

# Transaction Costs and Fisheries Co-Management

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**Abstract** *Fisheries co-management as an alternative to centralized command and control fisheries management is often suggested as a solution to the problems of fisheries resource use conflicts and overexploitation. This paper highlights some elements of the transaction costs under a fisheries co-management system. The transaction costs can be categorized into three major cost items: (i) information costs, (ii) collective fisheries decision-making costs, and (iii) collective operational costs. An approach to measuring transaction costs of fisheries co-management systems both in static and dynamic processes is also proposed. There is a need to empirically evaluate the nature of the transaction costs involved in fisheries co-management institutions as a basis for evaluating the efficiency or net benefits of co-managed fisheries compared to centrally managed fisheries.*

**Key words** Collective fisheries decision-making costs, collective operational costs, fisheries co-management, information costs, institutions, transaction costs.

## Introduction

The search for sustainable, efficient, and equitable ways for managing fisheries has been a long and difficult one. The conventional approach for managing fisheries is to acquire property rights over the fishery through legislation by the state. The state then parcels out rights and establishes rules (regulations) of use for the fishers. The state regulates the resource. The outcome of such an approach has been to greatly reduce the capacity of local fishing communities, to manage coastal resources, and to provide a minimal role for the fishers to participate in the management of the resource. This has often resulted in antagonism between government and fishers. It has made it difficult for government fisheries agencies to communicate to fishers the need for and benefit of management of fishery resources, and for fishers to communicate their needs to government and to fully participate in management.

The increased difficulties faced by central authorities in preventing resource depletion, despite the regulations in place, has caused resource managers as well as scholars, to look more closely at both the need for fisher participation and the role of institutional arrangements (rights and rules) in fisheries management (Jentoft and

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McCay 1995; Dubbink and Van Vliet 1996; McCay and Jentoft 1996). The current interest in co-management of fisheries as an alternative to the heavily centralized management of fisheries is an example of a worldwide change in the way fisheries management is being approached, at least in the current decade. Co-management is expected to effectively address some of the problems of fishery overexploitation, dissipation and redistribution of resource rents, limited fisher participation, and conflicts among the different groups of resource users. One of the functions of co-management systems is the shifting of some control, administration, and enforcement from the central authorities to the users (fishers) and user community. This reduction in authority and responsibility by the central agencies through co-management is alleged to lead to improved resource use outcomes as measured by economic efficiency, equity, and ecosystem (natural and human) sustainability.

One of the purported advantages of co-management compared to centralized management is that it will reduce transaction costs—the cost of gaining information about the resource and what users are doing with it, reaching agreements and coordinating with others in the group with respect to use of the resource, and enforcing agreements that have been reached. Hanna (1995) points out that a centralized approach is often associated with low program design costs, but high implementation, monitoring, and enforcement costs as the management regime may have little legitimacy with user groups. A co-management approach, on the other hand, is associated with high program design costs, as effective participation is time consuming and therefore costly. However, co-management is likely to lead to lower implementation, monitoring, and enforcement costs as legitimacy of the regime is greater.

A fisheries co-management system seeks to perform a variety of management functions (Pinkerton 1989) to achieve its objectives. To perform these functions, the management institutions at both the government and community levels will incur costs. An important factor that has not been explored in the fisheries co-management literature is the integral involvement of transaction costs in institutional and organizational arrangements. In essence, institutional arrangements, which are a set of rights and rules of behavior for the use of resources (Ostrom 1990), arise out of the need to internalize externalities. In fisheries, the externalities arise out of the common property and the depletable nature of the resource. Societies choose the best structure available for accommodating the externality given their historical development. Both market and nonmarket institutions develop to handle the externalities, but all forms of institutions incur transaction costs to some degree. In theory, markets for accommodating externality problems will naturally arise if transaction costs are sufficiently low (Demsetz 1964, 1967).

