Case Studies of Fisheries Co-management in Asia

A number of case studies on fisheries co-management were conducted in collaboration with research partners across Asia. The purpose of the case studies was to systematically assess the performance of co-management as an equitable, sustainable and efficient management strategy, guided by a common institutional analysis research framework. This framework (see Chapter 4) links contextual attributes with the incentives to cooperate in resource management, as well as analyzing the outcomes of co-management arrangements. Its structured approach permits documentation and evaluation of the origin, current status, operation, and impact of co-management institutions, and facilitates a comparison across sites at differing levels of complexity. This chapter draws insights from thirteen case studies from the Philippines, Bangladesh, Indonesia, Thailand and Vietnam.

Four selection criteria guided the choice of case study sites: 1) actual sharing of responsibility and authority for resource management between the government and the resource users; 2) existence of institutional and organizational arrangements (i.e. property rights and rules, and resource user organization); 3) establishment of a resource management technology at the site (for example, marine sanctuary, marine reserve, mangrove rehabilitation); and 4) continuity or sustainability of resource management interventions at the site for at least two years after the project was completed and/or the external agent (NGO, academic/research institution, or government agency) left the area.

The latter part of this chapter presents a typology of the co-management case studies. The typology reflects diverse aquatic resource systems under which co-management has taken place in Asia and synthesizes the variables that have prompted resource users and other stakeholders to work together. It also highlights the predominant attributes associated with various sites.

It should be noted that what is presented in this chapter are only brief summaries of much longer and more comprehensive case studies. A full listing of the titles and authors of the thirteen case studies is provided at the end of this chapter.

6.1 The Philippines

The case study sites in the Philippines cover two islands and two bays. These include: 1) San Salvador Island (Katon et al.1997); 2) Cogtong Bay (Katon et al. 1998); 3) Malalison Island (Baticados and Agbayani 1998); and 4) Orion, Bataan (van Mulekom and Tria 1998).

6.1.1 The Marine Conservation Project for San Salvador (MCPSS)

San Salvador Island is a 380-hectare village that forms part of Masinloc Municipality in the province of Zambales, Philippines. It lies on the western coast of Luzon, about 250 km from Metro Manila (Figure 15).

San Salvador had a population of about 1,620 people, comprising 284 households in 1996. This represents an increase of 8 per cent from 1989, the initial year of the implementation of the Marine Conservation Project for San Salvador (MCPSS). Village households are dependent on fishing (64%), farming (23%), trading (4%), and service-related occupations (9%). Such occupational structure has remained fairly stable since the project started, where fishing and farming have continued to be the dominant economic activities.
In-migration has largely accounted for the emergence of a heterogeneous village population since the 1970s. Village residents are physically distributed across the island in three distinct ethno-linguistic clusters. The native Sambals (50%) occupy the northwestern and southeastern portions; the Ilocanos and Pangasinenses (20%) reside in the northeastern portion; and the Visayans from Central Philippines (30%) inhabit the southwestern part. In the 1970s and 1980s, resource use conflicts often occurred between the Visayans, who used sodium cyanide and dynamite, and the rest of the residents, who normally deployed non-destructive fishing gear such as hook and line, nets, and spear guns.

The San Salvador fishery is multi-species, multi-gear, and mainly artisanal. Fishing operations are generally done with motorized boats in dispersed fishing grounds, both around and outside the island. Food fish, both sedentary and migratory, are normally caught around the island. These include grouper, snapper, mackerel, anchovy, tuna, wrasse, and rabbit fish, among others. Aquarium fish, which are sold in the international market, are largely caught in the waters of Pangasinan, a neighboring province. The major types of fishing gear used are bag-nets, compressor, hook and line, hand-line, nets, and spear guns.

Figure 15. Map of San Salvador Island, Philippines
Brief history of resource management at the site

The island has been inhabited by three generations of residents. The initial migrants, who were largely farmers from the mainland of Zambales Province, had neither their own tradition of fisheries management nor an indigenous expertise in fish stock management. Moreover, the village residents did not have a history of collective action in fisheries management prior to the implementation of the Marine Conservation Project for San Salvador (MCPSS).

During World War II (early 1940s), Japanese troops occupied the island and sometimes used explosives to catch fish, marking the early beginnings of blast fishing on a limited scale. After the war, village fishers continued with their non-destructive fishing methods to meet the subsistence needs of the residents. The prevalence of abundant marine resources, socio-economic homogeneity of village residents, and a subsistence village economy enabled the residents to live together with minimal resource-use conflicts until the late 1960s.

In the 1970s, the scenario began to change due to the influx of migrants from the central Philippines, who brought with them destructive fishing methods, the integration of the village economy into the international market for aquarium fish, and the pronounced shift to destructive fishing operations such as blast fishing, aquarium fish collection using sodium cyanide, and use of fine mesh nets. These events led to the progressive devastation of San Salvador’s fishing grounds and to conflicts among resource users.

The effects of fishery depletion and unabated destruction of coral reefs began to be felt in the 1980s. Open access to the resource, rapid decline in fish stocks, and the existence of unscrupulous village residents contributed to worsening resource conditions. Village fishers using hook-and-line and gillnets reported that their average fish catch per fishing trip dwindled from 20 kg in the 1960s to barely three kg in 1988. Many reef fishes, such as groupers, snappers and damselfish, became scarce. A pre-project coral reef assessment in 1988 indicated an average of 23 percent living coral cover for the entire island.

Rampant illegal fishing activities prevailed in the 1970s and 1980s, fostered by a de facto open access fishery and lack of vigilant law enforcement. The highly centralized national government of the Philippines at that time was too distant to control the situation, while the San Salvador fishers themselves were too fragmented to embark on any collective action to avert resource degradation.

Changes in resource management: major initiatives

External change agents were instrumental in initiating resource management measures. A Peace Corps volunteer who arrived in San Salvador in 1987 was responsible for assessing the needs of the village, surveying coral reef conditions, and holding informal dialogues with resource users and stakeholders on the long-term consequences of environmental degradation. In 1988, he conceptualized the MCPSS, a community-based coastal resource management (CBCRM) project for coral reef rehabilitation. Funding came from the Netherlands Government and the Jaime Ongpin Foundation. The Haribon Foundation, one of the first non-governmental organizations in the Philippines to recognize the role of the community in resource management projects, served as the lead implementing organization (1989-93). Through the project, it had the opportunity to establish a marine sanctuary that featured a biological intervention (i.e. marine sanctuary and reserve) and a governance intervention, initially through CBCRM.
Project activities formally started in January 1989, a month after project launching. The goal was to reverse the downward trend in fish yields. The MCPSS sought to enhance institutional capabilities, develop and implement a marine resource management plan, and establish a coral reef fish sanctuary and a marine reserve. In addition, it encouraged the formation and strengthening of local groups responsible for marine resource management and income-generating projects. Central to the achievement of the project's goal was the community organizing process. Despite the absence of a tradition of collective action in fisheries management and the existence of heterogeneous village residents, the project succeeded in mobilizing the residents to take collective action on resource management problems. Intensive information campaigns helped the residents realize the consequences of unsustainable resource uses and heightened their concern for nurturing their natural environment, upon which their survival and livelihood depend.

