

# Co-management as a Solution to the “Tragedy of the Commons”? Lessons from Thai Fisheries†

Rachel Fleishman

Public Administration, The Maxwell School of Syracuse University

†This paper was presented at the 13th Symposium on Development & Social Transformation at The Maxwell School of Syracuse University in April 2006.

*Like many common property resources, Thai fisheries have been over-exploited. Causes are varied, including the introduction of destructive fishing technologies and lax enforcement of regulations. Small-scale fishers have been impacted most severely by declining catch rates, and conflicts with commercial fishers have intensified. The Thai government is experimenting with a policy alternative called “co-management”, a middle ground between state and community control of fisheries. This paper describes co-management and derives insights from three cases in Thailand. Results indicate that co-management provides an innovative means to leverage unique capacities of the state and fisher communities. However, transaction costs may be high and there is potential for negative consequences, including inequities that benefit community elites at the expense of marginalized populations.*

## Introduction

Common pool resources (CPRs) such as fisheries, forests, and grazing lands present a complex management challenge. A CPR is a public good in that it is difficult or impossible to deny users access to the resource; but it is also a private good in that consumption by one user precludes or significantly diminishes others’ consumption. Because of these unique properties, a CPR is especially vulnerable to the “tragedy of the commons”, in which individuals acting in their own self-interest tend to over-exploit the resource (Hardin, 1968). This occurs because behavior that is economically rational for the individual diverges from what is collectively rational (Pomeroy & Berkes, 1997). Barring mechanisms for coordination, monitoring, and enforcement, individualized behavior will dominate and the resource will be degraded.

However, research has shown that the “tragedy of the commons” is not inevitable if appropriate management institutions are applied (Durrenberger & King, 2000). Theoretically, there are four management solutions for common pool resources: open-access, private property, state property, and communal property (ICLARM & IFM, 1998). As Hardin (1968) described, *open-access* is not a viable long-term solution. Assigning *private property rights* to a resource, the option most famously articulated by the economist Ronald Coase (1969), is also not feasible for many CPRs. In fisheries, for example, the resource (fish) tends to migrate, making the assignation of exclusive rights difficult (Wilson et al., in press). *State control* of CPRs, where the government regulates access to and use of the resource, relies on the state as a coercive force and has been the most commonly used management scheme (ICLARM & IFM, 1998). The fourth option, *communal ownership*, has received more attention in the past 25 years. It requires that communities of resource-users devise their own management institutions, including the allocation of access rights, rules for decision-making, and mechanisms for monitoring, enforcement, and conflict resolution (Ostrom, 1990).

These four management scenarios are ideal-types;

in reality, the management of a CPR combines different types of control (Pomeroy & Berkes, 1997). Fisheries scholars have recently highlighted a management strategy, called *co-management*, that combines aspects of state and community control (e.g. Pomeroy & Berkes, 1997; ICLARM & IFM, 1998). Co-management involves a partnership between the government and a community of resource-users in which the community develops a system of access rights and rules, while the state provides the legal and political authority needed to enforce this system. (e.g. Nielsen et al., 2004; Pomeroy & Berkes, 1997) As such, co-management offers the opportunity to leverage the unique capabilities of both the state and the resource community.

This study explores the concept of co-management and its potential advantages and disadvantages as a solution to the CPR problem. It also compares the impacts of co-management to those of more traditional regulatory (or “state control”) approaches. Fisheries policy in Thailand was chosen as an empirical focus because Thailand has experimented with both regulatory and co-management approaches and because a sufficient amount of information is available regarding their successes and failures. The regulatory history of Thailand and recent cases of *fisheries co-management* provide a preliminary basis on which to evaluate the impact of co-management and conditions under which it can be a viable management option.

To what class of cases can the findings from this study be generalized? As we will see, co-management in Thai fisheries has generally taken place in small, rural fishing communities with a large portion of residents dependent on fisheries for their livelihood. Conflict in these communities has stemmed from tensions between small- and large-scale fishers or, more broadly, from twin desires to support the subsistence activities of traditional, artisanal fishers while developing a globally competitive fisheries industry. Similar conditions exist in many developing countries, related not just to fisheries but other CPRs. For instance, forests provide products that

are important both for commercial purposes (i.e. timber sales) and to support traditional and/or subsistence activities. Thus, findings from these Thai cases apply most directly to CPRs in rural communities where a significant portion of the community is resource-dependent, and where subsistence goals conflict with, or are somehow threatened by, global market pressures.

This paper is organized into three main sections: 1) a theoretical introduction to co-management; 2) a description and analysis of fisheries policy in Thailand, including both regulatory measures and co-management; and 3) an evaluation of the conditions under which co-management may be successful.

## A Theoretical Introduction to Co-management<sup>1</sup>

Co-management has been applied to common pool resources around the world, including fisheries, forests, pastures, and watersheds (Castro & Nielsen, 2001). Because of contextual variation and the complexity of the relevant ecological, social, and political systems, there is no single structural arrangement that characterizes co-management (Carlsson & Berkes, 2005). This variation gives rise to a multitude of definitions, several of which are listed in Appendix A. Most applicable here is the definition of fisheries co-management, developed by Nielsen et al. (2004), as "an arrangement where management responsibility is shared between the government and fishing communities.... a set of institutional and organizational arrangements (rights and rules), which define the cooperation among the fisheries administration and relevant fishing communities (154)."

### *Balance of power between government and the community*

A theme common to definitions of co-management is the sharing of responsibility between different stakeholders, in particular government and the community of resource users. Among the many responsibilities that can be shared, the most essential is establishing institutional arrangements that will govern the management of the resource (ICLARM & IFM, 1998). This includes the allocation of access rights, rules that define how these rights may be exercised, and systems of positive and negative incentives that, ideally, will allow the system to be self-enforcing (Ostrom, 1990). Systems of rights, rules, and incentives must be negotiated among stakeholders. Since each stakeholder group holds its own set of interests in the resource, the negotiation of co-management arrangements is largely influenced by the distribution of power among stakeholder groups, where power is defined in terms of the groups' capacity for negotiation, legal or political clout, and perceived legitimacy (Castro & Nielsen, 2001).

Many of the definitions in Appendix A assume that stakeholders are equal in their negotiating power, or gloss over potential power imbalances. Scholars have found, however, that the balance of power among actors greatly

influences the type of co-management mechanisms that emerge (e.g. Pomeroy & Berkes, 1997). Take the simplest case of a partnership between a homogenous "resource user community" and a homogenous "government" (i.e. the classic structure of co-management). Figure 1 shows the diversity of co-management arrangements that may emerge from this relationship. It illustrates a power distribution between government and the local community ranging from centralized ("top-down") government control to community self-governance. Between these extremes lie different co-management arrangements (e.g. communities informing government, partnership, information exchange), each corresponding to a different mix of community and government control. According to this model, co-management is not a single management strategy but encompasses several strategies.