This paper will highlight some of the transaction costs that may either increase or decrease the total costs of managing fisheries under a co-management system. An implied assumption here is that the transaction costs of co-management institutions are equal to, or lower than, centralized government-based fisheries management systems. This is a critical policy question as governments evaluate the resources provided for fisheries management and the benefits obtained. The problem, however, is that it is rarely possible to know, *a priori*, whether the transaction costs of centralized government managed fisheries institutions are higher or lower than co-managed institutions.

Understanding the components of transaction costs in a fisheries co-management regime is, therefore, imperative for at least two reasons. First, there is a paucity of literature on the transaction costs in a fisheries co-management system; and second, there is a need to assess outcomes and costs of achieving the outcomes from the new system. In fisheries co-management, there is a shift of costs from society to collective groups and individuals, and also a shift in the magnitude of transaction costs of operating a different management system. By identifying the major components of transaction costs in this management system, fisheries managers can have a

clearer idea of the total costs involved in implementing the management option. In doing so, the net benefits of the management option can then be accurately evaluated and compared with the existing management system.

The objective of this paper is to explore the elements of transaction costs in co-managed fisheries and build an agenda for empirical research in this important area. We will begin with a discussion of a few fundamental definitions of co-management and property rights. This is followed by a brief discussion of the theory and definition of transaction costs. The next section is a discussion of the three major transaction costs in fisheries co-management. An approach to measuring transaction costs is given in the fourth section. Policy implications and conclusions are presented in the final section of the paper.

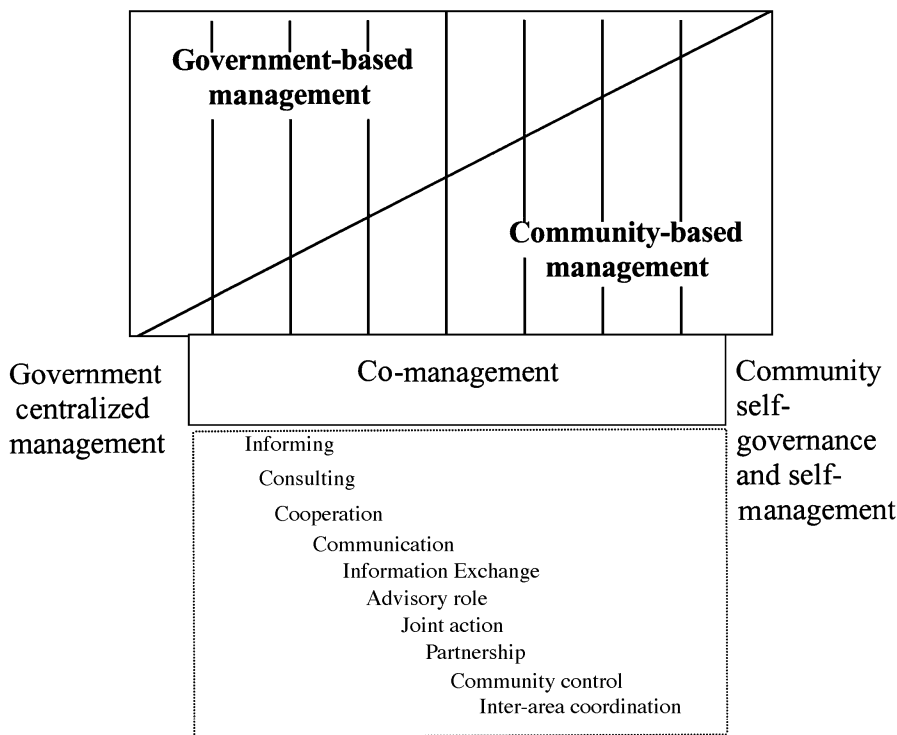
## **Fisheries Co-Management and Common Property**

Fisheries co-management is defined as the sharing of responsibility and authority between the government and the community of local fishers to manage a fishery (Pomeroy and Williams 1994; Sen and Nielsen 1996). Co-management covers various partnership arrangements and degrees of power-sharing and integration of local and centralized management systems. There is a hierarchy of co-management arrangements from those in which the fishers are merely consulted by the government before regulations are introduced, to those in which fishers design, implement, and enforce laws and regulations with advice and assistance from the government (figure 1). The amount of responsibility and authority that the state and various local levels have will differ and depend upon country-specific and site-specific conditions, and will ultimately be a political decision.