A major event in the first year of project implementation was the ten-day trip to Apo Island, a marine sanctuary in the Central Philippines, of seven village residents who comprised the informal core group-cum-internal change agents. The Apo Island experience helped generate the confidence, and the motivation among the village residents that they, too, could embark on a similar undertaking. In 1989, the core group members spearheaded a campaign to support the 127-hectare marine sanctuary and reserve of San Salvador. Together with the external agents, they drafted a local ordinance that banned fishing within the sanctuary and allowed only non-destructive fishing methods in the marine reserve, such as hook and line, bamboo traps, gill nets (3 cm or larger), spear fishing without compressor, and traditional gleaning. In response, the Masinloc Municipal Council passed an ordinance in July 1989 that helped provide legitimacy to the San Salvador marine sanctuary and reserve at the local level and imposed penalties on rule infractions.

The MCPSS was not conceived as a co-management project. However, the Masinloc municipal government, which has political jurisdiction over San Salvador, was drawn into the picture in several ways: 1) by passage of enabling legislation (Municipal Ordinance 30-89) in July 1989 that provided a legal basis for sanctuary management and apprehension of rule violators; 2) through mediation of conflicts between village-based resource users and local residents on the one hand, and between village-based resource users and outside resource users on the other hand; 3) by provision of a motorized boat, hand-held radios, and fuel for patrolling the coastal waters in response to a request of San Salvador residents; 4) through the formal creation in 1993 of a patrol team to enforce fishery laws; and 5) by provision of a political environment that allowed the pursuit of community-based initiatives. Thus, the beginnings of co-management, which date back to mid-1989, were prompted by the political dynamics in San Salvador and by limited resources on the part of village fishers for enforcement operations. The project also called for the settlement of disputes. Village fishers recalled that confrontations with violators of the sanctuary ordinance required the support of the municipal mayor, particularly when village authority figures were unable to do so. Community organizers were hesitant to become directly involved in law enforcement since they felt that it was an inappropriate role.

Support from the Village Council was manifested in the endorsement of the sanctuary ordinance in 1989 and the banning of kunay, a traditional fishing gear that uses a long scare-line of coconut fronds for herding fish from the reef flat into a fine mesh net. The Village Council is a formal decision-making body in the village, whose members are elected to political positions with a three-year tenure. The Council also proposed to the Masinloc Municipal Council stiffer penalties for violations of the sanctuary ordinance.
In 1991, policy and legal support from the national government came through the passage of the Local Government Code, which gave the municipal government jurisdiction over municipal waters. The national government, moreover, declared Masinloc Bay as a protected seascape in 1993 under Presidential Proclamation No.231.

The Haribon Foundation turned over the project in 1993 to the village-based fishers’ organization it helped establish. Four years of community organizing work drew to a close, paving the way for the crucial task of sustaining project initiatives with local resources.

Co-management became increasingly more visible in the post-project phase (1993 onwards). The Village Council and the Municipal Council have taken a more active role in sustaining project initiatives by providing funds, personnel and additional facilities. Led by the Masinloc municipal government, law enforcement is now a collective responsibility of the government-deployed patrol team, fishers’ organization, and the village police. The municipal government demonstrated its continuing support by constructing a new guardhouse in San Salvador, providing food for the marine guards, augmenting radio facilities, and allocating funds for law enforcement operations. It also approved stiffer penalties for violations of the sanctuary ordinance. The Village Council, for its part, has deployed its village police and paid for the honoraria of resident marine guards. The village fishers have continued to adhere to non-destructive fishing practices, patrol the waters on a 24-hour basis, and guard the sanctuary. In July 1996, the San Salvador sanctuary won a prestigious national award for its achievement in coastal resource management and local governance, providing a source of pride to all partners and reinforcing the incentive to protect the sanctuary.

The strengths of the project lay, in part, in the active involvement of resource stakeholders in project planning and implementation, well-defined objectives, supportive leadership, strong linkages with the municipal government and sources of technical expertise and funds, and generation of tangible project benefits. Decision-making was participatory, marked by a series of consultations, dialogues, and public hearings to thrash out issues and conflicting interests, as well as by interaction among partners.

**Incentives to cooperate**

At the level of resource users, the factors that prompted cooperation were: dependence on fishery resources, recognition of resource management problems, and legitimacy and enforceability of rules. At the level of government and non-government organizations, the concern for improved living conditions and for sustainable coastal resource management served as motivation to collaborate. Worth noting, too, is the national acclaim for the resource management accomplishments of San Salvador, which reinforced the sense of pride of resource users and project partners and provided a new incentive to collaborate in the post-project phase.

The path to co-management, however, was not problem-free. Alienation and resentment prevailed among aquarium fishers and those who used destructive fishing gear due to the lack of alternative livelihood activities at the site. The displaced groups were compelled to fish in distant fishing grounds around the province and in neighboring provinces. The introduction of an alternative, non-destructive technology for catching aquarium fish using barrier nets came one year after destructive methods were banned. Over time, tangible project benefits in the form of a higher fish catch from San Salvador’s fishing grounds helped encourage rule compliance and adoption of non-destructive fishing practices.
Outcomes of co-management
The San Salvador experience attests to the triumph achieved by a fishing village in rising above the odds associated with de facto open access nature of the fishery and worsening marine resource conditions. More importantly, it demonstrates that a partnership between the village and the local government can succeed in averting resource degradation and sustaining resource management initiatives after the external donor has phased out from the site. Co-management has been instrumental in redefining resource access, encouraging fishers to shift to non-destructive practices, and instituting measures to guard the coastal waters from poachers and illegal fishers. In the process, a remarkable improvement in resource conditions has occurred. Fishers, moreover, have perceived positive socio-economic changes over time.

Biological changes are manifested in several ways. Based on key informant interviews, the average fish catch per fishing trip increased from barely three kg in 1988 (pre-project) to about 6-10 kg in 1996. This may be attributed to the protection of habitats where fish can breed and grow, primarily through the formal designation of a marine sanctuary; the control of destructive fishing practices, such as blast fishing and sodium cyanide fishing; and the pursuit of vigilant law enforcement by the local government and the village fishers. A recent resource assessment affirms that the condition of fish habitats has indeed improved and fish families have become more abundant. These may be seen in the extent of living coral cover, which more than doubled from 23 percent for the whole island in 1988 to 57 percent in 1998, and in the number of fish species, which increased by about 47 percent over the same period.

