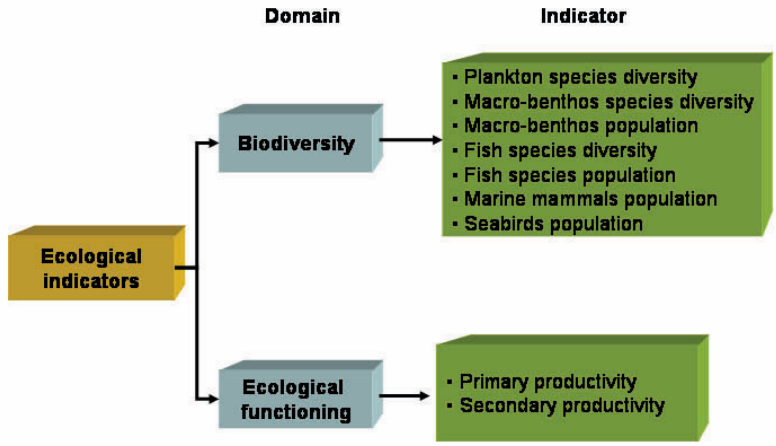
Bio indicators of fisheries management (Linton and Warner, 2003)



Meanwhile, Kabuta and Laane (2003) identified the importance of ecological indicators in ocean and coastal management. There are two groups of indicators in their framework, namely a biodiversity indicator and an ecological function indicator. The biodiversity indicator focuses on the sustainability of the ocean and fisheries species, such as plankton, benthos and fish. The ecological function indicator includes primary and secondary parameters of productivity. Figure 4.20 shows Kabuta and Laane's (2003) ecological function indicator.

FIGURE 4.20

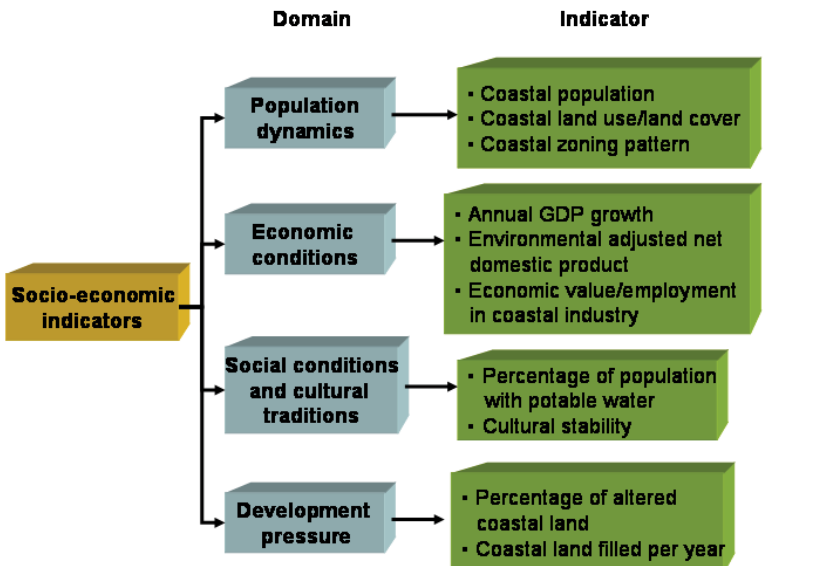
Ecological indicators in fisheries management (Kabuta and Laane, 2003)



Bowen and Riley (2003) describe socio-economic indicators in the context of ocean and coastal management by using the pressure, state, impact and responses (PSIR) approaches developed by Turner *et al.* (1998). According to Bowen and Riley (2003), there are at least four main socio-economic domains that provide a basis for identifying a sustainability indicator, namely (1) population dynamics; (2) economic conditions; (3) social and cultural conditions; and (4) development pressure (Figure 4.12).