The analysis of co-management falls in the area of common property theory (Jentoft 1989; Pinkerton 1989; McCay 1993; Baland and Platteau 1996). Co-management arrangements can be analyzed in terms of who holds what kind of property-rights over a resource or who controls the fishery. Common property resources share two important characteristics. The first is excludability, or the control of access. The physical nature of the resource is such that controlling access by potential users is a problem and may be costly. The second characteristic is subtractability; that is, the fish harvesting activities of one fisher subtracts from or lowers the catch per unit fishing effort of other fishers. These two problems often create a divergence between individual and collective economic rationality which, unless mitigated, leads to a "tragedy of the commons," a situation that typically occurs in the absence of property rights to the resource (Feeny *et al.* 1990; Hanna, Folke, and Maler 1996).

Common property regimes can be effective at controlling access to the resource. Most common property regimes are based upon some form of access control and some form of institutional design to regulate use and to minimize the subtractability problem. The literature on common property regimes recognizes that solutions exist through three basic kinds of property rights regimes: (i) state property or state governance indicates that rights to the resource are controlled exclusively by government agencies on behalf of all the citizens, (ii) communal property or common property means that the resource is held by an identifiable community of users who can exclude others and regulate their own use, and (iii) private property refers to a situation in which an individual or a corporate body has the right to exclude others and regulate the use of the resources (Ostrom 1990; Bromley 1992; Hanna, Folke, and Maler 1996; McCay and Acheson 1987; McCay 1993; Bromley 1991).

Common property regimes as collective resource management systems have been shown to develop when a group of individuals are highly dependent on a resource(s) and when the availability of the resource(s) is uncertain or limited



**Figure 1.** A Hierarchy of Co-Management Arrangements (after Berkes 1994)

(Runge 1992). If the resource problem is repeatedly experienced, such as low or no catch, and if it exists within a single community of users, the fishers are likely to develop a collective institutional arrangement (rights and rules) to deal with the problem. In the face of uncertainty in resource availability, group members are willing to trade-off some benefit from individual use of the resource, for the collective assurance that the resource will be used in a more equitable and sustainable manner (Gibbs and Bromley 1989). Institutions, through rules, provide incentives for the group members to take certain actions to achieve the desired outcome. The development of institutional arrangements requires an investment of time by the members of the community. Coordination and information activities are initial aspects of building institutions (Ostrom 1992). The transaction process of developing institutions will have costs. For common property regimes, these costs are part of the collective decision-making process.

As Jentoft (1989) put it, "how then is co-management to be distinguished from other common property management systems, such as government regulation or community-initiated regulation?" The answer is that co-management is a middle course between pure state property and pure communal property regimes. The three property rights regimes mentioned above (plus the open access regime or the absence of property rights) are ideal, analytical types—they do not exist in the real world. Rather, resources tend to be held in overlapping combinations of these four regimes. Strictly speaking, pure communal property systems and community-based coastal resource management (CBCRM) are always embedded in state property systems and derive their strength from them. Co-management may involve the recognition and legitimization of traditional or customary local-level management systems.

A certain degree of community-based resource management may be a part of co-management.