A comparative perception of other outcomes before and after co-management (1988 versus 1996) shows that the San Salvador fishers perceived positive changes. They felt that their knowledge of fisheries improved, particularly on fish stock management. Prior to the project, local knowledge was basically limited to fish capture and fishing gear, but relatively little was known on the biological/reproductive capacity of fish stocks. This type of knowledge is crucial to sustainable fisheries management. The fishers, likewise, perceived that co-management led to a more active sharing of information on fisheries among village residents. Contributing to this were project strategies that placed a premium on village-wide information campaigns, trips to other sites with similar resource management interventions, interactive meetings, and informal dialogues. Other areas where the fishers perceived relatively larger gains are satisfaction with fishery arrangements, benefits from the marine reserve, and quickness of resolving community conflicts. Fishers felt that conflicts among resource users tended to be resolved faster during the co-management phase. This could be attributed, in part, to the legitimacy of rights and rules, the existence of mechanisms for conflict resolution, and the intervention of the municipal mayor whenever village authorities needed assistance in dealing with difficult issues. Perceptions of ease in collective decision-making on fisheries management were also positive, partly attesting to the efficiency of co-management arrangements at the site.

Finally, the fishers perceived gains in equity. They felt a stronger sense of participation, influence over fisheries management, and control over fisheries, which was reinforced through the project’s empowerment strategy and participatory decision-making. They also perceived gains in the fair allocation of access rights, in household well-being, and household income over time. The outcomes are inspiring, particularly when viewed in the context of a degraded resource base during the late 1980s, lack of prior experience in collective resource management, and conflict-torn resource users. The project has provided the fishing village a reason for optimism, a motivation for taking collective action, and a sense of pride in its resource management achievements.
6.1.2 The Mangrove Rehabilitation and Coastal Resource Management Project (MRCRMP) of Mabini-Candijay, Bohol: Cogtong Bay

Cogtong Bay is located in the Central Visayas region of the Philippines. Two municipalities, Mabini to the north and Candijay to the south, share the Bay's 10,000 ha of municipal waters (Figure 16). Limestone hills and a thin fringe of mangroves are found at the outer portions of the Bay. The inner portion has extensive mangrove stands bordered by rice fields and coconut groves. Out of 2,000 ha of mangrove forest, 1,400 ha are still intact. Of these, about 275 ha on the islands of Lumislis, Kati-il, Tabondio and Calanggaman were declared as a mangrove wilderness by the national government. These are characterized by secondary bushy growth, having been cut repeatedly in the past. The rest of the mangrove areas, comprising about 600 ha, have been converted to fishponds.

The coastal villages of Cogtong in Candijay and Marcelo in Mabini are inhabited by native Boholanos (83%) and other Visayans from neighboring provinces. The predominant religion is Roman Catholicism. The village residents are fairly homogeneous in terms of ethnicity, religion, and occupation. About 75 per cent of the population at the case study sites rely on coastal resources for survival and livelihood, indicating a high degree of dependence on coastal resources. Aside from fish, most families gather crabs, shellfish, algae and other marine products for subsistence, as well as for sale to local markets.

The population of Cogtong has grown from 2,508 people (434 households) in 1988 (pre-project year) to 3,361 people (or 561 households) in 1997. This represents an increase of 27 percent from 1988, or an average of 3 percent per year. Mabini's population has grown more slowly from 675 people (120 households) in 1988 to 777 people (144 households) in 1997. This translates to an increase of 15 percent from 1988, or approximately 1.7 percent annually.

The Cogtong Bay fishery is multi-species, multi-gear, and mainly artisanal. Fishing operations are generally done with small, non-motorized boats in dispersed fishing grounds, both outside and within the Bay. Small pelagic species, including sardines and mackerel, are caught offshore. Rabbitfish, mullet, trevally, wrasse, scad and snapper are caught within the Bay. The types of fishing gear used are gillnets, hand-lines, fish corrals, spears, fish traps, squid jiggers and Danish seine.

Brief history of resource management at the site

Historically, Cogtong Bay has been marked by open access, where unrestricted entry to the waters and free-for-all harvesting of coastal products prevailed until the mid-1980s. The Bay has no customary rights of tenure to the fishery. For the mangrove areas, however, some form of informal management and tenurial rights have existed for three generations of residents in Cogtong, Candijay. Some 25 families informally took care of small mangrove areas of one hectare or less per family. Informal tenurial rights were passed on to the succeeding generations. Eventually, these rights became formal when the third generation applied for mangrove stewardship contracts in the latter half of the 1980s.

Fishers in Cogtong Bay recalled that fishery resources were abundant and mangrove stands were thick until the 1960s. Resource abundance, together with the use of non-destructive harvesting practices and the predominance of subsistence village economies, enabled the coastal residents to utilize coastal resources without major conflicts in resource use. The next two decades, however, saw a drastic change in the situation due to three major developments. These include the introduction of fishpond technology from Iloilo, a province in the Western Visayas region; the arrival of commercial fishers and entry of commercial mangrove cutters from neighboring provinces; and the integration of Cogtong Bay into...
Figure 16. Resource map of Cogtong Bay, Philippines

Legend:
- Mangroves
- Fishponds
- Fishing Areas
- Municipal Water Boundary
- Artificial Reef
- Nipa Palms
- Coconut
- Cassava
- Shoreline
- Rice
the heavily market-driven economies of nearby provinces and urban centers, such as Cebu and Tagbilaran. These factors hastened the degradation of the Bay’s resources and resulted in conflicts among resource users. The open access nature of the resource and lack of vigilant law enforcement efforts fostered the use of illegal fishing practices (i.e. use of fine mesh nets and blast fishing), as well as rampant mangrove cutting for firewood and fishpond development. The situation was aggravated by fragmented resource management functions among national government agencies and a lack of leadership. This gave rise to unclear jurisdiction over coastal resource management. The shift from subsistence village economies to market-driven economies opened new linkages to provincial and regional markets in the Visayas and intensified resource use.

The devastation of mangroves and fisheries posed a serious resource problem and was a source of discontent among coastal residents whose very survival is intertwined with the Bay’s resources. Village fishers became increasingly aware of the decline in their average fish catch over time. Their average catch reportedly dwindled from about 20 kg in the 1960s, to 10 kg in the 1970s, and to approximately 5-7 kg in the 1980s. The native residents found disturbing the influx of non-coastal residents and outsiders from neighboring provinces who destroyed mangrove areas to make fishponds.

Changes in resource management: major initiatives

In 1989, a major effort to avert resource degradation in Cogtong Bay and promote a more sustainable coastal resource management (CRM) came through the initiative of ACIPHIL, Inc., an externally-based private firm that has actively provided technical assistance to resource management projects in the Philippines, including the Central Visayas Regional Project. ACIPHIL entered into a partnership with the Department of Environment and Natural Resources (DENR) of the national government to pursue mangrove rehabilitation and coastal resource management as a component of the USAID-funded Rainfed Resources Development Project (RRDP). Inspired by the nearshore fisheries component of the World Bank-assisted Central Visayas Regional Project (1984-92), the Cogtong Bay project of Mabini-Candijay sought to transform resource users into resource managers who are directly responsible for day-to-day resource decisions. It adopted a co-management approach to address the problem of resource degradation and poverty in coastal villages along Cogtong Bay from 1989 to 1991.