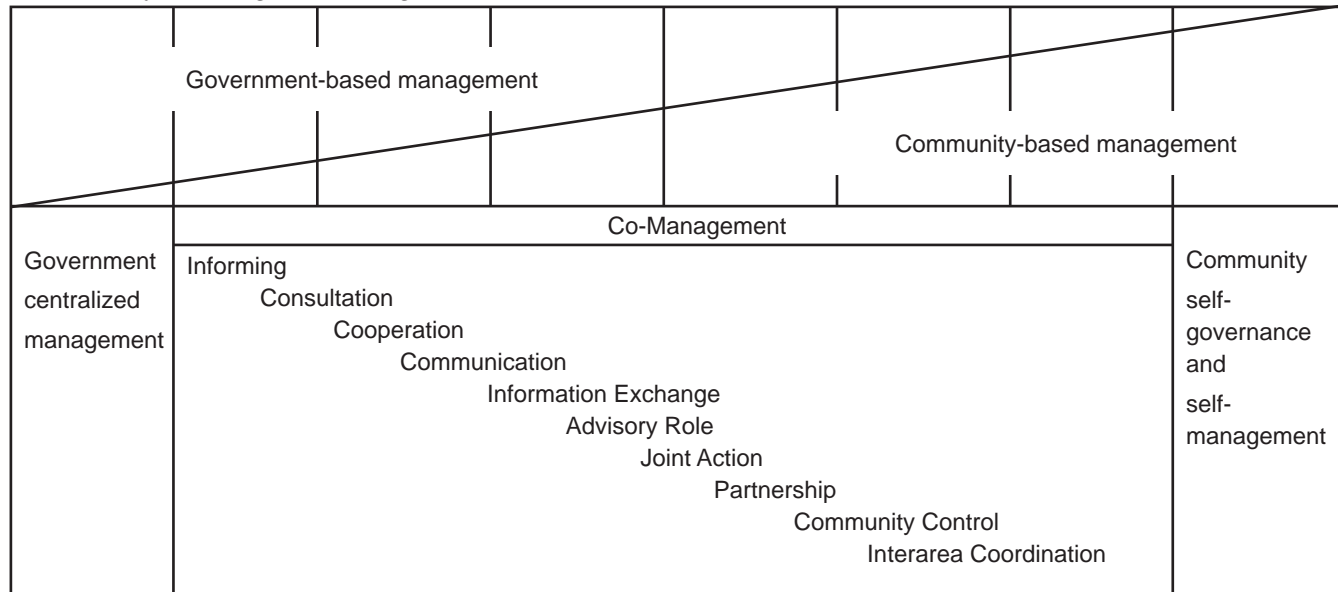
One question left unanswered by this model is: What are the appropriate roles of government and the resource community in co-management? Scholars seem to agree that the main role of government is to provide the legal and political basis for co-management institutions to function and to encourage institutional development at the local level (e.g. Nielsen et al., 2004; Pomeroy & Berkes, 1997). Ideally, government should encourage communities to form their own co-management institutions rather than relying on "official" government-sponsored organizations imposed from above (Pomeroy & Berkes, 1997). This requires commitment from government to share power, since authority must be devolved to community organizations for them to effectively enforce the local co-management system. At the same time, co-management requires that government provide community organizations with legal and political backing, particularly regarding enforcement, because "only government can legally establish and defend user rights and security of tenure (Pomeroy & Berkes, 1997, p. 469)." Pomeroy and Berkes (1997) identify other potential roles of government, including: 1) providing technical, administrative, and/or financial assistance to ensure the sustainability of co-management organizations, 2) overseeing local arrangements and adjudicating abuses of local authority, 3) applying regulatory standards, and 4) serving as a facilitator in co-management processes.

The main role of the community is to establish a system of rights and rules that are culturally and socially appropriate and form management institutions capable of monitoring and enforcing this system. Communities are typically involved in monitoring on a day-to-day basis, but enforcement may occasionally require state intervention. Communities must also develop the capacity to resolve resource-related conflicts and make changes to the co-management system over time.

Co-management requires a delicate balance of power between the state and local communities. By what mechanism(s) can this be achieved and maintained? Wilson et al. (in press) present two options: 1) through the active involvement of local government officials, who generally have close ties to the community and provide resource

Figure 1

Continuum of co-management arrangements.



(Adapted from Pomeroy &amp; Berkes, 1997)

users with easy political access; or 2) by devolving legal authority to the local level, usually to a local organization that can manage the local system of rights and rules. The difficulty with the first option is how to ensure that resource users are empowered enough to prevent “top-down” management by local government officials. The main issue with the second option is that government does not always fully back the local organization in terms of legal, political, and enforcement support, leaving its authority unclear (Wilson et al., in press).

The co-management literature focuses on variations in the power relationship between “government” and the “community of resource-users.” This is clearly a simplification, partially because these actors are not homogenous, but also because there are other stakeholders involved in the management process (for instance: international NGOs, community members that are not resource-dependent, and community associations representing specific interests). Some of the co-management definitions in Appendix A acknowledge the potential for a broader range of actors (e.g. the IUCN and Birrini-Feyerabend definitions). However, the co-management literature does not provide a conceptual foundation for understanding the more complex, multilateral relationships that emerge between NGOs, various levels of government, private partners, and community-based organizations.<sup>2</sup>

#### Why co-management?

Scholars have pointed to several advantages of co-management over “top-down” regulatory regimes. These focus around three themes: democracy, effectiveness, and efficiency. In terms of democracy, co-management may promote a more participatory decision-making process

at the local level by engaging community members in protection of their local resource (Nielsen et al., 2004). Moreover, co-management “locates the rights and responsibilities of management with the people closest to the system”, potentially increasing responsiveness to local needs (Durrenberger & King, 2000, p. 6).

*Policy effectiveness* may be enhanced by a well-designed co-management system, with appropriate incentive structures and enforcement mechanisms, since resource users can be assured that they will benefit from the resource in the long-term (Johnson, 1998). Moreover, co-management may lead to greater compliance if local communities have been able to incorporate their preferences into policies (Nielsen et al., 2004). An additional benefit of this local involvement, also related to policy effectiveness, is the availability of better and more detailed information about local preferences, capacities for management, and resource conditions (Johnson, 2001). In particular, there is an opportunity to integrate the experienced-based knowledge (EBK) of resource users into management (Nielsen et al., 2004).<sup>3</sup>

Finally, co-management may be more *efficient* than state regulation if it utilizes comparative advantage in the allocation of tasks between government and communities (Carlsson & Berkes, 2005). Certain tasks (such as monitoring other resource users) can be done easily and cheaply at the local level while others (such as enforcement) are more efficiently done by the state. However, efficiency gains in the allocation of tasks must be weighed against the transaction costs of formulating and implementing a co-management system. Transaction costs are high when there is little community capacity to support a co-management system, due to weak community institutions, poor leadership, and/or high levels of conflict (Tokrisna et al., 1999; Pomeroy &

Berkes, 1997). Transaction costs are also high when it is costly or difficult to exclude outsiders from using the resource.