FIGURE 4.21

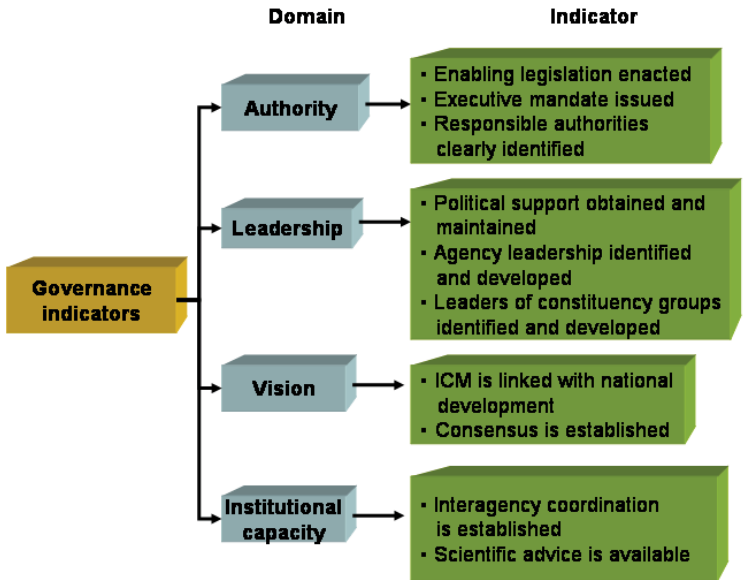
Socio-economic indicators in fisheries management (Bowen and Riley, 2003)



The other important indicators of ocean and fisheries management are governance performance indicators. Ehler (2003) identifies sustainability indicators by using an institutional approach. In Ehler's framework, there are at least 17 domains; these are shown in Figure 4.22 below.

FIGURE 4.22

Fisheries governance performance indicators (Ehler, 2003)



HOW TO DEVELOP A LOCAL FISHERIES CO-MANAGEMENT PLAN

INTRODUCTION

After more than five decades of centralized fishery management in Indonesia, it is time for local fishery users (fishers and fish farmers) to be involved in decision-making. One of the fundamental tasks of fisheries management is to prepare a fisheries management plan.

Some of the current weaknesses of fisheries management in Indonesia are the lack of success indicators in the fishery management system; the lack of a well defined management programme; and the domination of the decision-making process by government. When formulating a fishery co-management plan, government and fisheries resource users need to work together. Usually a mediator is required to assist the two stakeholders to formulate a co-management plan, at least in the early stages. The mediator is generally an individual or working group who originates from a research organization or a non-governmental organization. The role of a mediator is shown in Box 4.9, below.

BOX 4.9.

The role of the mediator in the formulation of a fisheries co-management plan

- To explain the benefits of a co-management plan.
- To prevent any one party from becoming dominant during the discussions between the government and local fisheries community.
- To diminish the cultural obstacles that may arise between the two main stakeholders in fisheries co-management.
- To assist with conflict resolution.
- To provide technical information.
- To assist the fisheries users to receive fair treatment in decision-making.
- To assist with the implementation of regulations as agreed in the local management plan.
- To encourage the sharing of experience and local knowledge.
- To ensure participation in the discussion process leading up to the formulation of a fisheries co-management plan.

As a fisheries co-management plan is implemented, so the role of mediator may be reduced, provided that the relevant government officials have understood the democratic spirit in which the plan is being implemented and the concepts of decentralization, transparency and participation.

Through the involvement of fishers and fish farmers, the principles of good governance, transparency and accountability are more likely to be incorporated in the fisheries co-management project. Past failures of Indonesian fisheries management were largely due to the over emphasis of "the short term top-down project based approach" during the development process (Figure 4.23).

FIGURE 4.23

A coordination instrument in the development of fisheries co-management

THE FORMULATION OF A LOCAL MANAGEMENT PLAN

The method that is described below, which explains how to formulate a management plan for a local fisheries co-management system, has been tested in lake and reservoir systems in the province of West Sumatra (Lake Maninjau, Central Kalimantan (Lake Sembuluh) and Bangka Belitung Island (Delta Layang River). The method used focused on questions and answers, whereby the mediator - acting as a facilitator – prepares an open-ended set of questions to be answered in the discussion between the government and the fishers or fish farmers (Box 4.10).

BOX 4.10

Examples of questions used to formulate a management plan for the local co-management of fisheries. (These questions should be posed in sequence, in a dynamic and flexible manner)

1. Where do the fishers usually catch the fish, what tools are used, at what time are the fish caught and where are they caught, etc?
2. What are the fisheries related problems? What problems are faced by the fishers or fish farmers, and what problems are encountered by the government officials?
3. What changes in the fisheries system are necessary? (The answers to this question will be used to formulate the objectives of a local fisheries co-management system).
4. What are the opinions of the fishers or fish farmers about how to achieve these changes, i.e. the objectives of the local fisheries co-management system? (The answers to this question must be used to formulate the fisheries co-management program, which will eventually become the activities and projects).
5. If the fisheries co-management program is implemented, how will its successes and failures be measured? (The answers to this question will form the basis of the fisheries co-management success indicators. What is important is that the indicators are agreed to in a participatory manner.)