The project featured a set of interventions and a process of empowering coastal villagers to carry out their own development and manage their renewable resources. Community organizers were hired as catalysts to initiate awareness campaigns, strengthen local capabilities, forge linkages with government units and establish village-based fishers’ associations for coastal resource management. In line with efforts to improve the condition of coastal resources, the project introduced mangrove management as a major intervention. Complementing mangrove management were other project components, such as community organizing, capability building, environmental education, mariculture (i.e. culture of mussels and oysters), concrete artificial reefs, and project facilities. The Network Foundation, a non-governmental organization, assisted ACIPHIL in implementing the Mangrove Rehabilitation and Coastal Resource Management Project (MRCRMP) of Mabini-Candijay between 1989 and 1991. Among the project’s physical accomplishments were the organization of 13 fishers’ associations, issuance of 265 Certificates of Stewardship Contracts (CSCs) for mangrove tenurial rights, rehabilitation of 110 ha of mangrove areas in Mabini and Candijay, and installation of 265 modules of concrete artificial reefs.
The assistance of the government was visible in several ways: provision of funds, resolution of policy issues, law enforcement, passage of enabling legislation, and issuance of property rights. Central to project implementation was the provision of secure mangrove tenurial rights to local fishers. The MRCRMP phase (1989-91) ushered in the redefinition of access to mangrove areas and the establishment of formal tenurial rights through the issuance of 25-year CSCs. The DENR gave CSC holders the right to manage their mangrove areas and harvest their trees, provided they replant each tree cut. Non-CSC holders were not allowed to cut mangrove trees in CSC-covered areas. This period also saw the need for a clearer delineation of political and legal boundaries to address issues of jurisdiction and resource use. The fragmentation of functions for coastal resource management at that time was manifested in the jurisdiction over mangrove areas by the DENR and in the authority of the Bureau of Fisheries and Aquatic Resources (BFAR) over fisheries.

During project implementation, a closer coordination between the DENR and the BFAR became imperative to resolve conflicting policies on resource use and fishpond development. BFAR at that time was encouraging fishpond development and issuing Fishpond Lease Agreements (FLAs). In some instances, this led to the clearing of well-stocked mangrove forests for fishpond construction. Village residents asked why they were expected to plant new mangroves and refrain from cutting existing trees when outsiders were allowed to come in and destroy mangrove forests. The struggle between FLA holders and village fishers was resolved when the DENR ruled that cutting trees in mangrove forests for fishpond development was illegal. In the absence of cutting permits from the DENR, FLA holders could not cut mangrove trees legally.

Recognizing the importance of strict and vigilant law enforcement efforts, the project staff and village fishers’ associations linked up with the municipal government of Mabini and Candijay for support in terms of facilities, police officers, and local legislation. The management of Cogtong Bay’s resources called for a committed partnership between the government and the village residents. Joint patrol teams regularly guarded their coastal waters and mangrove areas. Although prevention of illegal fishponds was not envisaged as a project activity, the fishers’ associations felt that the problem was serious enough to warrant collective action. In many instances, they succeeded in preventing the construction of illegal fishponds and the illegal harvesting of mangroves for commercial sale. They also played an active role in controlling blast fishing in the Bay.

During the post-MRCRMP phase, however, fishers observed a lower level of rule compliance. This was due, in part, to weaker law enforcement and lower support from the municipal government that came with a change in political leadership and with budgetary constraints. Consequently, the lack of vigilance and the breakdown in enforcement efforts encouraged illegal fishers to resume their destructive activities in Cogtong Bay. Illegal mangrove cutting, however, was less problematic in areas with formal property rights. The CSC holders, on their own, continued to protect their mangrove areas.

Political boundaries became more distinct when the Local Government Code effected the devolution to local government units of many of the functions previously performed by BFAR and DENR. At present, the municipal government exercises jurisdiction over municipal waters (i.e. waters within 15 km from the shoreline of the municipality) and over the management of community-based forestry projects. Areas beyond the municipal waters as well as those outside communal forests, however, remain under the BFAR and DENR, respectively.
In recent years, the Village and Municipal Councils of Candijay and Mabini have demonstrated a stronger interest in coastal resource management. They have supported the establishment of a new fish sanctuary at Lumisilis Island, pushed for stricter local legislation, and recognized communal mangrove areas for firewood gatherers.

Incentives to cooperate

The shift from open access to a communal property rights regime for mangrove areas in Cogtong Bay was prompted by several factors. These include: 1) common dependence on coastal resources on the part of resource users; 2) desire for better coastal resource management on the part of governmental and non-governmental organizations; 3) concern for improving the socio-economic condition of poor coastal residents; 4) legitimacy of property rights; and 5) realization of the need for collective action against illegal fishing and illegal mangrove cutting to avert further resource degradation.

Disincentives to cooperate, on the other hand, initially stemmed from conflicting government policies and indifference of some local government officials to strict law enforcement. These were eventually resolved when the MRCRMP drew attention to these areas and, together with fishers’ associations, pressured appropriate organizations to take action.

The delineation of mangrove property rights, however, led to the displacement of firewood gatherers. The restriction of harvesting rights to CSC holders alienated the firewood gatherers, but this was resolved with the designation of communal mangrove areas for firewood gathering. To prevent the rapid depletion of mangroves, the municipal government passed a local ordinance that banned the sale of mangrove firewood outside of Mabini and Candijay. The intent was to meet only the needs of the domestic market.

Outcomes of co-management arrangements

The co-management experience in rehabilitating mangroves at Cogtong Bay may be regarded as a victory over indiscriminate mangrove cutting on a large scale and a demonstration of a greater consciousness among resource users of the interaction between man and his environment. Nurturing the resource base and protecting livelihoods for the longer term called for a shift from a “use orientation” to a “resource management orientation” that actively seeks the enhancement of knowledge, skills, responsibility and accountability of resource users and other stakeholders. Central to this perspective is the recognition that resource users are de facto managers of the natural resource base and stewards of the environment in which they live.

Mangrove rehabilitation and provision of stewardship contracts to mangrove planters paid off. A post-project mangrove assessment in July 1997 indicates a relatively good mangrove growth at the reforested areas, particularly at Katungkian, which seems to have been influenced by protection from waves, relatively shallow depth, extensive water run-offs, and a muddy soil layer. The total basal area of mangrove stands was highest in Katungkian at 6.82 m²ha⁻¹. It was slightly lower at other sites, such as Panas, Catili and Lumisilis. Compared with San Miguel Bay, another site in the Philippines where over-harvesting and mangrove conversion to aquaculture also led to mangrove denudation, mangrove growth at Cogtong Bay is relatively better.

In relation to fish catch per fishing trip, key informants noted a continuing downtrend in the 1990s for various types of fishing gear, particularly for long-line, fish pot, hand-line, spear gun and squid jigger.
The only exceptions apply to gillnet and fish corral, from which the average fish catch of about 3-10 kg in 1997 comes close to the estimated catch in the 1980s. Though marine sanctuaries were established in 1995, they are relatively recent. The absence of benchmark data, moreover, precludes conclusions on the extent to which a change in fish abundance and living coral cover has occurred.

