

Fisheries Co-Management - An Institutional Innovation.

Perspectives and Challenges Ahead

Jesper Raakjær Nielsen^a and Poul Degnbol^b
Institute for Fisheries Management and Coastal Community Development (IFM)
The North Sea Centre, 9850 Hirtshals, Denmark
^ajrn@ifm.dk and ^bpd@ifm.dk

and

K.Kuperan Viswanathan^c and Mahfuzuddin Ahmed^d
ICLARM – The World Fish Centre
Jalan Batu Maung, Batu Maung, 11960 Bayan Lepas, Penang, Malaysia
^cK.VISWANATHAN@CGIAR.ORG and ^dM.AHMED@CGIAR.ORG

ABSTRACT

Current fisheries management approaches based on centralised government intervention have proven inadequate to deal with the present management and cannot meet its objectives including reverting stock depletion, resolving user-group conflicts, increase profitability and prevent social disruption.

There is no easy solution to this problem. New institutions enabling fishing communities to deal with present pressures are needed. Fisheries management is however still largely government-driven although experiences worldwide show that various forms of partnership between government, industry and fishers strengthen management and produce results. Such partnerships have become known as co-management.

During the last decade the co-management concept has gained increasing acceptance among governments, development agencies and researchers as an important aspect of future fisheries management systems. It has however at the same time become increasingly evident that the co-management concept is not clearly defined and means very different things to different people. A growing number of attempts to introduce variants of co-management systems have been studied and documented and there is now a considerable body of documented experience available. This will enable a more comprehensive understanding of co-management and to summarize the experiences with both the positive outcomes and the problems in actual implementation, which have been made in recent years.

This paper addresses these issues and provides evidence from a recent worldwide study on fisheries co-management that have researched case studies of various implementations of co-management arrangements in coastal and freshwater fisheries in Asia and Southern Africa.

Keywords : fisheries management, co-management, governance, conflict resolution, Asia and Southern Africa

1. INTRODUCTION

Fisheries in developing countries are under strong and increasing pressure. Increasing populations in coastal and freshwater environments impose pressures leading to overexploitation of resources and conflicts concerning access to resources, space and markets. Competing uses of resources and space in coastal zones and freshwater environments such as infrastructure development, tourism, hydropower development and aquaculture may lead to further loss of access to and control over fisheries resources by fishing communities. Changes of the environment due to pollution, coastal erosion and deforestation may lead to further losses of production and value of fisheries resources. Globalisation, which is the integration of local markets into global markets and the subsumption of political and social processes under international economic forces, often leads to exclusion rather than new opportunities for fishing communities.

Current fisheries management approaches based on centralised government intervention have proven inadequate to deal with these issues and meet almost any reasonable set of objectives including reverting stock depletion, resolving user-group conflicts, increasing profitability and preventing social disruption.

Existing institutions within fishing communities are not able to cope with these rapidly developing pressures either. The communities are in effect disempowered relative to emerging, stronger and in many cases distant stakeholders.

There is thus no easy solution to this problem given the strength of these forces. New institutions enabling fishing communities to deal with present pressures are needed. Fisheries and aquatic resources management is however still largely government-driven although experiences worldwide show that various forms of partnership between government, industry and fishers strengthen management and produce results. Such partnerships have become known as co-management.

During the last decade the co-management concept has gained increasing acceptance among governments, development agencies and researchers as an appropriate arrangement of future fisheries management systems. It has however at the same time become increasingly evident that the co-management concept is not clearly defined and means very different things to different people. A growing number of attempts to introduce variants of co-management systems have been studied and documented and there is now a considerable body of documented experience available. It is therefore timely to move on to a more comprehensive understanding of co-management and to summarize the experiences with both the positive outcomes and the problems in actual implementation, which have been made in recent years.

This paper addresses these issues and provides evidence from a recent study on fisheries co-management that have researched case studies of various implementations of co-management arrangements in coastal and freshwater fisheries in Asia and Southern Africa (Normann *et al* eds 1998, Viswanathan *et al* eds in press). When reference in this paper is made to specific cases, the case will be described in these two proceedings volumes unless a specific reference is stated.