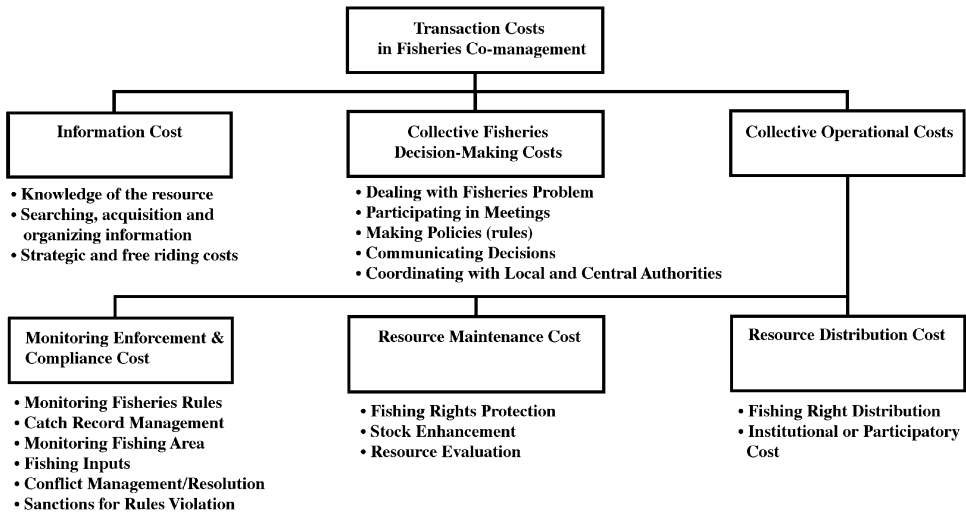
Fishers' ability to organize for collective action has a number of prerequisites, essentially involving the question of local institutional arrangements. Not all groups of fishers have appropriate local institutional arrangements. In such cases, any co-management initiative will start with institution-building. The establishment and successful operation of fisheries co-management can be a complex, long-term, and costly process. The costs for individuals to participate in co-management (time and money) may outweigh the expected benefits. Community organizing, for example, can take from three to five years before a self-sufficient organization is in place, on the basis of cases in the Philippines (Carlos and Pomeroy 1996), and five to ten years on the basis of a case in St. Lucia, West Indies (Smith and Berkes 1993).

The delegation of significant responsibility and authority to manage the fisheries may be one of the most difficult tasks in establishing co-management systems. While governments may be willing to call for more user participation, they must also establish commensurate rights and authorities and devolve some of their own powers. Government resource managers are often reluctant to share their authority or parts of it. Many managers fear a loss of political power or infringement on their professional and scientific turf. Fishers will need to take some of the responsibility of convincing managers of their ability to undertake local-level resource management. In all cases of co-management, the ultimate authority is held by the government.

### Transaction Costs in Fisheries Co-Management

Transaction cost economics was first discussed in the economic literature by Ronald Coase (1937) in his seminal paper "The Nature of the Firm." Coase proposed that the decision whether to have a transaction within a firm or in the market place will be determined by transaction costs (Coase 1937). He suggested that the form of control chosen (firm or market) would tend to be the one with the lowest transaction costs. This early analysis eventually spawned a great deal of theoretical work known as transaction cost economics. This theory suggests, if given a choice, individuals will choose the set of institutions, contracts, or transactions that will minimize the (transaction) costs of doing business. Coase went on to say that a contract that offers the lowest transaction costs will tend to be used the most to govern a set of actions. However, as Libecap (1991) points out, having lower transaction cost is a necessary rather than a sufficient condition for adoption. It is, therefore, appropriate to examine transaction costs when evaluating the potential of new institutions as alternatives to existing institutions. A number of useful definitions of transaction costs are available in the literature such as Williamson (1973, 1975, 1981), Randall (1972), Dahlman (1979), North (1990), Davis (1986), Barzel (1989), and Cheung (1969).

When multiple individuals are involved in environments where complex activities must be coordinated across space and over time, they may attempt to reduce the substantial uncertainties they face through various forms of implicit or explicit agreements. These contracts involve costly activities expended in the processes of achieving agreements before and continuing to coordinate activities after an initial agreement is reached in an uncertain environment. Williamson (1985) identifies the costs associated with contracting activities as *ex ante* and *ex post* transaction costs. Using the generic of the Williamson's transaction cost economics, the transaction cost in fisheries co-management can, therefore, be broadly categorized into three major cost items: (i) information costs, (ii) collective fisheries decision-making costs, and (iii) collective operational costs. The first two categories are *ex ante* transaction cost while the latter is defined as the *ex post* transaction cost. This breakdown is largely



**Figure 2.** Schematic Flow Diagram of Transaction Costs in Fisheries Co-Management

based on anecdotal information, and the schematic flow diagram of the transaction costs in fisheries co-management is shown in figure 2. The transaction costs arise from the problems of information, coordination, and control that stem primarily from the fact that fisheries resource management decisions involve multiple actors with different interest in long-term, interdependent, and uncertain processes.