When fisheries co-management was first introduced in Indonesia, government officials involved in the management of fisheries were sometimes reluctant to participate. Under these conditions, the process of formulating a local management plan was managed by conducting separate discussions on the

formulation of the plan, first with government officials and secondly with the groups of fishers or fish farmers. If this pattern of formulating a local management plan is used, the results of the separate discussions must be evaluated by the mediator to see if there is a significant gap between the plans formulated by the two groups of stakeholders. The government officials and the fisheries user groups must then get together to strengthen and harmonize the plan.

An example of this way of formulating a local management plan is taken from the Regency of Bangka in the Province of Bangka Belitung. The plan was formulated by government officials – consisting of the regional marine and fisheries office and other, related offices (Figure 4.24) – and fishers from the villages of Rambang, Bernai, Tirus, Gedong and Tanjung Batu (Figure 4.25). The government officials and the fishers' groups worked separately. A researcher from the Institute of Limnology acted as the mediator or facilitator in the process of formulating the plan for local fisheries co-management.

From the experience gained so far, the participatory process of formulating a management plan is always welcomed by the fishers or fish farmers. Using sound communication techniques, the community groups were able to formulate a good fisheries co-management plan.

FIGURE 4.24

Focus group discussion for local government officials in the Regency of Bangka

FIGURE 4.25

Focus group discussion for the local fisher community using a map and calendar of fishing activity

The next stage of the planning process

Although a mediator may be necessary, if the government officials have understood the concept of fisheries co-management, discussions around the formulation of a plan for local fisheries co-management may be conducted jointly between the government officials and the fisher groups. If this strategy is adopted, the two main stakeholder groups work together in the decision-making process. This is an essential feature of fisheries co-management.

Basic information needed

The information needed for the formulation of a plan for local fisheries co-management includes information about fisheries resources, environmental conditions, the current situation in the fishery and the management of the fishery itself. In Indonesia, this basic information may be acquired by asking the stakeholders simple questions. These questions will guide the stakeholders to formulate the objectives of management, the management plan and the indicators that will gauge the success of the implementation of the management plan.

The same questions can be directed to the government officials and fisher community but must be adjusted according to the activities and abilities of those stakeholders. The information acquired from this question and answer session can reveal the profile of the local community and will form the basis of planning activities for marine and inland fisheries.

The questions posed to the fisher groups must be as simple as possible in order for all members of the group to understand the questions and participate in the discussion process. In the example of the Regency of Bangka, the results of the focus group discussions showed that the local government officials and the fisher groups were able to formulate the local fisheries management plan, although differences occurred in the objectives of the plan.

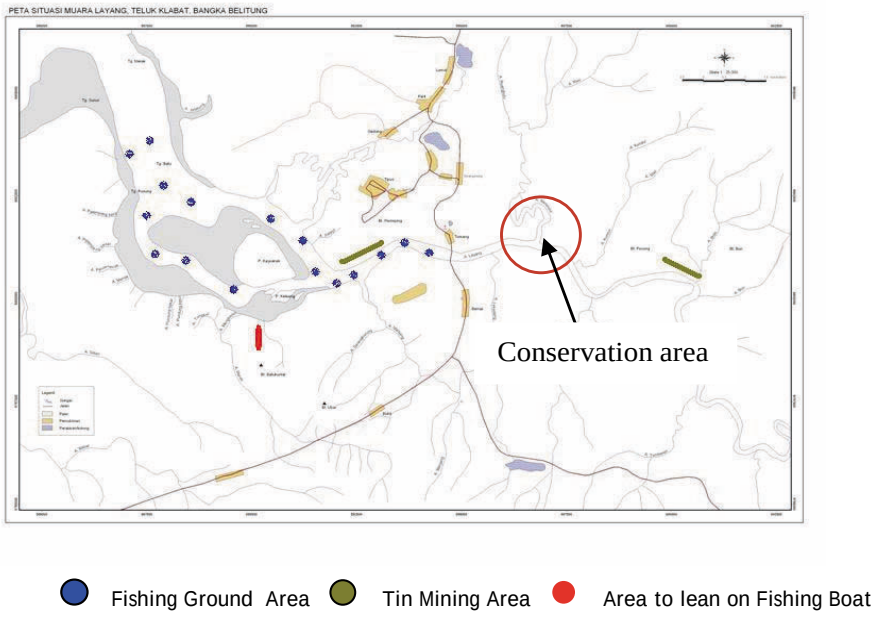
THE RESOURCES MAP AND ACTIVITIES CALENDAR