### *Skepticism about co-management*

Most co-management scholars, not surprisingly, stress these positive results and advocate for the expanded use of co-management (e.g. Pomeroy et al., 2001). However, there is substantial room for skepticism about the ability of co-management to improve democracy, effectiveness, and efficiency. Potential disadvantages must be confronted. For instance, co-management requires that significant power be devolved from the central government to local communities. This is an unrealistic expectation, since states are generally unwilling to share power with local communities beyond a superficial level. But there is a more fundamental flaw: *co-management scholars do not question their assumption that greater community power will lead to more effective, equitable, and sustainable resource management.* They explicitly assume that communities of resource users are better equipped than the government to develop an appropriate system of rights and rules for allocating the resource. This is not always true, as some of the case studies described later will illustrate. Local communities may create inequitable social systems that marginalize certain groups of people; they may cause harm to neighboring communities; or they may neglect the general public's interest in environmental protection. The institutions of the state play a pivotal role in tempering parochial tendencies and assuring accountability to the nation as a whole. Local and national priorities must be balanced. Further research, beyond the scope of this project, is needed to understand the appropriate balance of state and community control and how to achieve it. For the purpose of this study, the important point is that we need to seriously consider negative (as well as positive) consequences of an enhanced community role in CPR management.

### *Applying co-management theory*

Concepts about co-management described above, regarding its structure, distribution of authority, benefits and drawbacks- are used in the analysis of the Thai case below. I am particularly interested in how co-management can contribute to (or undermine) democracy, policy effectiveness, and efficiency. Are these goals achieved through co-management? Why or why not? Under what conditions can co-management work positively towards these objectives?

All information comes from secondary sources, including the three co-management case studies. These cases were selected based on data availability. This "convenience" sample is adequate for the purpose of this study, which is to identify major issues facing governments and communities as they attempt to implement co-management regimes. The point is not to reach conclusions about the worthiness of co-management or

provide a prescription for successful co-management, but rather to identify areas of tension, conflicts, options and opportunities that co-management may offer.

## **Fisheries Co-Management in Thailand**

### *Background: Fisheries situation in Thailand*

Fisheries are important to the Thai people as a means of employment and a source of fish for personal consumption. In 1995, about 535,210 people were employed in the Thai fisheries sector, representing 0.9% of the total population (Janetkitkosol et al., 2003). In coastal areas, the proportion of fishing households is much higher, ranging from about 40% to 75% in the cases I examined (Johnson, 2001; Pimoljinda & Boonraksa, 1999; Polioudakis & Polioudakis, 2000). A large majority of these fishing households (about 85%) are engaged in small-scale fishing and are highly dependent on fishing income (Boonchuwongse & Dechboon, 2003). Moreover, fish is the primary source of animal protein for residents of coastal provinces (Janetkitkosol et al., 2003).

The country as a whole benefits from fish products as exports and sources of foreign exchange. In 1997, fish products accounted for 69% of total agricultural exports and 7.3% of total exports (Boonchuwongse & Dechboon, 2003). Between 1983 and 1997, the trade balance (total export value minus total import value) for fish products increased by \$3.5 million (in 1997 U.S. dollars), a significant contribution to foreign exchange earnings. On the other hand, fish products represent a small portion of total GDP (1.9% in 1996) and this portion has declined in recent years as the Thai manufacturing and service sectors have taken off (Boonchuwongse & Dechboon, 2003).

Coastal communities, however, remain highly dependent on fisheries for income and employment. The two major fishing areas are the Gulf of Thailand (east coast) and the Andaman Sea (west coast). Of the approximately 1500 villages scattered along these coasts, most are heavily dependent on fishing and fish processing. A 1992 nationwide survey found that fisheries income accounted for an average of 75.2% of the total income of small-scale fisher households. In addition, fishers tend to have lower incomes and fewer years of education than the average Thai person, leaving them with few employment options outside of the fishing sector (Boonchuwongse & Dechboon, 2003). Fishing households that do manage to find supplementary or alternative employment tend to have higher and more stable incomes. Common alternative enterprises are rice farming, coconut farming, and aquaculture. Some villages located in the inner part of the Gulf of Thailand benefit from development activities such as ports, oil refineries, petrochemical plants, and tourism (Janetkitkosol et al., 2003).

For fishers who lack supplementary employment, over-exploitation of Thai fisheries poses a serious problem. The "catch per unit of effort" (CPUE) rate has declined dramatically and steadily since the mid-1960's. In the Gulf of Thailand, CPUE declined from 173 to

18 kg/hr from 1966 to 1998; while in Phang-nga Bay on the Andaman Sea, CPUE dropped from 160 to 38 kg/hr between 1969 and 1988 (Janetkitkosol et al., 2003; Johnson, 1998). Some critical habitats, such as coral reefs and mangrove forests, have been destroyed or degraded, and the species composition of bottom-dwelling aquatic insects (which provide food for fish) has changed dramatically due to the disappearance of more than 300 species (Janetkitkosol et al., 2003). The increasing proportion of “trash fish” - small non-commercial species and juveniles of commercial species- in the trawler catch indicates a depleted stock of commercial demersal (bottom-dwelling) fish (Tokrisna et al., 1999).

The main causes of over-exploitation include the introduction of destructive fishing technology such as trawlers; the development of new processing techniques; increases in world demand for fish; the accumulation of excessive fishing capacity; and exclusion from foreign fishing grounds. (Janetkitkosol et al., 2003; Johnson, 2001; Tokrisna et al., 1999; Bennet, 2000). The introduction of new fishing technology in the 1960's and 1970's (trawlers in 1962, purse seines in 1973, and light-luring techniques in 1978) attracted commercial investment and was a boon for Thai fish production, which quickly expanded to meet rising world demand. Similarly, development of refrigeration and processing techniques allowed Thai fishers to take advantage of new markets. However, the rapid rise in fish capture, combined with the destructive nature of some of the new technologies, eventually caused a sharp decline in fish stocks. Trawlers, for instance, tear up the sea bed and capture large numbers of small fish called “trash fish,” up to 52% of which are juveniles of commercial species (Janetkitkosol et al., 2003).

A dual problem emerged: an increased investment in fisheries and, at the same time, depleted fish stocks. Many medium and large-scale fishers had incurred debt by investing in new technologies and were forced to pay this off by fishing, even if their catch consisted mostly of trash fish (Bennet, 2000; Carr & Scheiber, 2002). In 1982, a further difficulty arose for Thai fishers when the UN Convention on the Law of the Sea (UNCLOS) established Exclusive Economic Zones (EEZ) protecting the fishing rights of coastal nations over an extended offshore area. Thai fishers lost a large portion of their traditional fishing sites, now enclosed in the EEZs of neighboring countries (Janetkitkosol et al., 2003).

The declines in catch rates and depletion of fish stocks exacerbated conflicts between small-scale and large-scale fishers.<sup>4</sup> In Thailand, fishers are primarily defined by gear type. Small-scale fishers (also called artisanal fishers) have boats less than 12 meters in overall length; usually work in shallow waters within 5 km of shore; and use simple gear such as gillnets, traps, falling nets, entangling nets, set nets, and hook and line. They are generally limited to single-day or night operations and bring their catch directly back to the village, where it is sold to a middleman. Large-scale fishers (also called commercial fishers) use boats greater than 12 meters in length; fish with modern and highly

efficient gear such as trawlers, purse seines, and push nets; and have several crew members. They are able to fish off-shore for several days, selling their “food fish” catch at fishing piers and their trash fish catch separately at fish meal plants (Janetkitkosol et al., 2003).

The root of the conflict is the tendency of large-scale fishers to deplete fish stocks through their use of trawlers and other destructive gear, particularly when they fish close to the shore. Moreover, trawlers and mechanized push nets may damage the stationary gear of small-scale fishers if they get too close (Tokrisna et al., 1999). The contribution of small-scale fishers to the depletion of fish stocks is much lower because they use a large diversity of gear, minimizing the impact of each type, and because their gear tends to be passive and selective (Mathew, 2001).