2. THE CHALLENGE FOR GOVERNANCE

The exploitation of fisheries resources and the markets for fisheries products are increasingly operating in the international domain. This represents opportunities for fishers and fishing communities, but utilisation of these opportunities requires substantial financial and organisational resources and securing of future access to fisheries resources. These requirements are rarely met in fishing communities in developing countries and the opportunities in globalisation are therefore likely to turn into exclusion - that fishing communities lose control over and access to the fisheries resources in their local environment as other users take over. Such users may be more resourceful fishing industries as is seen in many developing countries when distant water fleets compete with coastal fisheries. An example is the foreign fleets harvesting shrimp along the Mozambican coast in direct competition with local fleets.

Another aspect of globalisation is the development of international agreements and conventions on standards for environmental and fisheries management, which generally focus on the aquatic ecosystems rather than on local communities. Market driven arrangements such as green labelling or certifications of fisheries products also tend to focus on ecosystems rather than people. The objectives of such arrangements may be in the long term interest of fishing communities, but may not address or may even be considered counterproductive in relation to their immediate concerns such as meeting daily requirements for food and income.

Fisheries are under pressure from other uses of the coastal and freshwater environment such as infrastructure and industrial development, irrigation and flooding control, hydropower development, aquaculture and environmental changes. Such uses are often exclusive to fisheries by competing for space or by changing the environment in ways that lead to reduced productivity of fisheries resources. Examples of such developments are the coastal aquaculture development in Thailand, which has resulted in loss of mangrove habitats of importance for the reproduction of fish stocks, the development of agriculture and flooding control in the Mekong River Basin, which reduces the floodplain areas on which the fisheries rely (Sverdrup-Jensen 2002), and development of tourism on Lake Kariba in Zimbabwe which has led to large areas being closed to fisheries by local communities (Jul-Larsen *et al* 2002). This form of exclusion has led to reduced access to resources and increased tension within communities.

The developments in the coastal environments attract populations from inland areas leading to further pressure on coastal space and resources. Fisheries harvest living natural resources and are thus based on a limited natural production in the aquatic ecosystem. Increased exploitation leads to overexploitation, reduced production per fisher and eventually to conflicts between fishers concerning access to resources and markets and gear conflicts. Globalisation and competing uses of the aquatic environment leave fisheries communities in a precarious situation where they are in danger of losing access to and control over their resource base while the same resource base may be dwindling due to environmental changes and overexploitation. There is a need for an innovative way of managing fisheries that addresses these problems.

The basic challenge to governance in fisheries management is to establish and maintain institutions - norms and rules guiding decisions including a formal framework for decision-making - which enable the communities to address this complex and fragile situation.

Institutions regulating access to fisheries have in many - if not most - cases been in place long before modern concepts of fisheries management were developed (Jul-Larsen *et al* 2002). The problems the fishing communities are facing are therefore not necessarily a result of an absence of management institutions, but rather the result of the inadequacy of these institutions to deal with recent developments. Revitalisation of such existing institutions will therefore not lead to solutions to the problems. They may have lost their significance exactly because they were set up to solve other problems and are thus inadequate to deal with the present situation.

Fisheries management as it has developed within the modern rationality of industrialised societies ('modern fisheries management') does not represent a solution either. This centralised top-down fisheries management, focussing on objectives relating to the fish resources and based exclusively on formal biological science is increasingly questioned in the societies in which it was developed. Attempts to introduce such management in other environments have generally been without much success. Such management systems are inherently unable to address the present problems of fishing communities due to the ways objectives are defined, limitations in the knowledge on which they are based and the top-down nature of implementation. The overriding and immediate objectives of modern fisheries management are related to the sustainability of the resource. This objective is of relevance to the fishing communities, but their immediate priorities for management are generally not directly related to the resource but to other pressures on their social and resource system - which may also include the causes for excessive exploitation of the resource. The combination of a top-down approach and a narrow focus on resource issues leads to management being based on formal biological science produced in specialised research institutions and disregarding or even being in direct contrast to the experiences of fishers (Degnbol 2002). The result is that modern fisheries management fails to address the core concerns of fishing communities, is insensitive to local conditions, lacks backing from fishing communities and is even inefficient in achieving its own objectives.

A new governance approach needs to be developed. This approach cannot be a revitalisation of existing or former management regimes in the community, which have proven inadequate to deal with the situation, nor can it be a replication of modern centralised fisheries management.