From the perspective of fishers, positive socio-economic changes occurred in a number of indicators, given a comparison of the situation before the project (1988) and after the project (1997). Larger positive changes were perceived in knowledge of mangroves, information exchange on both mangrove management and fisheries management, control over mangrove resources, quickness of resolving community conflicts, and influence over community affairs. They also perceived an improvement in household income and household well-being, among other factors. The fishers, however, did not perceive a statistically significant change in the overall well-being of coastal resources. This perception seems to have been influenced by the relatively lax enforcement of fishery rules during the post-project phase, return of illegal fishing activities in recent years, and a general downturn in fish catch for simple types of fishing gear. The fishers, nonetheless, are optimistic that the fishery will improve in the next five years. It appears that the co-management regime has been more successful in mangrove management partly because of the issuance of stewardship contracts that provided a strong incentive to protect the mangrove stands, and the relative ease in patrolling the mangrove areas on the part of the mangrove planters.

The experience of Cogtong Bay affirms that the management of coastal resources is not easy. It draws attention to the difficulty of managing coastal resources without the sustained cooperation of the government and the resource users to make rules and regulations work, particularly for fisheries management. Gains, nonetheless, are possible in spite of formidable odds if resource users and the government have a shared commitment to sound resource management and livelihood protection, and are willing to take decisive action. The continuing existence of mangrove stands established by the project along Cogtong Bay, the persistence of holders of mangrove stewardship contracts to voluntarily guard their respective mangrove stands from illegal cutters, and the recent emergence of new resource management initiatives (i.e. marine sanctuary) provide concrete proof that resource stakeholders have made a breakthrough.

6.1.3 The Community Fishery Resources Management Project: Malalison Island, Antique

Malalison is a small island village with a total land area of 55 ha. It is found in the municipality of Culasi, Antique in the central Philippines (Figure 17).

Three dominant families, consisting of descendants of the early island settlers during the Spanish era, have inhabited Malalison. In 1990 (the pre-project year), Malalison had a population of 421 people; this number rose to 512 in 1995, representing a 4 per cent increase per year. The average household size at present is about 5-6 members. The village residents are homogeneous in terms of ethnicity, religion, and occupation. Ninety-seven percent (97%) are native Ilongos who were born on the island, while three percent are migrants. Almost all the village residents are Roman Catholics. About 80 percent of the village households are dependent on fishing, shell gathering, and fish trading. Others are livestock raisers (4%), construction workers (3%), laborers (9%), and food vendors (2%). About 2 percent are unemployed.
Figure 17. Map of Malalison Island, Philippines
The Malalison fishery is multi-gear, multi-species, and artisanal. Fishers normally fish around the island and in nearby areas with hook and line, spear, nets and compressors. The types of fish caught are snappers, mackerels, groupers, surgeons, jacks, tuna, emperor, and marlins, among others. During low tide, women and children glean shells, sea urchins and sea cucumber. Most fishers (60%) use non-motorized boats. The rest have motorized boats and sailboats. Nobody owns boats that exceed three gross tons. The majority of the Malalison fishers reported that their fishing grounds have not changed over time and that they have shared nine reefs around the island with fishers from neighboring villages. Only 19 percent have frequented deeper waters.

**Brief history of resource management at the site**

Historically, the waters of Malalison Island have been characterized by open access. Nonetheless, there was an attempt on the part of the Culasi municipal government from the 1930s to the 1970s to regulate the fishery by accepting bids for four coral reefs in Malalison waters. The person who won the bid enjoyed the right to fish in the designated area. Fishers had to pay 10 to 20 percent of their catch from the area to the person who won the bid.

The 1970s saw more rampant use of blast fishing, whose beginnings actually date back to the end of World War II. The use of sodium cyanide in catching aquarium fish, a fishing method picked up from migrant fishers, also became widespread in the 1970s.

In the mid-1970s, the residents of Malalison filed a petition with the municipal government to open the Malalison waters and stop the bidding process. As a result, the fishers gained free entry to various fishing grounds. Fishers with hand-paddled boats and sailboats converged near the island. Spear and net fishers frequented the reef areas, while hook-and-line fishers moved to the deeper portions of the sea and reef slope.

The 1980s ushered in more intensive fishing operations. Commercial fishing vessels using purse seine and bag-net entered the Malalison waters, particularly in January and February, causing periodic conflicts between the native fishers and the transient fishers. Compressor-aided spear fishing started in 1987. The native fishers learned this method from fishers on a neighboring island and discovered that they could stay underwater for a longer period. The following year, a group of fishers put up a smaller version of the muro-ami, which enabled them to catch 200 to 300 kg of fish in one fishing trip. Muro-ami is a fishing method that uses stone-weighted scare-lines to drive fish out of their coral habitat into a surrounding net. Although this method is illegal, its use in Malalison continued until 1991.

In the late 1980s, dwindling fishery resources became evident. A subsequent fish-landing census from 1991 to 1992 indicated a low yield of 5.8 t.km$^{-2}$.year$^{-1}$ from coral reefs. If the reefs were intact, the yield would have been higher at 17 t.km$^{-2}$.year$^{-1}$. Live coral cover was low at 35 percent. The patch reefs and the southern fringing reef were substantially degraded, indicating that destructive fishing methods (i.e. cyanide fishing, blast fishing and muro-ami) were used in the past.

**Changes in resource management: major initiatives**

In 1991, the Aquaculture Department of the Southeast Asian Fisheries Development Center (SEAFDEC) launched an eight-year Community Fishery Resources Management Project, with funding support from the International Development Research Center of Canada (IDRC). The project aimed to enhance the
coastal environment through a community-based approach to resource management, and to improve the socio-economic condition of fishers. Four major interventions were introduced: 1) deployment of concrete artificial reefs to enhance fish habitats; 2) grant of territorial use rights of fisheries (TURFs) to solve problems brought about by ineffective law enforcement; 3) community organizing and institution building; and 4) alternative means of livelihood. SEAFDEC tapped a non-governmental organization, known as the Participatory Research Organization of Communities and Education toward the Struggle for Self-Reliance (PROCESS) Foundation, to handle community organizing and institution building.

During the initial phase, the inexperience of the research team in community-based projects created problems. Expectations of immediate project benefits prevailed among the village fishers. SEAFDEC’s research activities and the community organizing activities of PROCESS were not integrated. Moreover, other problems included an unstable leadership within the Fishermen’s Association of Malalison Island (FAMI), lack of understanding and appreciation of research activities by some community members, and absence of a full-time project leader.

To address these problems, the project team held regular community dialogues, general assemblies, staff visits, joint planning workshops, and meetings with the fishers’ association. The project also facilitated information exchange on fisheries management through visits to other CBFM sites, seminars, and annual forums where research results were shared with the fishing village.

The project has drawn its strengths from several factors. One is the active role of the municipal government of Culasi in project planning and implementation. Thus, the project was a co-management project at the outset. The municipal government formally designated an area of one km2 for FAMI’s management, where territorial use rights of fisheries are in place, and provided funds for training and livelihood assistance (Baticados and Agbayani 1998). Another factor is support from the Barangay (Village) Fisheries and Aquatic Resources Management Council (BFARMC) in endorsing the municipal government’s establishment of a fish sanctuary on Guiob reef in 1995. This hastened the provision of legitimacy to the fish sanctuary and related resource management activities. The third factor lies in the availability of external expertise, largely through SEAFDEC and PROCESS, in building up local capabilities, promoting non-destructive fishing practices, and encouraging interaction among resource stakeholders. The presence of these external agents helped bring about a rethinking of fishing practices and a better compliance with fishery-related rules.