#### *Thai fisheries policy: a reliance on command-and-control regulation*

Legislation, regulations, and development plans formulated and promoted by the Thai government indicate a commitment to creating sustainable and equitable fisheries. There are three laws that directly govern Thai fisheries: the Thai Vessels Act (1938), the Act Governing the Right to Fish in Thai Fisheries Waters (1939), and the Fisheries Act (1947) (Janetkitkosol et al., 2003; Tokrisna et al., 1999). The Fisheries Act, passed in 1947 and amended in 1953 and 1985, is the most important of the three laws and includes provisions for fisheries management and conservation, aquaculture, registration and application for permits, fisheries taxes, and data collection (Janetkitkosol et al., 2003).<sup>5</sup> The Fisheries Act imparts authority to two government entities: the Ministry of Agriculture and Cooperatives (a federal bureaucracy) and the provincial governors. The Ministry, through the Department of Fisheries (DOF), is responsible for specifying and enforcing regulations, which generally fall under the following categories:

1. Prohibiting certain types of fishing gear during the spawning and breeding seasons of commercially important species (Janetkitkosol et al., 2003).
2. Prohibiting certain types of gear in some areas. For instance, the regulation passed in July 1972 prohibited fishing by trawlers and push nets within 3000 meters of the shoreline or 400 meters of any stationary gear. The first restriction is meant to protect fish stocks in the productive near-shore areas and the second protects the stationary gear of small-scale fishers (Janetkitkosol et al., 2003).
3. Setting rules and fees for fishing or gear licenses. For instance, in 1980 the DOF stopped issuing new licenses for trawlers or pushnets, and made existing licenses non-transferable except to one's children (Tokrisna et al., 1999).
4. Designation of protected areas and protection of endangered or threatened species (Janetkitkosol et al., 2003).
5. Setting and enforcing a maximum allowable catch for certain species (Janetkitkosol et al., 2003).

6. Setting and imposing penalties for the violation of regulations (Tokrisna et al., 1999).

In addition to regulations under the Fisheries Act, the Thai government addresses fisheries management through its National Economic and Social Development Plans (NESDP). The Eighth and Ninth plans (which span the years 1997-2006) share basically the same set of goals, including: (1) managing fisheries responsibly and efficiently to obtain maximum sustainable yield, (2) improving fishers' quality of life and increasing their participation in management, (3) increasing production from aquaculture and deep-sea fishing, methods that are less threatening to marine fish stocks (4) standardizing and controlling product quality to increase competitiveness in the global market, and (5) developing the domestic market for fisheries products (Janetkitkosol et al., 2003).

For the most part, the Thai government has relied upon regulatory mechanisms to implement the fisheries provisions of their National Development Plans. Under authority of the Fisheries Act, the DOF has taken the lead in formulating and enforcing restrictions similar to those listed above. However, government agency representatives find that "despite more than 27 issues of Ministerial Notification, the marine resources have still not recovered (Janetkitkosol et al., 2003, p. 947)."

Most scholars concur that a core problem is the government's lack of resources for enforcement. The central and local governments have limited manpower, equipment, and financial resources to enforce regulations over Thailand's 2,614 km of coastline (Tokrisna et al., 1999). In addition, government officials must contend with a large variation in species caught and gear used, which requires the formulation and enforcement of many unique standards (Tokrisna et al., 1999; Ahmed & Delgado, 2000). Because of these difficulties, enforcement costs may exceed the value of fisheries themselves (Tokrisna et al., 1999; Carr & Scheiber, 2002). Another impediment may be conflicting interests between small-scale fishers and other powerful interests in Thai society. Catches from destructive gear such as trawlers and push nets benefit up- and down-stream industries such as shipbuilding, net construction, ice making and cold storage, transportation, fish processing, and fish canning (Johnson, 1998). Representatives of these industries may exert pressure on elected officials or government agencies not to strictly enforce regulations.

Another core issue is whether regulations emanating from the central government hold legitimacy at the local level. Some scholars believe that the DOF has failed to take into account local conditions and needs, and has alienated fisher communities. Part of the problem may be the predominance of biologists on staff and their tendency to focus on ecological health over socio-economic needs (Nielsen et al., 2004). Another barrier may be the central government's reluctance to share decision-making power with local communities (Pomeroy, 1996). In any case, government regulations that lack legitimacy among fishers are bound to fail, especially when combined with

weak enforcement (Nielsen et al., 2004).<sup>6</sup>

#### *Fisheries Co-management in Thailand*

Fisheries scholars and practitioners have presented co-management as an alternative and/or complement to regulatory policies. Co-management has the potential to garner greater support among fishing communities by involving them in the process. Also, monitoring by local fishers would greatly decrease the state's enforcement burden.

There are several co-management projects currently active in Thailand. Key actors are government agencies, local government officials, local NGOs, village organizations, academics, and religious leaders (Tokrisna et al., 1999; Wilson et al., in press; Pimoljinda & Boonraksa, 1999). International organizations have also played a role. Starting around 1995, several Thai co-management programs received financial and technical backing from the FAO Bay of Bengal Program (Johnson, 1998; Pimoljinda & Boonraksa, 1999). From 1994-2004, the "Worldwide Collaborative Research Project on Fisheries Co-management (WCPFC)" collected data and conducted analyses on co-management programs in Thailand, in addition to many other Asian and African countries. Their research has been an important information source for this paper.<sup>7</sup>

#### *Case 1: Baan Ao Lom (a pseudonym) (Source: Johnson, 2001)<sup>8</sup>*

In Baan Ao Lom, a co-management system evolved internally with minimal interference from government and, more importantly, no formal incentives for participation or penalties for non-participation. This case illustrates the power of social and cultural norms in prescribing behavior, and points to the fact that co-management systems can mirror or even intensify existing inequalities within a community.

Of the forty-four households in Baan Ao Lom, eighteen (41%) earn a regular income from marine fishing and most of these use small-scale gear. In the early 1980's, due to the expansion of tourist and export markets, push nets and small trawlers entered village fisheries. Around the same time, small-scale fishers adopted motorized boats, push nets, and synthetic gear, increasing production and fostering greater market competition. The production boom led to conflict and over-exploitation in the early 1990's, forcing some villagers to leave the fishery. For small-scale fishers that remained, damages to their stationary gear by trawlers and push nets remained a source of unrest.

In 1995, the village decided to institute a simple ban on trawlers, push nets, explosives, and poison (956). This was an unusual decision in that they were the only fishing community of 28 in their province to implement and enforce some form of restricted access (956). Moreover, the village had never initiated such a system before (956). The rules were simple: any vessel that did not use the banned technologies could access the fishery

(956). Monitoring was done informally by the fishers themselves, with individuals volunteering for special patrols and keeping an eye out while they fished (956). Also, monitoring was simplified by two conditions: 1) it was easy to recognize the banned equipment and 2) since it was a ban there was no ambiguity about whether a rule was being broken (956-7).