The fisher groups may provide information for the map of fisheries resources, such as the areas where fish are caught by the different villages and related information such as the condition of the surrounding environment. This information is based on their direct observations. The area that is experiencing environmental degradation can also be shown on the map.

For instance, during the formulation of a management plan for the co-management of fisheries in the Muara Layang river (Figure 4.26), the location of the fishing grounds of every village was pinpointed. It then became evident that all the fishing grounds, with the exception of grounds used by fishers from the village of Tirus, were located outside the conservation area proposed by the Center for Limnology Research (LIPI) (Figure 4.26).

FIGURE 4.26

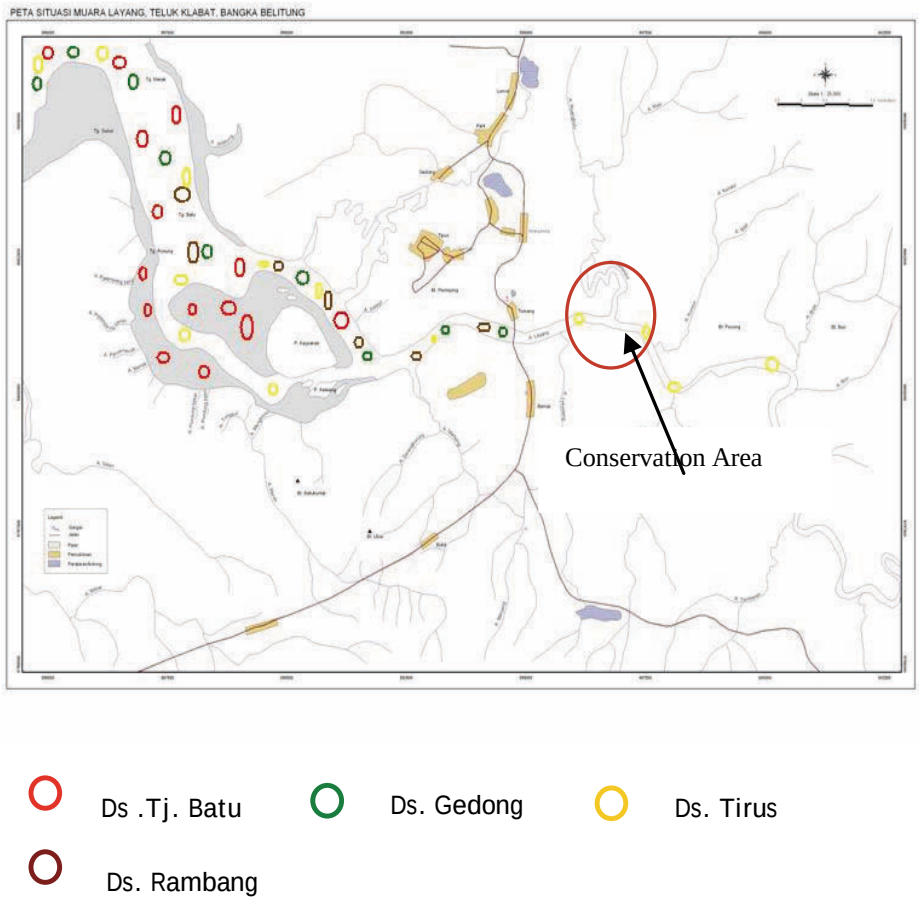
The fishing grounds of the fisher groups living on the Muara Layang River. The map was compiled after discussions with fisher groups



The resources map that was compiled for the Village of Rambang, not only shows the location of the fishing grounds, but also shows the location of tin mines and the jetty for the villagers' boats (Figure 4.27).

FIGURE 4.27

The fishing grounds of fisher groups from the village of Rambang



The daily and yearly fisher activities calendar can provide information about the quantities of fish caught and thereby help to formulate indicators of success for the local fisheries co-management plan. The calendar can also assist local government officials to formulate the plan and determine the policies for local management, such as the timing of the open fishing season.