The key factor that differentiates centralized management from co-management is the level of user participation in the design and implementation of the management activities; namely, resource assessment, determining management objectives, selecting management measures, allocating the resource among users, allocation of the resource over time, and enforcing regulations. The extent to which the state allows for user participation for each of the management activities determines the spectrum of different co-management arrangements possible between the state and the users. The expected level of transaction costs involved for each of the different management activities under a pure centralized management system compared with a co-management system with a high level of user participation is shown in table 1. However, the actual costs of these management activities can only be ascertained through further empirical work.

## Information Costs

Whichever management system, centralized or co-management, information for managing the system must be collected and organized for decision making. The success of a management system depends on the amount and types of information available to both decision-makers and participants or resource users. Decision-makers concerned with fisheries resource management may have different types of information available to them; likewise, resource users have a variety of information available to them. The information available to those two groups may vary and may not be shared. The kind of information we are referring to is not easily accessible to everyone; for example, size of fish stocks, number of stakeholders, and preferences

**Table 1**  
Transaction Costs in Centralized and Co-Managed Systems

Resource Management Activities	Centralized Management	Co-management
Information seeking	low	high
Decision making and setting management objectives	low	high
Resource distribution among users	high	low
Resource distribution over time	high	low
Monitoring, enforcement and compliance	high	low
Resource maintenance	high	low

about allocation of the resource among stakeholders and other interested parties over time. Once this information is acquired, it has to be sorted and organized in such a manner for it to be meaningful to all users. The information search and acquisition costs are costly, and they are closely related to strategic and coordination costs. Since participants in fisheries co-management systems face asymmetrical information problems, they may behave strategically or opportunistically to maximize their own welfare in providing information to management authorities and thus aim to avoid social and economic responsibilities altogether. This strategic and opportunistic behavior, coupled with difficulties stakeholders incur in acquiring and integrating information used in reaching decisions, is a possible reason for much higher transaction costs under a co-managed system as shown in table 1.

### Decision-Making Costs

One of the many challenges facing the fisheries co-management regime is how to get the fishers to reach some level of consensus on certain contract or collective actions with regards to resource management. The collective fisheries decision-making costs include dealing with fisher's problems; participating in meetings; making policies, rules and regulations; communicating decisions to the community; and coordinating tasks with local and central fisheries authorities. As individual fishers have different sets of information and interests which seldom match, it will take a special effort just to bring them together, let alone reach an agreement on some uncertain processes. Even if they agree to meet, some actors will behave strategically or opportunistically so that they obtain maximum benefits from the proposed project. In the event that they manage to draw up "acceptable" rules and regulations to all resource users, they still have to communicate the decisions to their peers and some form of coordinating mechanism with local and central fisheries authorities has to be planned. Coordinating actions of diverse actors requires that considerable time and resources be devoted to the process of gaining agreement, monitoring activities, and evaluating performances. These are some of the transaction costs in the collective fisheries decision-making process which are expected to be higher under a centralized management system as shown in table 1.

### Operations Costs

The third major component of transaction costs is the collective fisheries operations costs. This component can, in fact, form the strongest counterargument for the cen-

tralized resource management system. It is argued that if the resource is to be managed by both the central agency and the community, the operations costs can be quite substantial to ensure that rules are followed, conflicts among users are resolved, and the reward system from the new institution is apt to be fair and equitable. As the reward system is designed or structured by the community, it is more likely to be acceptable to the community. There is validity to this reasoning. Operations cost can be quite significant in carrying out a management regime. Operations cost comes in three forms: (i) monitoring, enforcement, and compliance costs; (ii) resource maintenance costs; and (iii) resource distribution cost.