Incentives to cooperate
The key reasons that induced various resource stakeholders to work together largely stemmed from resource use conflicts and recognition of dwindling fishery resources; desire to improve the socio-economic conditions in the village; legitimacy, enforceability and applicability of rules; and tangible project benefits.

The homogeneous and fishery-dependent village of Malalison was disturbed by the incursion of transient fishers who used highly efficient fishing methods, leading to conflicts with village fishers. The consequent decline in fishery resources prompted the village fishers to jointly assess the situation with the external agents, and pursue measures to reduce the threats to the resource base and fishers’ livelihoods.

The concern of external agents for sustaining resource uses and uplifting village conditions served as a springboard for initiating co-management arrangements and resolving gear conflicts. Bringing together
the resource users and the local government units at the municipal and village levels to agree on appropriate measures and to enforce the rules was crucial to the reduction of illegal fishing activities.

The passage of the sanctuary ordinance by the Culasi municipal government formalized the collaboration between the resource users and the local government to manage coastal resources. This was consistent with the Local Government Code of 1991, a landmark national legislation that grants local executives the political and legal mandates to shape the course of coastal resource management within their area of jurisdiction. The creation of the FARMC also institutionalized the participation of fishers in the development and conservation of their resources.

Potential conflicts, nonetheless, exist. There is a brewing tension among the village fishers on the use of compressor-aided spear fishing. Although this method is not illegal at present, some fishers who are not compressor users resent its use in Malalison. They feel that there is an adverse effect on their own fish catch since they are using less efficient gear.

Outcomes of co-management

The Malalison experience dramatizes an attempt to reverse destructive fishing practices through a collaborative effort on the part of external agents, village fishers, and local government units at the municipal and local levels. The acquisition of external fishing technologies and the entry of transient fishers who deployed destructive fishing gear altered the condition of the Malalison fishery over time. This has been translated into degraded reefs, dwindling fishery resources, and conflicts among resource users. The establishment of co-management arrangements proved to be an important turning point, marking the institution of property rights and rules, re-thinking of fishing practices, and reduction of resource use conflicts. The Malalison experience demonstrates that resource stakeholders and local government units at the municipal and village levels can work together to address issues related to sustainable resource uses and betterment of socio-economic conditions.

In a study conducted by SEAFDEC, the Malalison fishers expressed the view that significant changes have been associated with co-management arrangements. Consistent with the capacity-building and empowerment approach of the project, the village fishers perceived improvements in equity, particularly in terms of control over the fishery, fair allocation of access rights, participation and influence over fisheries management, household income, and overall household well-being. They also felt that collective decision-making has become easier and conflict resolution has been faster since the establishment of co-management arrangements. This was linked to the existence of formal bodies for planning, policy-making, and arbitration of disputes. Apart from these, perceptions of rule compliance, information exchange, and overall well-being of the fishery were positive, bearing favorable implications for sustainability.

Nonetheless, the ability of the fishers and resource stakeholders to jointly maintain resource management interventions after SEAFDEC phases out from Malalison remains to be seen. Building on earlier initiatives and meeting new resource management challenges will shape the course of future co-management arrangements.
6.1.4 Coastal resource management in Orion, Bataan

Orion is a municipality in Bataan province that lies along Manila Bay (Figure 18). Manila Bay may be regarded as a nightmare for sustainable development and resource management. It has a large area of 1,500 km², is heavily polluted, and suffers from outbreaks of red tide and over-exploitation of fish and non-fish resources. Orion municipal waters cover almost 10 percent of the bay area.

Orion has 23 villages, nine of which are coastal. The municipal coastline of Orion spans about nine kilometers. The population density in the coastal zone is high, at 1,541 persons/km². The residents are fairly homogeneous in terms of ethnicity. About 88 percent are Tagalogs while the rest are Visayans. Forty percent of the population is directly dependent on the fishery as a source of income. Most of the residents of Orion are engaged in a mixture of livelihood sources as a survival strategy, given the degraded condition of Manila Bay.

The Orion fishery is multi-gear and multi-species. Fewer than 20 small pelagic species and benthic non-fish species make up almost 90 percent of the fish catch. The dominant gear types are gillnets, long-lines, hook and line, small seines, trawls and push-nets. Most fishers use small boats (less than 3 GT?) with outboard (16 hp) or in-board (4-K) engines. The majority of the fishers in Orion fish outside the municipal boundaries. They consider the entire Manila Bay as their fishing ground. The fish are sold locally in Bataan (75-80%) as well as in distant Metro Manila.

Brief history of resource management at the site

Manila Bay used to teem with fish and other marine life. According to older fishers in Orion, fishing was easy during the 1940s and 1950s, often involving no more than throwing a seine in the water from the shore. They recall that many species were not even harvested but discarded as by-catch. Moreover, Orion and many other coastal areas along Manila Bay at that time still had plenty of natural mangroves.

During the 1960s and 1970s, an extensive commercial fishery gradually developed. Large trawls, both foreign and domestic, harvested large volumes of fish. During the same period, coastal habitats and mangroves were destroyed on a massive scale in response to the needs of a growing resident and immigrant population for housing and for fishponds. Industrial estates and beach resorts also emerged. Fish yields declined rapidly. The fishers decided to invest in larger and more efficient gear, encouraged by government-funded development programs that aimed to improve access to capital. As a consequence, fishers were able to venture into farther fishing grounds within Manila Bay.

During the 1980s, small-scale fishers started using destructive and illegal means of fishing. Yields continued their downward trend, species disappeared, and the returns from fishing became marginal. In the first half of the 1990s, the large community of small-scale fishers in Manila Bay hardly made any economic profit from the fishery despite long hours at sea. The rampant abuse of the ecosystem increased in spite of the government ban on commercial fishing in the bay. Frequent red tides and the El Nino phenomenon of 1998 aggravated the problems of fishers.
Figure 18. Map of the coastal area of Orion with main socio-economic and ecological features

LEGEND
- tidal flat
- mangrove area
- reforestation area
- boat-launching sites
- nipa/wetland area
- fish pond
- housing areas
- coastal and highway system
- rocky fore-shores
- coastal village

Note: adapted from a map drawn in 1991, based on visual surveys. Displayed fishing grounds roughly correspondent with patrolled areas.
Changes in resource management: major initiatives

The attempt of the national government to increase economic production and efficiency of the small-scale fisheries during the late 1970s was perceived to have contributed to over-exploitation and marginal returns. Recognizing this, the Philippine government embarked on a nation-wide Fisheries Sector Program (FSP) during the late 1980s that placed a premium on the rehabilitation of the coastal ecosystem and fisher participation in management.