The new governance approach must be able to address the problems facing the fishing communities in the present situation including

- The risk of exclusion from resources and markets due to globalisation, competing uses of the freshwater and coastal environment and other activities which may lead to reduced resource productivity
- Provision of an institutional framework to control access and resolve questions of distribution of access between fishers
- Reverting overexploitation to sustainable exploitation of the living aquatic resources on which the fishing communities rely
- Reconciling the immediate needs of fishing communities with international agreements focussing on the aquatic ecosystem

3. INNOVATION OF GOVERNANCE INSTITUTIONS

Governance of fisheries involves: 1) setting management *objectives*, 2) defining and providing the *knowledge base* for management and 3) ensuring *implementation* of management decisions.

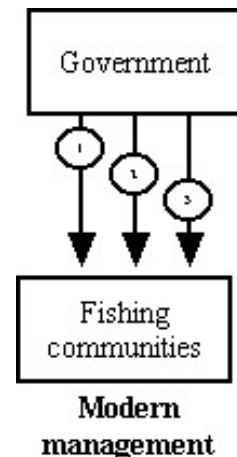
In most countries around the world the fish resources are state property and thus, governments need to play an

important role in governing these resources. Governments have institutionalised the fisheries management process and a global mainstream approach has evolved, which can be characterised as the ‘modern fisheries management’ approach because it reflects modern rationality being implemented in fisheries management. In the modern management approach decisions are taken at the central level (top-down), management objectives have primarily focussed on conservation aspects and the knowledge base has primarily been defined as resource biology. Implementation has been through policing. The involvement of fishing communities has been rather limited in all respects and the management system is top-down in relation to both setting management objectives, defining the knowledge base and implementation as illustrated by the arrows in the figure.

The modern fisheries management approach has not prevented over-exploitation of fish resources as is evident from the international experience that many important stocks that have been subject to this regime for decades have been severely overexploited and even collapsed.

One of the main reasons for the lack of success for the modern fisheries management approach is that the top-down approach has left the fishing communities completely out of the process and build-up barriers between the fisheries administrations and the fishing communities. This has undermined the legitimacy and efficacy of the management system (Hara and Raakjær Nielsen, 2002).

These past experiences and the present challenges for fisheries management have led to a general acceptance that institutional reforms in the governance structures for fisheries management are required.



Co-management has been widely recognised as a promising option for reform of fisheries governance institutions. An early case of a co-management was presented by Jentoft (1989) and Pinkerton (1989). The co-management concept as a basis for natural resource management was introduced by Kearney (1984). Frameworks for understanding common property resources including co-management arrangements were developed by Oakerson 1992 and OECD (1996). The early conceptual development and frameworks for analysis were open for a wide interpretation. An attempt to use a more specific terminology by classification of co-management arrangements along one dimension was introduced by Sen and Raakjær Nielsen (1996). The concept of co-management has however been used to cover a large range of institutional arrangements which have very little in common and has been adapted very differently in various situations. The acceptance of co-management as an important correction to modern fisheries management has thus been associated with the concept being adopted so vaguely that it has lost substance in the process. The present brief will attempt to restore substance by distinguishing co-management systems according to the scope of the cooperative features of the governance system.

Co-management can broadly be defined as an arrangement where management responsibility is shared between the government and fishing communities. It can be viewed as a set of institutional and organizational arrangements (rights and rules), which define the cooperation among the fisheries administration and relevant fishing communities Raakjær Nielsen and Vedsmand (1999).

The emergence of co-management has been based on considerations of both democracy (involvement of citizens in decisions concerning their own livelihood) and efficacy (to reduce implementation costs and improve compliance). Co-management is considered to represent a more democratic governance system because it implies increased involvement of users and delegation of decisions to be taken as close to the users as possible. Co-management has been expected to improve the efficacy of fisheries management because acceptance of management measures is assumed to be higher when users have been involved in the decision making process and the contents of management measures is assumed to be more adequate and better reflect the actual situation if users knowledge is included in their development.

Different co-management arrangements may be distinguished by their relative emphasis on democracy and efficacy aspects.

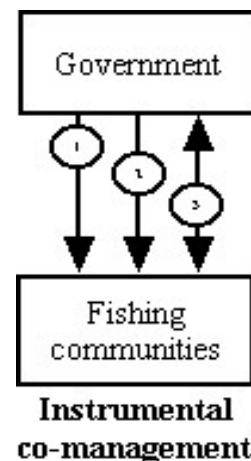
3.1 Instrumental co-management

Co-management can be an innovative change to the modern fisheries management approach as it implies a power sharing arrangement between government and fishing communities to undertake fisheries management. However, the practical adaptation by governments of the co-management approach has most often been limited to involving fishing communities in the implementation process - an ‘instrumental co-management’ approach.