The data that is gathered by utilizing a calendar of activities generally include the timing of the fishing season, the condition of the fish when they are caught, the spawning season and the type of fishing gear that is most commonly used. An example of a daily and yearly calendar of activities is provided in Table 4.7 and Table 4.8 and an example of problems identified by stakeholders is provided in Box 4.11.

The use of visualization tools may encourage interaction between the members of the fisher groups during the focus group discussions.

TABLE 4.7
An example of a yearly calendar of activities, based on the results of discussions with the fishers of the village Rambang in the Province of Bangka Belitung

ACTIVITIES Fishing gear & fish species	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Hand line: *sembilang* fish	*	*	*	*	*	*	* ●	* ●	* ●	* ●	* ●	* ●
Bottom long line: ray fish	*	*	*	*	*	*	*	*	*	*	*	*
Pintor: crabs	*						* ☺ ●	* ☺ ●	* ☺ ●	* ☺ ●	* ●	* ●
Net: shrimp, mullet, groupers	*	*	*	*	*	*	*●	●	● *	● *	● *	●
Trawl net	☼	☼	☼	☼	☼	☼	☼	☼	* ◙	* ◙	* ◙	* ◙

Key:

* = Setting fishing gear
● = Spawning season
☺ = Very good catches (large sizes)
☼ = Fishing during the day time
◙ = Fishing at night time

TABLE 4.8
An example of a yearly calendar of activities based on the result of discussions with the fishers of the village of Rambang in the Province of Bangka Belitung

Activities	SPECIES																								
	06.00	07.00	08.00	09.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00	01.00	02.00	03.00	04.00	05.00	06.00
Catching fish	*	*					*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
Wooden hand line	*												*	*	*	*	*	*	*	*	*	*	*	*	*
Bottom longline	*												*	*	*	*	*	*	*	*	*	*	*	*	*
Trawl (in the dry season)	*	*																							
Pintor (caught in large swells)	*	*	*	*	*	*	*	*	*	*	*	*	*	*										*	*
Trawl net		*	*	*	*																				
Collecting bait							▲	▲	▲	▲	▲														
Setting nets												*	*												
Shooting fish using iron spears														*	*	*	*	*	*	*	*	*	*		

BOX 4.11

Examples of problems identified in the inland fisheries

Identified by government officials

- Pollution from unconventional mining area
- Fish capture using poisons
- No limits on fishing gear
- A lack of social welfare in the fishing communities
- Low community awareness of environmental issues
- A lack of knowledge about modern fisheries management techniques
- Difficulties in acquiring the *selanget* fish

Identified by fishers groups

- Pollution from unconventional mining area
- Fish capture using poisons
- No limits on fishing gear
- Shallow river

THE IMPORTANCE OF PROTOCOL DURING THE PARTICIPATORY PROCESS

Some points that must be taken into account when formulating a plan for local fisheries co-management are as follows:

- The venue selected for this activity should be close to the community of fishers or fish farmers.
- The people who will assist with the discussion process must be selected. It is necessary to discuss who will open the activity (in accordance with the local tradition) and who will provide explanations about the purpose and objectives the discussion. The facilitator and note taker must also be appointed.
- Determine what kind of information is needed and how to use that information.
- Create a list of easily understood, open-ended questions for all the stakeholders. It is best to test the questions.
- Determine the stakeholders that will participate in the discussion process.
- Determine the agenda and the venue for this activity. Arrange the room so that the participants can sit in a relaxed manner and form groups. During the focus group discussions in the community of Muara Layang, the discussions were conducted in people's homes or in religious places, such mosques.
- Provide snacks and beverages as well as lunch or dinner.
- The facilitator will ask questions and gather information necessary to support the plan of local management. The assistant facilitator will record or take notes on every answer given.
- The facilitator must prepare the supporting tools such as maps, a calendar of activity, etc.
- Analyze the results of the discussions that are captured by the assistant facilitator immediately after the end of the activity. An example of the changes expected by stakeholders and methods to achieve such changes is presented in Box 4.12 and 4.13.

BOX 4.12

Examples of expected changes: The objectives of fisheries co-management

By the government officials

- Improve the income and welfare of the fishers.
- The tin mining activities must be environmentally friendly.
- Increase the awareness of people towards the environment.
- Improve the fishers' ability (home industry).
- Increase the number of human resources involved in the fisheries sector (crab processing, private lenders).