In 1990, a non-governmental organization (NGO) known as the Philippine Rural Reconstruction Movement (PRRM) started a program in Bataan that aimed to promote sustainable municipal fisheries, diversify income sources, and build capacity and opportunity for community development. This was done through its Sustainable Rural District Development Program (SRDDP). From 1991, the PRRM incorporated the concerns of fishers in the program and initially organized fishers into village-based associations. This quickly led to fisher-based patrolling activities and deployment of artificial reefs. The fishers themselves initiated efforts to protect a small patch of mangroves from the threat of destruction. In 1992, the organizing efforts resulted in the federation of fishers at the municipal level, known as SUGPO (Samahan at Ugnayan ng Pangisdaan sa Orion).

It took another one to two years of organizing before the fishers readily participated in drawing up plans and initiatives in fisheries management. Their first priority was to exclude commercial and destructive fishing gear from the fishing ground, partly by means of efficient patrolling by volunteers from the village. In 1993, the municipal government enacted ordinances on the use of fisheries resources. Frequent consultations took place between the fishers and the representatives of municipal and provincial governments.

Five years later in 1998, the joint effort of the fishers and the government culminated in a comprehensive Coastal Resources Management Plan. Among the rehabilitation measures pursued are mangrove reforestation, sanctuary establishment (no fishing), and marine reserve establishment (limited fishing). The local fishers’ association has recently reforested about eight ha and has applied for mangrove stewardship agreements with the national government to obtain a 25-year right of tenure over reforested areas. In addition, a mangrove nursery was established at the Bataan School of Fisheries. A 50-hectare sanctuary is being maintained within the Orion waters. Although the sanctuary was set up in 1994, the marking structures were only installed in mid-1996. Initially, the fishers were apprehensive that a group of small trawl fishers in Orion would object to the buoys and markers.

Surrounding the sanctuary is a marine reserve with an area of six km². Fishing in the reserve is allowed only if passive, small-scale gear types are used. At present, more than 90 percent of the local fishers support the maintenance of the sanctuary and the reserve.

Under the current co-management system, the fishers are responsible for planning, policy and rule formulation, project proposal preparation and implementation, and enforcement of fishery-related rules. The municipal government provides legislative and formal endorsement, administrative support, and funding for the patrol teams. The present fisheries co-management system in Orion may be characterized as advisory, with some elements of informative management.

Incentives to cooperate

The incentives that induced the resource users and the government to cooperate are varied. For the fishers, these involved dependence on the fishery, access to government and non-government funding,
legitimacy of rules, tangible benefits from co-management efforts, and existence of various mechanisms for conflict resolution, information exchange, and collective action.

For the NGO, the motivation lay in its concern for environmental sustainability, service delivery and impact, and desire to bring about an improvement in the socio-economic and political conditions of coastal residents. On the part of the municipal government, the incentives took the form of concern for the local resource base, political stability and constituency, and a formal mandate for coastal resource management.

Outcomes of co-management
The co-management system in Orion, Bataan emerged in the context of declining fish catches that were closely linked to rampant overfishing and resource degradation. The case of Orion highlights the need for stakeholder participation in fisheries management. Moreover, where rehabilitation efforts are slow due to the extent of resource degradation and the size of the management area and where fishing income is inadequate to meet survival needs, the diversification of income sources becomes imperative.

Despite the environmental odds they faced, the Orion fishers perceived positive changes over time. These perceived changes, however, are basically related to less tangible benefits (i.e. participation, influence, resource access, rule compliance, information exchange and knowledge of fisheries) rather than to more tangible benefits (i.e. increases in fishing income, higher fish catch and improvement in the general condition of the fishery). This is understandable in light of the scale on which the project is implemented and the small management area in comparison to the total fishing ground. Co-management appears to have been more associated with perceived changes in social, political and attitudinal aspects. In spite of the apparent lack of tangible benefits, co-management continues to enjoy a large base of support in Orion.

6.2 Bangladesh
The case study sites in Bangladesh cover inland waterbodies, primarily semi-enclosed lakes. They include Hamil Beel (Thompson et al. 1998) and Ox-bow Lakes (Khan and Apu 1998).

6.2.1 Community-based management of Hamil Beel
Hamil Beel is a small semi-enclosed lake located in Dhanbari Union. It is under Modhupor Thana in Tangail District, in north-central Bangladesh (Figure 19). The horseshoe-shaped beel (lake) has a dry season area of about 16 ha (40 acres). The lake retains water throughout the year and has a small catchment of adjacent fields. The depth of the water in the lake never falls below one meter, even in the dry season, except in very exceptional drought years (i.e. 1986 and 1995).

In the monsoon season, the lake is connected with the Bangsi River to the east through a small channel. Fishers block this channel with a bamboo fence to prevent fish from escaping from the lake. In high flood years, the lake connects with wider floodplains linked with the Jamuna River. Only in these years can fish migrate freely between the lake, floodplains and river.

The residents of five predominantly Muslim villages around Hamil Beel are mainly involved in farming and providing labor services. Fishing is a secondary occupation. The participants who hold rights over the fishery form a homogeneous group, with the exception of a few influential leaders. They are part-
time fishers who derive about half of their household income from fishing. The people involved in fisheries, both capture and culture (carp), are market-oriented. Some small fish are caught for food. Seine nets are used for organized fish harvesting while push nets, cast nets, and hook and line are deployed for individual subsistence fishing.

Figure 19. Map of Hamil Beel, Bangladesh
Brief history of resource management

Fishers recall that during the 1960s, abundant and diverse indigenous fish species were found in Hamil Beel. However, connections with the river system became less regular due to siltation, flood control, and other infrastructure works. Fishers observed a gradual decline in fish stocks, along with the disappearance of the economically important migratory Indian major carps.

Until 1971, the government leased out fishing rights in the lake to private individuals through an open auction. The naturally occurring fish stock was harvested in large numbers. In 1972, a fishers' organization emerged, known as the Dhanbari Fishers Cooperative Society. It controlled the beel fishery from 1972 to 1987. A local fisher, who was well acquainted with the laws on public leasehold fisheries and who had good relations with the local leaders and the elite, led the cooperative society. The ordinary group members did not show much interest in management, possibly afraid of the powerful people involved in the fishery. Thus, the fishers were open to exploitation. The cooperative society retained control over the lake by establishing strong linkages with local leaders and government, particularly with the local staff of the Department of Fisheries (DOF) and the Thana administration. From 1972 to 1987, the cooperative society purchased wild fry and fingerlings (about 2-5 cm long) in boatloads.

From 1988 onwards, Hamil Beel came under a licensing system that was instituted according to the New Fisheries Management Policy (NFMP). Under the NFMP, individual fishers were to receive licenses directly from the DOF on payment of a fee, instead of bidding for the lease. In practice, the cooperative leaders retained control – they made a list of their members as the "genuine" fishers who would be licensed and then paid their license fees. During this period, cooperation between the fishers and the DOF increased and hatchery-reared carp was obtained for stocking the beel.

The financial returns from the beel fishery were poor, despite stocking during the NFMP period, which lasted for six years. The maximum production, occurring in 1990/1 but was only 291 kg.ha⁻¹. In 1988, a severe flood caused the stocked fish to escape and wild species to enter the lake. A serious fish disease, called Epizootic Ulcerative Syndrome (EUS), first reached the lake during this flood and in some subsequent years wrought havoc on the beel fish population.