Enforcement was generally accomplished by intimidation and force; villagers banded together as many boats as possible to challenge the violator (957). Enforcement costs could be high- in one case, a fisher was shot and killed while helping government officials arrest a group of push-netters (957). Avenues for fisher participation included monitoring and/or enforcement, supporting a larger lobby organization that was pressuring the government for improved enforcement, and providing moral and/or financial support (957).

One surprising aspect of this co-management system is that there were *no formal incentives to participate* (no salaries, no compensation for the expenses of going on patrol), and *no penalties for free-riding* (957). How did co-management work without formal incentives? This can be partly explained by material incentives, in that the villagers who had invested most heavily in the fishery (and stood to gain materially from the ban) were among its most enthusiastic supporters. However, this explanation does not account for non-participation by many younger fishers, and participation by many non-fishing households (963).

Johnson found that other incentives emerged from *informal community norms and institutions*. For instance, access to material benefits such as credit were dependent on maintaining good standing in the community, and good standing required that villagers engage in activities deemed important by village elders (965-6). Participation was particularly important for aspiring community leaders, who were able to extract favors from government officials and develop valuable social relationships (969). Another factor was the symbolic value of fishing as a traditional activity complementary to Thai-Muslim culture and encouraged by village religious leaders (967). Finally, a strong “us vs. them” mentality contributed to group cohesion. Villagers tended to blame fisheries over-exploitation on the “capitalist, predominantly Sino-Thai constituency on Phuket (968).” The exclusion of these “outsiders” allowed the community to assert power in the local economy, against external pressures from tourism and industrial development (967). By identifying a “common foe”, villagers both increased group cohesion and ensured that the “costs of change were allocated *outside* the village community (968, emphasis in original).”

The other important finding was that participation in the co-management system was dominated by elites in terms of gender (men), age (older), and status (wealthier). Official meetings were attended mostly by village elites, full time fishermen, and members of a local NGO, and interviews with poorer members of the community indicated that they were either uninterested in or did not

know about the participatory process (960-1). Moreover, structural constraints impeded participation by poor fishers and women. Poor fishers could not participate in enforcement without a motorized boat, while women were busy with domestic duties and faced cultural barriers (970). Due to combination of structural and cultural constraints, marginalized groups did not benefit as much from co-management as village elites (971).

*Case 2: Ban Bang Chan & Ban Haad Sai Pleug Hoy (Source: Pimoljinda & Boonraksa, 1999)*<sup>9</sup>

In contrast to Baan Ao Lom, co-management arrangements in these two villages were imposed by the Thai government and international organizations as part of a co-management pilot project in Phang Nga Bay. Although information on this case is limited, it is presented to illustrate the government perspective on co-management.

These two villages faced a familiar problem. The introduction of new technologies such as trawlers, light luring techniques, and push nets had depleted fish stocks and led to increased competition in the fisheries. Conflict ensued between commercial and small-scale fishers. Small-scale fishers hoped to exclude commercial vessels from the near-shore waters, extend the protected zone further off-shore, and eliminate the use of certain destructive gears.

In 1995, with the financial and technical support of the Bay of Bengal Program (which was at the time an FAO program), the Thai government began to experiment with “community based fisheries co-management” in these villages. The agency in charge was the Andaman Fisheries Development Center (AFDEC), a branch of the Thai Department of Fisheries (DOF) based in Phuket province. According the report published by AFDEC (my source for this case), other stakeholders in the co-management arrangement included the Takuatoong District Fisheries Office (a local subsidiary of the DOF), local NGOs that represented the interests of small-scale fishers, the Bay of Bengal Program, local community leaders, Muslim religious leaders, and fish dealers.

Unfortunately, the AFDEC report provides little information about the project’s activities. However, it does provide clues about the viewpoint of the AFDEC and unintentionally reveals some of the problems that may arise when co-management is imposed by the government. An initial indication that what is called co-management may actually be closer to co-optation is illustrated by the following quote from the abstract:

The process of CBFM [community-based fisheries co-management] in the Bay began with the organization of a workshop to get the acceptance, commitment and consensus of key stakeholders on the CBFM workplan components... Later on, the problems faced and needs of the villagers were discussed and taken into account in the workplan (1).

Clearly, the AFDEC began the project with a plan in place, and participation by fishers (at least in the early stages of project development) was limited to "rubber stamping" what the government had already decided upon. Another issue was the selection of a local organization to implement co-management in the community. Instead of encouraging grassroots institutional development as suggested by Pomeroy and Berkes (1997), the AFDEC authorized a formal local government body, the *Or-Bor-Tor* to be in charge of planning, proposing regulations, and implementing development activities. Working with the *Or-Bor-Tor* satisfies the governments' need to find a formal, registered organization with the capacity to carry out co-management functions. However, by privileging formal organizations the government is limiting participation by less formal, unregistered organizations that better represent the fisher community (Macfadyen et al., 2005). On a more positive note, Macfadyen et al., (2005) found that the government of Thailand is becoming "increasingly receptive to working with local fisher organizations and NGOs (23)."

*Case 3: Mountainhead (a pseudonym) (Source: Polioudakis & Polioudakis, 2000)*<sup>10</sup>

Like Baan Ao Lom, the management scheme in Mountainhead was based on informal arrangements and institutions, many of which had been in effect for generations. This case is unique because a formal co-management scheme was never developed. Instead, fishing rights were distributed and enforced through a highly inequitable and pervasive system of elite control and government complicity.

The fishers of Mountainhead primarily use two fishing methods, *phong phang* (a bag net) and *wang kat* (a floating net). *Phong phang* is the preferred method because it is more productive and efficient; however it is also more destructive. Up until 1975, the distribution system for *phong phang* sites involved a complicated "bidding" process, tightly controlled by powerful people in the villages (91). This system encouraged a rigid social stratification with three main classes (89). The highest class, the row heads, gathered money from a group of fishers to buy access to a row of *phong phang* sites, which they would bid out for seasonal access. System members paid the row head for annual or seasonal access to *phong phang* sites. The lowest class included people without access to the *phong phang* system, who instead fished with *wang kat* (90).

Class differences were stark. Fishers in the *phong phang* system had livelihood alternatives, low debt, and money to lend. Those not in the system (i.e. the large majority of villagers) had few livelihood alternatives, lived in the least desirable locations and the smallest houses, and were indebted to system members. Two characteristics of the distribution system further solidified social stratifications. First, although *phong phang* sites could technically be "sold" to anyone, in practice they were only sold within families. Second, an elaborate system of money lending by wealth villagers reinforced their superior position. Predictably,

the result was significant social strain (90-91).

After 1950, technological innovations and improvements in shrimp preservation greatly expanded the shrimp market in Mountainhead and began to deplete shrimp and fish stocks (92). The introduction of medium-sized trawlers and population growth further strained fish resources and intensified competition. In the period from 1950 to 1975, yields declined by about half, but without resources to leave the village or find alternative employment, most villagers continued to fish (93).

In response to declining fish stocks in the area, the government banned trawling in 1972 and *phong phang* in 1975. Two years later (in 1977), villagers began to use *phong phang* again with the tacit approval of local officials, who realized that enforcing the ban would lead to civil unrest (95). Villagers estimate that there are now 600 *phong phang* sites (where there used to be 260), but it is difficult to tell because *phong phang* is illegal and done at night (95). In the new system, villagers pay a flat fee for a *phong phang* site, which goes to representatives of local rich people, moneylenders, fish dealers, and/or gangsters, who will help the fisherman in case of a problem (97-98). Local government officials in charge of managing the fishery also receive a portion of the *phong phang* fees.