Governments have generally not perceived co-management as a means to introduce more democratic principles into fisheries management, but have recognized co-management as an instrument to reach its management objectives more efficiently by involving fishing communities in the implementation process. Governments have not been prepared to expand user-participation to setting management objectives (this has only been observed in a few cases of limited consultation) and determine what knowledge to include in the management process (there are no documented cases where fishermen's knowledge have been used as basis for management decisions on equal terms with research based biological knowledge).

Examples of instrumental co-management approaches from Southern Africa and SE Asia are the Administrative Management Design for Game Management Areas (ADMAGE) in Zambia, the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) in Zimbabwe, the development of marine parks in Malaysia and the co-management arrangement in San Miguel Bay, the Philippines (see case studies in Normann *et al* eds 1998 and Viswanathan *et al* eds. In press). The practical adaptation of the co-management concept in the two regions, but also elsewhere in the world, has almost entirely been focussing on the implementation process, thus taking an instrumental approach.

On the ground experiences from the two regions strongly indicate that the present problems of making the co-management arrangements successful can be related to the instrumental approach to co-management taken. One of the best-documented examples is perhaps the co-management arrangement introduced at Lake Malombe, Malawi (Donda, 2001 and Hara, 2001). When the project was initiated the expectations in the local fishing communities were that empowerment was going hand in hand with the introduction of co-management, but it turned out differently. The Beach Villages Committees which were established to represent communities in this co-management process felt that they entirely became an implementation body for the Fisheries Department. In addition the Beach Village Committees felt, that the support from the Fisheries Department was insufficient in the implementation process.



The lack of support from governments to local co-management initiatives is a general observation from the case studies. One reason for this might be the lack of adaptation in the organisational structures of government departments to cope with new management concepts. The extent of the change in scope required to move from top-down management to co-management even in the most rudimentary instrumental form has generally not been realised by governments. The situation is further complicated by the fact that most fisheries departments have been staffed nearly exclusively with biologists and have mainly been driven by resource conservation concerns.

In reality the instrumental co-management approach does not differ significantly from the modern management approach and the efficacy has in most cases not been much better. The current trend might actually lead to a situation, where it will do worse, because the frustration among fishing communities will increase due to the lack of empowerment and this will consequently undermine the legitimacy of the management system. When co-management was initiated it created huge expectations for a genuine participation and empowerment, but the practical adaptation of the co-management turned out to be business as usual and not an institutional reform. This has led to frustrations and lack of achievement of objectives.

3.2 Empowering fisheries co-management: an institutional innovation

The limited success of instrumental co-management may be due to its lack of involvement of users where it really matters - in defining management objectives and in identifying the knowledge to be considered a valid basis for management decisions. It is a radical institutional change, to involve fishing communities in setting management objectives on equal terms with government. It should be anticipated, as a consequence hereof, that management objectives will be modified and in some situations in contrast to the previous biological/resource oriented focus. Socio-economic considerations are likely to play a more prominent role within an empowering co-management arrangement.

Empowerment of fishing communities is a mechanism to give the people within the fishing communities a chance to influence their own future in order to cope with the impact from globalisation; competing use of freshwater and coastal environments; and other fisheries related issues. An empowering co-management approach will apparently - to a higher degree than previous or present management approaches - fulfil the overall management objectives, although these objectives are likely to differ from management objectives set by

governments in the past.

The empowering co-management approach is a demanding concept, as it requires:

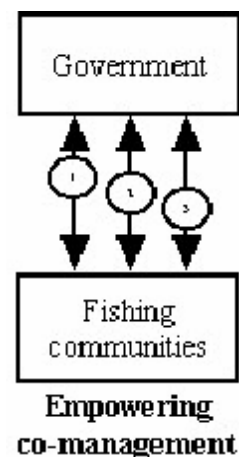
- A rethink of the logic for management and subsequently a change in the knowledge base for management
- A major restructuring of the institutional and organisational arrangements supporting management
- A substantial change in attitudes from both governments and fishing communities towards their role in such arrangements
- Aspiration from fishing communities and government to proceed a long this avenue
- Capacity-building at several levels both within government and fishing communities

The empowering co-management concept is a learning process for all involved parties. It takes an adaptive approach to management. In order to deal with the very complex issues the process will be a “muddling through”. The participants might from time to time perceive it as chaotic. Finally, it is important to emphasize that it will be a troublesome exercise, without any guarantee for success, but it promises to improve the efficacy of fisheries management in small scale fisheries in developing countries or for that matter in fisheries management in general.