Monitoring, enforcement, and compliance costs include the monitoring of fisheries rules, monitoring the fishing areas, catch record management, fishing inputs, conflict management, and resolutions and sanctions for rule violations. In resource maintenance costs, the transaction costs result from fishing rights protection, stock enhancement activities, and resource assessment work to ensure that the stocks in the area are not overexploited. Resource distribution costs include the cost of distributing the fishing rights to the appropriate stakeholders and costs of managing the participation of the stakeholders and administering the rights to the fishery.

Monitoring, enforcement, and compliance costs in fisheries management alone can be substantial. As an example, in Malaysia, where a centralized fisheries management system is in place, the monitoring, enforcement, and compliance costs as measured by government expenditure increased from about 5% of total fisheries development expenditure during the 1976–80 period to about 16% during the 1986–90 period. This amounts to about MR7.753 (US\$3.10) million during 1976–80 period and MR41.564 (US\$16.63) million during the 1986–90 period. For the 1991–95 period, a sum of MR80.797 (US\$32.32) million was allocated for monitoring, enforcement, and compliance expenditure for the Malaysian Fisheries Department (Kuperan 1994).

It may be argued that under a co-management system, the enforcement and compliance costs may be lower as there may be increased compliance realized from the increased legitimacy of the regulations and allocation procedures adopted by the community (see for example Hanna 1995). But enforcement and monitoring requires substantial resources, and there are likely to be economies of scale from the use of monitoring and enforcement vessels by a larger fishing community as represented by the centralized management system.

The co-management system, therefore, represents a shift in the burden of financing the costs of governance of common property resources from the central or public purse to groups or individuals involved in managing the resource. This shift in the costs from the central authorities to user groups has implications for overall management costs and the capability of user groups to bear such costs. The benefits from such a shift are improved compliance and lower management costs. It is the ability of user groups, especially in overexploited fisheries, to bear the cost of governance from the minimal rents from such fisheries that is often questionable.

In many fisheries systems the costs of maintaining and enhancing the resource through material interventions involves large investments and long gestation periods to realize the benefits. These costs are often incurred by national agencies in most countries. A move towards co-management systems will call for the community to spend resources for such maintenance and replenishment interventions. Most communities will be reluctant to incur such costs as the benefits may often accrue to future generations and others since fish are migratory resources. Such investments are important for long-term sustainability of resources and may not be considered in co-managed systems.

New institutions often require members to sacrifice time and effort to bring people together for decision making and enforcement. Since the benefits of such in-



stitutions flow to all members irrespective of participation, the free rider and public goods nature of institutions can pose problems for co-managed institutions. Unless some form of benefit is readily available to members who sacrifice their time, the durability of the institutions will be at stake. In addition, the equity and fairness aspects of the allocation of the benefits and costs of running the institutions will be affected. In overexploited fisheries the resource rents might be so low that fishers may not be able to maintain the institution.

The costs mentioned above may not be readily apparent, but their identification is crucial in determining the sustainability of fisheries co-management systems. In centrally based management systems, the funds for operating and maintaining the system usually come from the general tax revenues, and the element of cross subsidies from other sectors of the economy may be in effect. In co-managed systems, the costs may have to be borne by the resource users and the community and obtaining subsidies from another sector may be difficult. A thorough examination of the often hidden transactions costs is necessary in an assessment of the feasibility of co-management as an alternative fisheries management approach.