The fact that local government officials are receiving payments for illegal activity testifies to their lack of commitment to enforcing national-level fisheries regulations. Government intervention has also caused unintended negative consequences. For instance, the government encourages Mountainhead villagers, through subsidies, to engage in sea bass aquaculture, an activity less environmentally destructive than marine fishing. However, even with subsidies only the rich can afford the start-up costs for this lucrative business. Thus the main result is to deepen social stratification rather than protect fish stocks, especially since most beneficiaries continue to supplement their income with *phong phang*.

Another key finding from this case is the persistence of social class divisions over time. In general, those who control the current system had ancestors in the old *phong phang* system (98). Villagers currently occupying the "upper middle class" and "highest class" have the most lucrative occupations, including selling cloth or jewelry, raising sea bass, money lending, and teaching religious school. Almost all of them had ancestors in the original *phong phang* system (96).

Even though Mountainhead is not a case of "planned" co-management, it offers three important lessons for co-management institutions. First, this case suggests that economic inequities are highly persistent, especially if management systems are created and maintained by the wealthy. Second, government intervention may have no effect or, even worse, unintended negative consequences. Third, investing power in the fishing community does not necessarily result in more equitable and sustainable outcomes.

*Impacts of fisheries co-management in Thailand*

The three cases described above may paint an overly gloomy picture of co-management in Thailand's fisheries. The truth is that the management of a CPR is challenging, messy, and often unpleasant no matter what arrangements are used. Co-management, even with its pitfalls, may offer some real advantages.

The main positive impact of co-management is the potential for better and more effective policies that benefit both fishing communities and the government. Policies developed through co-management are "better" if they can achieve better policy outcomes by incorporating information about local conditions, preferences, and needs. Decisions made through co-management will also be more effective in the long term if both parties (the community and the government) have invested themselves in the process and can expect to receive benefits.

Potential benefits to government include the opportunity to tap into the unique skills and capacities of fishing communities. In Baan Ao Lom, for instance, fishers willingly (and without compensation) monitor and enforce government regulations. The community, in turn, receives political and legal support for their activities, and gains greater control over the fate of their resources. In Thailand, there have also been "spin-off" benefits for community development as successful co-management institutions have taken on other environmental issues and further strengthened the community's institutional capacity (Wilson et al., in press). Similarly, co-management systems may provide long-term benefits as mechanisms for resolving resource-related conflicts (Carlsson & Berkes, 2005).

These positive impacts must be weighed against the costs of co-management and the potential for negative consequences. Co-management can incur significant transaction costs, particularly in communities with low levels of institutional and leadership capacity, or where there are severe conflicts of interest (Tokrisna et al., 1999). An extreme example is the fisher in Baan Ao Lom who was killed while enforcing a village regulation. Transaction costs also increase with the difficulty of excluding "outsiders" from encroaching. If fish are migratory or highly mobile, and the fishery lacks natural barriers, the costs of exclusion may outweigh its benefits.

Negative consequences of co-management center around issues of exclusion and inequity. Distribution of rights always creates winners and losers. In fact, the WCRPFC project found that local support for co-management usually stems from the communities' interest in excluding outsiders (Wilson et al., in press). But who is being excluded? The Baan Ao Lom and Mountainhead cases indicate that marginalized people reap the fewest benefits from co-management arrangements, while elites control the process. Participants tend to be overwhelmingly male, better educated, richer, and older (Wilson et al., in press; Johnson, 2001). This finding is confirmed by scholars studying co-management

arrangements in other parts of the world. For instance, Carlsson and Berkes (2005) cite the example of mahila mandals, women's organizations involved in forest protection in India, which tend to reproduce existing societal hierarchies by empowering female elites rather than marginalized women.

Another form of inequity exists in the power balance between government and the local community. The dominance of government and its unwillingness to form an equal partnership with community organizations was best illustrated in the Ban Bang Chan and Ban Haad Sai Pleug Hoy case studies. Whether intentional or not, the control exerted by government in the process of co-management can seriously limit participation from the local community and/or narrow the scope of participants to a small group of elites.

One very important lesson from these case studies is that co-management isn't necessarily more equitable or democratic than "top-down" state regulation. This finding directly contradicts some of the common justifications for engaging in co-management. Rather than create an inclusive participatory process, co-management may legitimize harms done to those outside the community (e.g. the Baan Ao Lom case) and solidify social stratifications within the community (e.g. Baan Ao Lom and Mountainhead). The case studies also indicate that co-management is not necessarily more effective or more efficient than state regulation.

These bold statements are not meant to discount or abandon the idea of co-management, but to point to the need for careful analysis of when co-management is or is not an appropriate management scheme.

### **Conditions under which co-management can be successful**

It is much easier to criticize co-management than it is to offer a practical alternative. The critical analysis is important, especially in light of so much scholarly enthusiasm. However, we should recall that other management schemes may be impossible to implement (e.g. privatization), more destructive than co-management (e.g. open-access), or highly impractical (e.g. complete state control or community control). The Thai government, for instance, simply lacks the capacity to enforce its own regulations (a common problem in many developing nations). This lack of viable alternatives leads us back to the task of trying to *improve* co-management by identifying the conditions under which it can be most successfully implemented.

#### *An appropriate balance of power and allocation of responsibilities*

As described in the first section of this paper, successful co-management hinges on an appropriate allocation of responsibility between the government and the community- one that simultaneously provides legitimacy, authority, flexibility, and responsiveness. Most scholars agree that co-management works best if the local

community focuses on formulating a system of rights and rules, while government focuses on formulating a legal framework to back up the system. This allocation of responsibilities takes into account the “comparative advantage” of each partner (Carlsson & Berkes, 2005).

However, maintaining this appropriate balance of power has several pre-conditions. First, government must be willing to devolve power to local communities. Often, this is a difficult task for state bureaucracies, which tend to want to manage a resource directly rather than take the “back seat” role of a facilitator (Wilson et al., in press). Second, communities must have the institutional capacity to use power effectively and equitably. Perhaps most of all, regardless of the exact distribution of responsibilities, both parties need to be clear on what their role is and what their role is not, but also be open to negotiation of these roles over time.

NGOs are beginning to take a more active role in co-management, and it is important that they also assume an appropriate set of responsibilities. These may include raising awareness and helping to organize co-management regimes (Wilson et al., in press); helping to resolve or mediate disputes (Johnson, 1998); and acting as a watchdog to ensure that equity is maintained. Unfortunately, little information was available regarding the actual role of NGOs in the co-management cases described above. A better understanding of how NGOs (and other stakeholders) influence co-management arrangements, and how their particular capacities can be utilized, is an important area for further research.

#### *Low transaction costs*

Co-management can be most efficiently and effectively applied where transaction costs of implementation are low. Transaction costs arise mainly from two sources: characteristics of the resource and the community. A resource that presents low transaction costs is one for which boundaries can be clearly defined and from which outsiders can be easily excluded. A fish resource that presents low transaction costs, for example, would generally be sedentary rather than migratory and would live in an area separated by geographical or artificial barriers (such as inside a cove and/or surrounded by reefs).