An empowering co-management arrangement will to some extent challenge the objectives set by main stream international conventions within fisheries management e.g. the Code of Conduct for Responsible Fishing and the precautionary approach for fisheries management, which is an attempt to ensure that all uncertainties in respect to stock estimation and fisheries management implementation is included to protect the fish stocks. This may be on the short-term expense of fishing communities, as their ability to generate income and food is correspondingly diminished. The approach taken in the international conventions is quite similar to the modern fisheries management approach. In this sense, the international decision-making arenas may have underestimated the limitations of this approach. A balance between conservation and socio-economic concerns need to be found. In this process empowering co-management can actually facilitate the process by exposing government to the impacts for fishing communities of the international conventions and assist national governments in making arguments to balance the various objectives in international decision-making fora.

4. ISSUES AND PROBLEMS IN IMPLEMENTATION

It is at the implementation stage that co-management requires careful planning, effort and co-operation of many parties for it to succeed. Co-management in essence is an institutional response that has emerged largely through a bargaining process in which groups with varying power seek to control how institutions allocate rights over resources and provide for their representation for determining those rights. Co-management will not take place in an institutional vacuum and existing institutions or power bases will influence the formation of new ones. Co-management will thus not go without being contested by the many interested parties involved in securing benefits from the resource in question.



4.1 Empowering communities to help define management objectives

An important question is how co-management authority can be vested in or assigned to local communities. The experience in Southeast Asia and South Asia show that co-management is largely seen in terms of functional communities where rights and responsibilities will have to be assigned to representatives of fishing industry organisations or otherwise-defined groups of harvesters. These groups are usually defined in functional terms such as harvesters using particular gears such as trawls, purse seines or harvesting certain species such as shrimps or bivalves or pelagics or demersals or by area of operation or fishing grounds such as inshore and offshore fisheries. Co-management requires a clear commitment on the part of government to the sharing of power and authority with local government and groups of people such as local fisher and community organisations.

As a first step, governments must establish conditions for co-management systems to originate and prosper. Governments should allow fishers to hold meetings to discuss problems and solutions and to develop organisations and institutional arrangements for management. A second step for governments to nurture co-

management is to give fishers access to government and government officials to express their concerns and ideas. Fishers should then be given the right to develop their own organisations and to form networks and coalitions for co-operation and co-ordination. Fishers should be encouraged to develop organisations on their own initiative that meet their needs. Thus, the role of government in establishing conditions for co-management is the creation of legitimacy and accountability for the local organisation and institutional arrangements. It is crucial to note that the government has a pivotal role in co-management especially in providing the legal basis for the functioning of community organisations and community enforcement of user rights and resource extraction rights, as it is the case in Bangladesh. Governments are required to defend user rights and security of tenure delineated by community groups. The often-quoted cases of long standing marine fishery co-management arrangements that work, in Norway and in Japan have a legal basis (Jentoft and Kristoffersen, 1987 and Ruddle 1989). This suggests that beyond the simple call for more community involvement and fisher participation, governments must establish commensurate legal rights and authorities and devolve some of their powers.

The process of establishing co-management requires changes in the government organisation involved as a partner. It is necessary to accept that the empowerment process of co-management bodies is associated with a symmetric disempowerment of government agencies, which formerly had full control. There may be a need to supplement department staffing with other types of professional skills than required in former management organisations. There may be a need to develop capacity to deal with co-management processes in several communities simultaneously. Such changes may require reorientation in mindsets both in government organisations and in the communities towards openness for this type of cooperation.

4.2 Integrating the scientific knowledge base for co-management decision making

One of the noteworthy problems in fisheries management has been a gap in the understanding of condition of the resource as seen by fishing communities, scientists and government managers. Centralised government based management systems have relied heavily on research based on biological and ecological science as developed in research institutes and universities. The knowledge of fishers and the recognition of the special values, culture, practices of fishers have not been given systematic attention. The integration of fishers' knowledge and practices into contemporary management systems is one of the main benefits of the co-management approach. This is particularly important in ecosystems where both great uncertainty and irreversible natural processes require qualitative judgements. The incorporation of local level and indigenous knowledge into fisheries management is likely to minimise adverse social and environmental impacts of management and lead to more socially and environmentally sustainable systems.