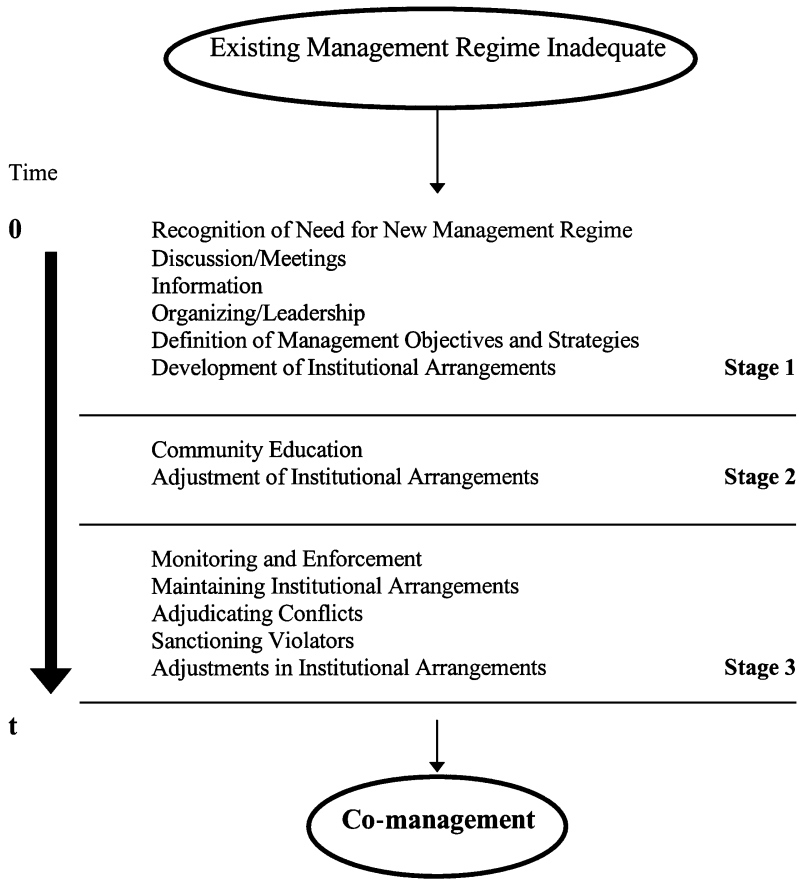
### Transition Costs

As mentioned earlier the process of establishing a co-managed system involves time of at least three to five years. The stages are: (i) devising and creating the institutions and obtaining information for decision making; (ii) implementing the decisions through dissemination of information and explanation of how the community-based system will work; and (iii) maintaining, monitoring, and ensuring compliance with institutional rules and adjusting rules as conditions in the fishery change. These stages are shown in figure 3, where the co-management process moves from the recognition of the inadequacy of the current regime at time 0 to the new arrangement; *i.e.*, co-management at present time  $t$ . The costs at stage one and two are the transition costs or sunk costs of developing a co-management regime. These transition costs, therefore, represent a major part of the transaction costs involved in moving from a centralized management regime to a co-management regime. The costs in stage one and two are for the nonrecurrent activities, while the costs in stage three are continuous or recurrent. The evaluation of the transaction costs of co-management will involve valuing both the recurrent and nonrecurrent costs at the three stages and comparing them with the cost of the management activities under a centralized regime.

### Policy Implications and Conclusion

In welfare analysis the Pareto criterion is used to judge whether one approach to overcoming an externality is better than another. As stated by Griffin (1991), once transaction costs are admitted, different property rules give rise to different welfare frontiers. Each of the property rules will also exact its own unique magnitude and distribution of transaction costs. Implementation of different property rules, liability rules, regulations, incentives, customs and behavioral standards, and other nonmarket devices, therefore, represent separate institutions with distinct economic consequences. The inherent transaction costs of each specification of each institution will produce an institutionally specific production possibility frontier and utility possibility frontier.

Co-management of fisheries involves the implementation of different property rules, liability rules, regulations, incentives for resource extraction and distribution.



**Figure 3.** Process of Moving Towards Co-management  
 Source: Modified from White *et al.* (1994).

As discussed earlier, the institution of these property rules involve transaction costs that will alter the production possibility frontier. The challenge is to determine whether the frontier will be moved in or out as the result of the implementation of the new institutional arrangement. There is a need to empirically evaluate the nature of the transaction costs involved in fisheries co-management institutions as a basis for evaluating the efficiency or net benefits of co-managed fisheries compared to centrally managed fisheries. The discussion presented in this paper will serve as a basis for further operationalization of the three categories of transaction costs and for empirical case study analysis.

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