A community that presents low transaction costs has strong organizational capacity and capable leadership; is relatively homogeneous in livelihood and culture; has a high level of dependence on the CPR and few alternative livelihood options; and has high visibility (i.e. people can easily monitor each other’s behavior). High levels of social capital in a community (which is linked to cultural homogeneity and visibility) can be a “lubricant” that eases the formation and maintenance of co-management arrangements (Ostrom, 1990).<sup>11</sup> Management capacity and capable leadership (which is unfortunately lacking in many rural communities) makes it easier and less costly to sustain co-management arrangements.

An important counter-point is that characteristics conducive to co-management are not always beneficial to the community. For instance, socio-cultural homogeneity makes co-management arrangements easier to sustain (for example, the Thai-Muslim culture of Bao Ao Lom), but may also be associated with rigid social structures and persecution of minorities. A heavy dependence on the CPR may enhance the community’s concern for sustainable resource management, but is also associated with poverty, vulnerability to ecological fluctuations, and a lack of economic opportunity. Unlike community management capacity (which is for the most part positive), these characteristics should not be sought out for the sake of improving co-management.

#### *Managing equity issues*

We have seen that equity issues play a central role in co-management. There are two main pitfalls: 1) a tendency for government to dominate local communities in the co-management process and 2) a tendency for social inequities to be reflected in or intensified by community institutions. The first, as mentioned above, can be addressed by devolving more authority from government to communities. The second can be addressed by requiring more transparent and accountable local systems of government, providing community members with recourse to higher-level government channels; and enlisting third parties such as NGOs to “audit” or watch over the co-management system.

The remedies for these two types of inequities are somewhat contradictory, indicating a trade-off between sovereignty and accountability of the co-management system. By imposing accountability systems on community co-management institutions, we are restricting the scope of their authority. On the other hand, by expanding the scope of their authority, we allow localized social inequities to emerge. Ultimately, the appropriate balance of these two types of inequity is a political decision, closely linked to the earlier discussion on the need to balance local and national priorities.

#### **Conclusion**

Clearly, co-management has its share of challenges but it also provides a diverse array of possibilities for tackling a difficult management problem. To summarize the findings I return to the triumvirate of democracy, policy effectiveness, and efficiency. Co-management has potential to contribute to *democracy* by introducing a more participatory process in the allocation of resource rights and in day-to-day resource management. In the cases presented here, however, democracy has not extended much beyond community elites, who tend to control the process of co-management and receive disproportionate benefits. A serious commitment to equity on the part of local government officials and the assistance of NGOs in auditing co-management may help expand “democracy” to a broader range of community members.

Co-management seems to improve *policy effectiveness* simply because communities are able to supplement the enforcement activities of government, which are generally not sufficient on their own. However, an important caveat (and one that is often overlooked) is that local communities must support the sustainable management of fisheries. The interests of local communities go beyond the simple continuation of their resource-dependent livelihoods- for instance, they many prefer to focus on the development of alternative livelihoods.

*Efficiency* may also be greatly improved through communities' contributions to monitoring and enforcement, particularly in light of regulatory failures. However, the transaction costs of maintaining a co-management system must be weighed against these efficiency improvements.

A core issue for CPR management is balancing local needs with broad national goals and priorities. This is where the importance of a partnership with government comes in. Scholars who enthusiastically and unhesitatingly support community control should remember the maxim: "Don't throw the baby out with the bathwater." Government regulation is imperfect, especially in developing countries. However, as we saw in Thailand, unconstrained community control brings with it a new set of failures and shortcomings. The best we can hope for is a partnership similar to that envisioned by co-management theorists, but one which is adaptable enough to balance competing needs and interests.

## References

- Ahmed, M., & Delgado C. (2000). *Introduction to the Issues and Context of Rapid Changes in World Demand for Fish*. Paper presented at the Microbehavior and Macroresults, a conference of the International Institute of Fisheries Economics and Trade (IIFET), Corvallis, OR.
- Bennett, Elizabeth. (2000). *Institutions, Economics, and Conflicts: Fisheries Management Under Pressure*. Paper presented at "Constituting the Commons: Crafting Sustainable Commons in the New Millennium", the eighth conference of the International Association for the Study of Common Property (IASCP). Bloomington, Indiana, USA, May 31-June 4 2000.
- Boonchuwongse, P., & Dechboon, W. (2003). Socioeconomic assessment of marine fisheries of Thailand. In G. Silvestre et al., (Eds.), *Assessment, management, and future directions for coastal fisheries in Asian countries* (pp. 657-688). WorldFish Conference Proceedings 67.
- Carr, C. J., & Scheiber, H. N. (2002). Dealing with a resource crisis: regulatory regimes for managing the world's marine fisheries. *University of California International and Area Studies (UCIAS) edited volume I: dynamics of regulatory change: how globalization affects national regulatory policies*. Berkeley Electronic Press.
- Carlsson, L., & Berkes, F. (2005). Co-management: concepts and methodological implications. *Journal of Environmental Management*, 75, 65-76.
- Castro, A., & Nielsen, E. (2001). Indigenous people and co-management: implications for conflict management. *Environmental Science and Policy*, 4, 229-239.
- Coase, R. (2000). The problem of social cost. In: R. Stavins, (Ed.) Robert N. 2000. *Economics of the Environment* (4<sup>th</sup> ed.). New York: WW Norton.
- Durrenberger, E. P., & King, T. D. (2000). Introduction. In E. P. Durrenberger, & D. T. King (Eds.), *State and community in fisheries management: power, policy, and practice*. Westport, CT: Bergin & Garvey.
- Hardin, G. (1968). The tragedy of the commons. *Science*, 162, 1243-1248.
- ICLARM (International Centre for Living Aquatic Resources Management) and IFM (Institute of Fisheries Management and Coastal Community Development). (1998). Analysis of co-management arrangements in fisheries and related coastal resources: a research framework. Retrieved from <http://www.co-management.org/download/wp1.pdf>
- Janetkitkosol, W., Somchanakij, H., Eiamsa-ard, M., & Supongpan, M. (2003). Strategic review of the fishery situation in Thailand. In G. Silvestre et al., (Eds.), *Assessment, management, and future directions for coastal fisheries in Asian countries* (pp. 657-688). WorldFish Conference Proceedings 67.
- Johnson, C. (1998). Beyond community rights: small-scale fisheries and community-based management in southern Thailand. *TDR (Thailand Development Research Institute) Quarterly Review*, 13(2), 25-31.
- Johnson, C. (2001). Community formation and fisheries conservation in southern Thailand. *Development and Change*, 32, 951-974.
- Macfayden, G., Cacaud, P., & Kuemlangan, B. (2005, August). Policy and legislative frameworks for co-management. Paper prepared for the APFIC Regional Workshop on "Mainstreaming" Fisheries Co-management in Asia Pacific, Siem Reap, Cambodia.
- Mathew, S. (2001, October). Small-scale fisheries perspectives on an ecosystem-based approach to fisheries management. Presented at the Reykjavik Conference on Responsible Fisheries in the Marine Ecosystem, Reykjavik, Iceland.
- Nielsen, J. R., Degnbol, P., Viswanathan, K. K., Ahmed, M., Hara, M., & Abdullah, N. M. R. (2004). Fisheries co-management- an institutional innovation? Lessons from Southeast Asia and southern Africa. *Marine Policy*, 28, 151-160.
- Ostrom, E. (1990). *Governing the commons*. Cambridge: Cambridge University Press.
- Pimoljinda, J., & Boonraksa, V. (1999). Community-based fisheries co-management case study: Phang-Nga Bay, Thailand. Proceedings of the International Workshop on Fisheries Co-management. Retrieved from <http://www.worldfishcenter.org/Pubs/Way%20Forward/8%20pimoljinda.pdf>
- Polioudakis, E., & Polioudakis, N. (2000). Resource management, social class, and the state at a muslim fishing village in southern Thailand. In Durrenberger, E. P., & King, T. D. (Eds.), *State and community in fisheries management: power, policy, and practice*. Westport, CT: Bergin & Garvey.
- Pomeroy, R. S. (1996). Community-based and co-management institutions for sustainable coastal fisheries management in