By the fisher groups

- Improve the income and welfare of the fishers.
- Area allotment for the protection of the area from the illegal tin mining.
- Encourage tin mining that is environmentally friendly.
- Increase catches.
- Utilize other areas once the illegal tin mining has been stopped.

BOX 4.13

Examples of detailed methods to achieve change in fisheries co-management programs

By the government officials

- Development of fisheries sanctuary area.
- Training for fishers and the family of fishers.
- The enactment of rules and regulations.
- Research to develop fish farming activities.
- Reseeding to increase fish population.
- Space management to utilize the fisheries resources.
- Formulation of fishers groups.
- Increase the number of fisher households.

By the fisher groups

- Development of a special fisheries area.
- After the illegal tin-mining is stopped, the area is used for shrimp farming.
- Develop the seeding places.
- Determine the areas where reseeding will take place.
- Monitor fisheries resources to prevent pollution.
- Control the number of fishers.

LESSONS LEARNED FROM THE CASE OF MUARA LAYANG

The inland fisheries system in Indonesia is generally characterized by a number of traditional people who are involved in fisheries activities. As a result, it can be difficult to establish a fisheries co-management process in inland fisheries. Although the following experience is acquired from the fisheries activities in the Muara Layang River, there are some lessons to be learned from it that may be implemented in other areas of Indonesia (Box 4.14).

BOX 4.14

Fisheries success indicators in the case of Muara Layang

Government officials

- Increase in the income level of the fishers.
- A decrease in the number of poor fishers.
- Improvement in the fishers' households.
- Fisheries support tools are used.
- *Selanget* fish can be caught once again.

Fisher groups

- There is an increase in catches.
- Fishers are able to put their children in schools.
- The welfare of the fishers is improved.

THE CASE OF MANINJAU LAKE: AN EXPERIMENT IN THE USE OF GENDER AND A SPIRITUAL APPROACH IN FISHERIES CO-MANAGEMENT

The fisher groups in the area surrounding Lake Maninjau are a unique community, characterized by a matrilineal system and influenced by Islamic tradition. Women hold a unique position in the society because they, rather than the male members of the community, always inherit the ownership of the land. On the other hand, the obligation to work and provide for the family is the responsibility of the man. Therefore it is male fishers who capture Bada fish (*Rasbora argyrotaenia*) in Lake Maninjau. This species of fish is caught by a group of fishers calling themselves *Mina Bada Lestari*. The group was formed in 2005 through the process of institutional empowerment developed by the Center for Limnology Research (LIPI).

BOX 4.15

Lessons learned in the formulation of a co-management plan in local fisheries

1. Data collected through the participatory method is the most efficient for a large research area and when limited time is available.
2. The questions posed to the fisher groups during the focus group discussions must be as simple as possible so that each member of the group can understand and participate by providing their opinions.
3. By using the participatory approach, we are not only collecting information but also providing knowledge or understanding about certain problems or matters to the fisher groups.
4. The officials and fishers are assisted to form groups and prepare the plan for local management.
5. The use of an area map is effective for marking the fishing grounds of the fishers from different villages.
6. The villages with different ethnic groups (such as Chinese people) require a different approach when it comes to fisheries data collection.
7. For the ethnic Chinese villages, data collection is entrusted to the person who has the biggest influence in that community.
8. The use of visualization tools such as resources maps and an activity calendar encourages interaction between members of the group.
9. The location of data collection (in the focus group discussions) must be in accordance with the local culture.

The fisher group of Mina Bada Lestari (MBL) where lessons learned are presented in Box 4.15 has succeeded in formulating a local fisheries co-management plan, but the women folk in this group are better able to determine the success indicators of fisheries co-management for the Bada fishery (Box 4.16). This is because the women are responsible for smoking the Bada catch and selling it to the grocers. The women know the exact daily income of the family because the money is used to pay for their daily living expenses and to pay for their children's tuition fees.