Many different types of collaborative processes for examining the condition of fisheries resources have been effectively used. Fisheries scientists have a great deal of experience in research collaboration in which fishermen assist scientists in research that the scientists direct. While such programs are well established mainly in developed countries, many examples of successful collaboration exist in both Africa and Asia. Programs, in which fishers gather data about fish abundance have been tested against parallel, scientifically designed sampling programs in the Philippines, Laos and Zambia and found to produce usable reliable data. Many effective methodologies have been developed in four decades of research on understanding folk biology and on gathering local ecological knowledge; at first mainly in terrestrial farming systems, but since the 1970s in aquatic environments as well. Truly collaborative approaches, in which fishers and scientists work together on all aspects of research from hypothesis formulation through the interpretation of results, have begun to appear in developed countries. These programs have almost all been the result of both grassroots action by citizens of fairly well educated communities, particularly in Canada, Alaska and Northern Europe, which had suffered devastating stock collapses (Wilson 1999). Many have also been part of a broader fisheries co-management program that has linked their results directly to management decisions. There is an increasing willingness on the part of fisheries management agencies in developing countries to make use of the local ecological knowledge found in their fishing communities, and to take what they see as appropriate to their situation from these models of even richer scientific collaboration. However, it is a difficult task and a serious challenge to integrate local ecological knowledge and research based scientific knowledge into a common basis for management decisions.

4.3 Co-management and conflicts over fisheries resources

The first lesson learned by any fisheries manager is that all conservation decisions are also allocation decisions, i.e., it is almost impossible to find a measure for conserving fish stocks that does not benefit some resource users more than others. It has actually been found that co-management arrangements may largely be driven by desires

to establish mechanisms for allocation of resource access. Very often management measures are selected for their political feasibility, e.g. technical measures that affect many fishers the same way are much easier to implement than quotas and area closures that affect some fishers much more than others. This reality has, of course, played an important role in the development of fisheries co-management programs. Advocates of co-management have often pointed to co-managements important role in conflict resolution, both directly through facilitating negotiations and by identifying the most appropriate measures. Studies of existing co-management efforts have turned up another critical dynamic: conflict can be an important motivation for fishing communities to become involved in co-management. Co-management efforts often increase the influence of government authority in the fishing community. Communities can use this increased authority, for example, to exclude outsiders that they do not want in their fishing area.

Many fisheries conflicts are between users of different types of gear. One particularly serious form such conflicts take is between large scale, mechanized, industrial fishers and small scale, artisanal fishers usually fishing further inshore. Artisanal fishers looking for protection against industrial fishers is a primary motivation for co-management in Mozambique and the Philippines as well. Other gear conflicts that have motivated co-management participation include competition between different artisanal gears, conflicts between gill nets and seines are common in Africa, and between different understandings of property rights. We have found the desire to use government authority to exclude outsiders from fishing grounds playing an important role in co-management programs in Laos, Malawi, Thailand and Zambia (see cases in Normann *et al* eds 1998, Viswanathan *et al* eds in press). A co-management program in Laos has found an innovative way to channel the motivation to exclude gears used by outsiders into both conflict resolution and effective resource management: it operates on the principle that any community can ban any gear within their zone as long as everyone, insiders and outsiders, are equally affected. Another issue that is arising in several African cases is that local co-management committees are asking for greater policing powers, almost to the point where they would become more an arm of the government rather than its partner.

Some partners in a co-management arrangement may see the arrangement as a mechanism to exclude other groups from access to the resource. An example of this was seen in Lake Chiuta in Malawi. Weaker groups including migrant fishers, who have been regular resource users and may have legitimate historical rights to access, may find themselves.

Both conflict and cooperation arise where multiple sources of authority are involved in fisheries co-management. Traditional claims to fishing rights play a strong role in co-management programs and, in both Southern Africa and Asia this has led to the increasing involvement of pre-colonial authorities in co-management programs. Research in both Indonesia and Malawi has found that the involvement of traditional authorities in co-management can lead to quicker conflict resolution. Other experience in Malawi, and in Zambia, suggests that involving traditional authorities in co-management can be a delicate matter. The relationship between these authorities and the government can be an uneven one, traditional authorities do not always operate in ways that fit well with the transparency and participatory decision making that co-management is based on, and, most important, traditional authorities often have their own unique interests in the fish resource. In several of the co-management examples from Southern Africa powerful local authorities have used the programmes to serve themselves rather than the fishers. The involvement of NGOs in co-management can also be delicate. NGOs play a critical role world wide in helping to initiate and build co-management programmes. Failures in coordination between NGOs and local governments, however, have led to redundancies and even conflicts. Villages have found themselves with several different local resource management committees, one village in Malawi was found to have five at one time. It is always necessary to verify that new institutions are justified before they are established in terms of their expected roles not already been fulfilled through existing mechanisms.