- Southeast Asia. *Ocean and Coastal Management*, 27(3), 143-162.
- Pomeroy, R. S., & Berkes, F. (1997). Two to tango: the role of government in fisheries co-management. *Marine Policy*, 21(5), 465-480.
- Rusnak, Gerett. (1997). Co-management of natural resources in Canada: a review of concepts and case studies. Minga Working Paper #2. Retrieved from [www.idrc.ca/minga](http://www.idrc.ca/minga)
- Tokrisna, Ruangrai, Ponpat Boonchuwong, and Penporn Janekarnkij. (1999). A review on fisheries and coastal community-based management regime in Thailand. Proceedings of the International Workshop on Fisheries Co-management. Retrieved from <http://www.worldfishcenter.org/Pubs/Way%20Forward/way-forward.htm>
- Western, D., & Wright, R.M. (Eds.), (1994). *Natural connections: perspectives in community-based conservation*. Washington DC: Island Press.
- Wilson, D. C., Ahmed, M., Siar, S. V., & Kanagaratnam, U. (In press). Cross-scale linkages and adaptive management: fisheries co-management in Asia.
- (now defunct) is <http://www.co-management.org>. The main project partners were ICLARM (International Center for Living Aquatic Resources Management, now called WorldFish Center) and IFM (Institute of Fisheries Management and Coastal Community Development). The primary funding source was the Danish International Development Agency (DANIDA). This project ended in 2004 and final assessments are still being completed. The most recent article, used in the research for this paper, is Wilson, et al, in press.
- <sup>8</sup> All information in this case study, if not otherwise noted, came from Johnson (2001).
- <sup>9</sup> All information in this case study, if not otherwise noted, came from Pimoljinda and Boonraksa (1999).
- <sup>10</sup> All information in this case study, if not otherwise noted, came from Polioudakis and Polioudakis (2000).
- <sup>11</sup> Although not explored in this study, literature on social capital describes how social capital can enhance a community's organizational and management capacities.

## End Notes

- <sup>1</sup> This conceptual discussion of co-management is drawn primarily from literature focused on Asian fisheries. Although some more general articles on co-management were consulted, the concept of co-management described here is probably most applicable to co-management of fisheries.
- <sup>2</sup> A better source for this is the literature on **community-based conservation**, which provides a broader perspective on partnerships in conservation. See, for example: Western, David and R. Michael Wright, eds. 1994. *Natural Connections: Perspectives in Community-based Conservation*. Washington DC: Island Press.
- <sup>3</sup> The process of integrating experienced –based knowledge and scientific knowledge is notoriously difficult, because of the contextual character of EBK and its inability to be distilled it into “indicators” (Wilson et al., in press).
- <sup>4</sup> It would be useful to know more about how small- and large-scale fishers relate to the communities they fish in, but this information was not apparent from the sources used for this study. For instance, it was not clear whether large-scale fishers are (in general) members of the local community, Thai nationals from another part of the country, or foreigners. It is also not clear, in the cases presented later, the extent to which small-scale versus large-scale fishers are active in fisheries co-management. What is clear is that small-scale fishers are poorer and represent a large majority of Thai fishing households—about 85% according to Boonchuwongse and Dechboon (2003), and that, due to differences in fishing methods, there is considerable tension between the two groups.
- <sup>5</sup> The Thai Vessels Act described a process for the registration and licensing of fishing boats. The Act Governing the Right to Fish designated Thai-controlled fishing areas in the near-shore coastal waters, areas that were extended once the Thai EEZ was created by UNCLOS. Both are described in Tokrisna et al., 1999.
- <sup>6</sup> It should be noted that in the past 10-15 years, the Thai government has complemented its regulatory regime with a range of non-regulatory policies. Some remote fishing villages received subsidized infrastructure improvements, including community landing areas, gear repair shops, and freshwater tanks; while others benefited from mangrove restoration projects, artificial reef construction, and fish stocking. The government also subsidized non-destructive fishing practices by providing cheap gear and training in gear repair, and promoted alternative employment opportunities such as aquaculture, fish processing, and fish marketing. These non-regulatory policies are described in Tokrisna et al., 1999.
- <sup>7</sup> A large number of the studies I've used were sponsored (Pomeroy 1996) by this program, presented at one of its conferences, or conducted by one of its partner organizations. The project website

## APPENDIX A: Definitions of co-management

Sharing of power between government and local resource users	“the sharing of power and responsibility between the government and local resource users (Berkes et al., 1991: 12).” <sup>a</sup>
	“governance systems that combine state control with local, decentralized decision making and accountability and which, ideally, combine the strengths and mitigate the weaknesses of each (Singleton 1998: 7).” <sup>a</sup>
	“the blending of these two systems of management [local-level indigenous and state-level] in such a way that the advantages of both are optimized, and the domination of one over the other is avoided (Inuit Tapirisat of Canada quoted in the Royal Commission on Aboriginal Peoples 1997).” <sup>b</sup>
	“the sharing of responsibilities, rights, and duties between the primary stakeholders, in particular, local communities and the nation state; a decentralized approach to decision-making that involves the local users in the decision-making process as equals with the nation-state (The World Bank 1999: 11).” <sup>a</sup>
Potentially a broader scope of actors	“a partnership in which government agencies, local communities and resource users, non-governmental organizations, and other stakeholders negotiate, as appropriate to each context, the authority and responsibility for the management of a specific area or set of resources (IUCN 1996).” <sup>a</sup>
	“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 (Birrini-Feyerabend et al., 2000: 1).” <sup>a</sup>
Specific contexts (indigenous lands and fisheries)	“institutional arrangements whereby governments and Aboriginal entities (and sometimes other parties) enter into formal agreements specifying their respective rights, powers and obligations with reference to the management and allocation of resources in a particular area of Crown [Canadian government] lands and waters (Royal Commission on Aboriginal Peoples 1997).” <sup>b</sup>
	“an arrangement where management responsibility is shared between the government and fishing communities.... a set of institutional and organizational arrangements (rights and rules), which define the cooperation among the fisheries administration and relevant fishing communities” (Nielsen et al., 2004: 154).

<sup>a</sup> These definitions were cited in Carlsson and Berkes ,2005, and were not taken from their original source.

<sup>b</sup> These definitions were cited in Rusnak, 1997, and were not taken from their original source.