BOX 4.16

The experience of formulating a local fisheries co-management plan with the fishers of *Mina Bada Lestari*

1. The process of institutional empowerment must be conducted thoroughly and involve a recognition of the fishers identity and an agreement on the ethical (spiritual) basis that will be used.
2. The meeting with the experts on fisheries management is part of the institutional empowerment process.
3. The plan for collecting fisheries data must be an inseparable part of the plan for local fisheries co-management. The organization of the fisher groups or fish farmers must be facilitated in the process of formulating a fisheries co-management plan.
4. The gender approach, whereby the assistance of women folk is requested when formulating a plan for fisheries co-management must be encouraged.
5. The process of formulating a plan for local fisheries co-management also becomes the instrument for improving transparency and honesty in fishery governance.

Explanations were given to the women folk about the objective of monitoring the size of the Bada fish stock. It was explained to them that when the average size of fish declines, it means that the stock is being overfished. After they understood the importance of fish size, they were willing to cooperate with the Institute of Limnology in collecting information about the size of the fish caught by their husbands every day. This is an example of how to successfully utilize a gender approach in fisheries co-management.

During the empowerment process, it was explained to the fishers of Mina Bada Lestari that human beings have an obligation to utilize natural resources in a responsible way, optimizing their use through the spirit of entrepreneurship, but preventing greediness. Consensus was later reached among the community to build ten *Rasau* (fish attracting devices) to increase the productivity of the capture fishery. Out of the ten *Rasau*, three are used as a fishery reserve. The success of this fisher group has attracted the attention of members of the Parliament of the Republic Indonesia who visited the group in October 2006, while the area around the *Rasau* was being restocked with fingerlings of Bada fish hatched by the Institute of Limnology. This process shows that through proper institutional empowerment, the participatory formulation of a co-management plan, using the democratic system and implementing the Politics of Identity, the fisher groups as the partner of government can do more in the area of fisheries co-management.

The development of a local fisheries co-management plan with a log frame application is a new approach to Indonesian fisheries management. This technique has been tested and applied in the area of Sembuluh Lake (in Central Kalimantan), the inland waters of Muara Layang in Bangka Belitung province and Riam Kanan Waters Reserve in South Sumatra Province.

CONCLUSION

The key criterion for both government and fisheries communities to participate in a fisheries co-management regime is that both stakeholders must demonstrate a willingness to participate in a democratic way and, through deliberation, achieve consensus.

In the first part of this Module, we learned about the important process of integrating the community into the fisheries co-management regime. The role of the community organizer was highlighted and a series of fundamental tasks – from paying a courtesy call to local leaders, to jointly formulating a working plan – were outlined.

In the second topic, the Participatory Action Research Approach to fisheries co-management was outlined. This approach constitutes an alternative to the failed "top-down" approaches that were standard academic practice for many years and generally hampered the development process. The different types of participation were explained and the technique of initiating a Participatory Rural Appraisal (PRA) was explained in detail.

In the third topic, the theory and benefits of community organization were highlighted. It was suggested that fishing communities need to be organized in order to take up their rightful role in fisheries co-management. The process of organization includes education, empowerment, developing or revitalizing values and ethics systems, developing notions of independence and partnership, developing organizational and leadership skills, and assisting the community to take action.

The importance of monitoring and evaluation (M&E) in fisheries co-management was the subject of the fourth topic of the Module. Clearly defined monitoring and evaluation procedures, as well as a suite of indicators, are required to benchmark the sustainability of fisheries co-management. The process of M&E was outlined in detail.

Finally, the nuts and bolts of how to develop a fisheries management plan were elucidated. The development of a fisheries management plan is one of the fundamental tasks of fisheries management. It was suggested that a mediator can play an extremely useful role in helping government and communities to reach consensus on a fisheries management plan; the roles and functions of a mediator were explained at length. The importance of protocol was also highlighted in the final topic so as to ensure that outsiders who deal intimately with fishing communities do not cause offence.

There are a number of highly useful tools that can be used in the process of formulating a fisheries management plan. These include a resources map and a calendar of activity. An explanation of both tools was given, together with some examples from rural areas in Indonesia where fisheries co-management has successfully been implemented.

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Participatory landing site development for artisanal fisheries livelihoods provides guidance on landing site development planning. This manual helps those working at artisanal fisheries landing sites to identify, collect and analyse information in a participatory way, and consequently to create and seek support for a development plan. It goes beyond simple data collection to explain how to write a project proposal and gives pointers on how to find funding, as well as technical and other support. In addition to well-known participatory methods of data collection and analysis, the manual includes transects in the fisheries production chain. This unique tool was adapted from the agricultural transect walk. The material is based on a number of cases in West Africa but the principles are applicable worldwide.

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