4.4 Managing scale issues

An important issue with co-management is the issue of scale. The problem of scale refers to the transferability of both empirical generalisations and casual inferences from one level to another in the dimensions of space and time. At issue is whether and to what extent the causal mechanisms through which institutions affect behaviour at one level or social organisation, such as small-scale or micro level societies, also play key roles at other levels of social organisation, including national (meso-level) societies and international (macro-level) society and vice versa.

One example of scale issues in fisheries is the division of authority between community fisheries regimes versus national fisheries regimes and international regimes for highly migratory species of fish. Most studies of co-

management arrangements have concerned management at the local scale, involving one or a few communities. However, lessons learned from such situations may not or will almost certainly not be directly applicable to larger scale situations. The questions are therefore: Can co-management handle large-scale fisheries systems? If it can, what institutional arrangements are required to handle large-scale fisheries? Can the standard design principles for long enduring common pool resource institutions (clearly defined boundaries; congruence between appropriation and provision rules and local conditions; collective-choice arrangements; monitoring; graduated sanctions; conflict-resolution mechanisms and; minimal recognition of rights to organise) be scaled up to apply to higher levels of social organisation?

Evidence from some efforts in the Philippines indicates that bay wide or large-scale resource systems can be handled by co-managed institutions. However these are still at the early stage of experimentation and new institutional developments are taking place such as bay wide joint councils, which aim to provide representation for the different communities of the larger group of fishers in the bay area.

In Bangladesh, the case of Beel fisheries is a good example of co-management success on a large scale where thousands of beels or enclosed water bodies are being managed jointly by NGO's representing fishing households. New institutional arrangements between Government and NGO's have emerged. Resources users set management objectives and participate in management with support from the Department of Fisheries

5. PERSPECTIVES AND CHALLENGES AHEAD

Studies of various co-management implementations have revealed potentials and benefits of co-management, but also many unresolved issues and problems to be addressed. There is still a long way to go before a general understanding of various co-management systems and examples of solutions to all the major problems are available.

A range of issues and problems need to be addressed:

Developing co-management institutions on a larger scale than the local community: Many of the problems and issues facing fisheries can only be solved on a provincial, national or even international level. The resource systems on which fisheries rely are in most cases too large to be entirely within control of a few communities and fisheries management institutions must therefore be able to address problems of resource access and sharing on that level. The solution to this scale problem may be representation within nested systems, but this raises a new set of problems relating to mechanisms to ensure genuine representativity and to avoid that a new process of alienation between communities and management is initiated.

Reconciling local and global agendas: International agreements on fisheries and environmental management are a special case of incongruence between scales. Means must be developed by which the governments can serve the double obligation of attending to international agreements while sharing power in setting objectives for fisheries management with the communities.

Identifying a knowledge base for management, which is considered valid by stakeholders: The knowledge base for fisheries management should relate to the objectives of management and be considered valid by the stakeholders. A co-management system must develop mechanisms to reconcile formal scientific knowledge and fishers' knowledge about their resource system in a way that maintains scientific validity and wide acceptance. There are no easy solutions to this problem. One approach may be to identify indicators of the status of the resource system that are both supported by science and reflects fishers' observations.

Developing approaches to manage conflicts between resource users who have acquired exclusion rights to a resource through the co-management process and those who are excluded: There is a need to understand the mechanisms and actual reasons behind the alienation process of the different user groups to manage these conflicts.

Developing appropriate approaches for empowering local communities to participate in the setting of management objectives through institutional reform: This may require substantial change in the way management authorities function to provide fisheries management services and changes in perceptions of stakeholders on the roles of fisheries management agencies.

These issues must be addressed in practice - in practical experiments with co-management. It is however

important that such experiments are documented and the experiences communicated to others who may be in the process of establishing or developing co-management arrangements. It is therefore necessary that attempts to implement co-management are associated with independent research to document and disseminate the experiences.

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