In 1995, there was no motivation to stock the lake due to lack of government support, changes in policy and a high flood. The breakdown of existing systems led to an open access fishery for natural fish and sporadic fishing in the lake by transient fishers.

Changes in resource management: major initiatives

The year 1996 saw new changes in the fishery, largely due to the initiative of a new government project and the assistance of a non-governmental organization (NGO). Hamil Beel was covered by the Community-Based Fisheries Management (CBFM) Project, a partnership involving the DOF, NGOs and ICLARM (now the WorldFish Center). Under the project, the local fishers were encouraged to take over the management of the fishery themselves. Caritas, the partner NGO, was responsible for supporting both the government and the local fishing villages in the introduction of new CBFM practices in Hamil Beel and four other water bodies.

In early 1996, the fishers were reorganized into six groups. A Beel Management Committee (BMC) comprising existing fisher leaders and representing all six groups was formed, and they stocked Hamil Beel in May 1996. Production under the reorganized arrangement improved and the returns were
distributed equitably among the fishers. To encourage the groups to be self-reliant and cohesive, the field staff of Caritas recommended each fisher group to begin a savings scheme. The fishers attended training courses in leadership and management, bookkeeping/accounts management, gender awareness, and adult literacy courses, which led to consciousness raising and capacity building. Caritas also extended credit to finance both fishery and non-fishery activities (i.e. rice husking, carpentry, van and grocery businesses). Women were involved in training and income-generating activities.

A new Beel Management Committee (BMC) was elected in early 1997, and the lake was again stocked. However, the change in leadership led to a weakening of the ex-leader’s power and the emergence of factions among the fishers. Underlying these was the awareness of fishers of exploitative practices in the past and of the need for change.

Under the new management, nonetheless, there were problems related to quality control of stocking, lack of commitment to guarding the lake, poaching, and mismanagement of funds. Complaints about the current BMC persisted in 1998. When the BMC attempted to exclude some 20 members for not contributing to the stocking costs, this resulted in a dispute with those who demanded re-instatement. The ex-leader and his supporters used this dispute to strengthen their move to discredit the existing BMC and regain power. They filed a legal case against the current BMC leader, alleging misappropriation of funds. At this stage, the project partners were in the process of diffusing the conflict. The situation highlights a power play involving the fishers, the DOF, and the NGO. The ex-leaders had a working relationship with the DOF for 10 years. Consequently, they sought the support of the DOF in their attempt to discredit the new BMC. The BMC, on the other hand, looked for support from the NGO that helped its new leaders gain power. Fortunately, such internal disputes did not escalate to the point of losing control over the fishery.

Incentives to cooperate

For the fishers, the incentives to cooperate in fisheries management are varied. They rest mainly on direct economic benefits associated with better management of a stocked fishery, secure access rights, and attraction to greater participation and equity in management. For the governmental and non-governmental organizations, the incentive for working together lay in a common concern for sustainable inland fisheries and for a more equitable distribution of financial returns among the Hamil Beel fishers.

In the first year of implementing the CBFM Project, there was considerable cooperation among the resource users when the advantages of the new approach were apparent to all. In the process, however, the empowerment of fishers led to the weakening of power of the ex-leader, who had been the primary decision-maker for more than two decades. This gave rise to rifts within the fishers’ organization and ineffective guarding of the beel. Eventually, the ex-leader stopped attending meetings and refused to cooperate. External threats to the fishers’ control over the beel were also a big incentive to cooperate. For example, in early 1999, the local municipal council tried to auction fishing rights in the beel although it did not have this authority. The acting BMC, ex-leader, NGO and DOF all cooperated to resist this threat.

Outcomes of co-management

The Hamil Beel experience represents a triumph over the inequitable sharing of returns from a fishery and a bold attempt to give ordinary fishers a voice in planning and decision-making. The restructuring of the fishery from an elite-dominated sector to a broad-based, participatory-oriented sector paved the
way for more transparent decision-making and a realization of higher incomes among members of the fishers’ organization. The immediate achievements of co-management were visible in terms of increased fish catches resulting from stocking with larger fingerlings in appropriate numbers, better rule compliance, and a more equitable sharing of benefits.

Perceptions of the Hamil Beel fishers attest to improvements over the first two years of CBFM implementation. In particular, the fishers perceived positive changes in information exchange, knowledge of the fishery, compliance with rules, and control over the fishery. These may be mainly attributed to the interactive discussions pursued by the project, development of local capacities for collective action, legitimacy of fishery-related rights and rules, and policy support from the government. The fishers also felt that they could influence community affairs and make their opinion count. Despite internal conflicts within the fishers’ organization that came about with fisher empowerment and weakening of traditional leaders’ influence, the fishers felt that the resolution of conflicts and collective decision-making could be achieved with relative ease under the co-management regime. What made this possible are the existence of clearly defined rules and procedures, availability of appeal bodies, and occasional mediation by external agents to diffuse tensions.

There was a high level of acceptance of BMC’s rules and control of the fishery among the CBFM participants. This is understandable because other households in the same villages were excluded from the fishery. Ultimately, widespread acceptance will depend on the legitimacy of the new co-management arrangements under the CBFM project.

The Hamil Beel experience highlights the dynamic and evolving nature of co-management and underscores the appropriate handling of conflicts and consensus building. Changes in the status quo may be accompanied by tensions, shifting loyalties, undermining of influence of traditional leaders, and emergence of new leaders. An understanding of the history of fisheries management at the site and a good grasp of the dynamics of stakeholder behavior are vital, particularly in the context of shifts in leadership, management arrangements and benefit sharing.

6.2.2 Fisheries Co-management in the Ox-bow Lakes of Bangladesh

Ox-bow lakes are formed by deeper sections of winding rivers that either changed their courses in the past or dried up. These sections are bends, both ends of which are silted up, rendering them semi-closed water bodies in dry seasons. During the rainy season, however, they get connected with the floodplain or their dried up parts. The name ox-bow is derived from its shape, which resembles a horseshoe.

The Ox-bow Lakes, locally known as baor, have been subjected to a number of management regimes over time. During the British colonial period (1757-1957), they belonged to the landlords (Zamindars) on whose properties they existed. In 1950, the East Bengal Estate Acquisition and Tenancy Act converted Ox-bow Lakes into government property and placed them under the jurisdiction of the Ministry of Land (MOL). The MOL leased these lakes for three years at a time to private leaseholders and cooperatives through an annual auction. The leaseholders engaged professional Hindu fishers to harvest fish in return for a share of the catch. They also allowed the poor to gain access to these lakes, and in the process, enjoyed social esteem in the community. The short duration of the lease, however, discouraged investments. Besides, water hyacinths clogged the lakes, resulting in low productivity. The leaseholders thus retained the lakes more as a symbol of prestige than as an income-earning asset.
During the late 1960s, the government attempted to increase carp production by introducing polyculture in closed water bodies, primarily through the Development Management Scheme (DMS). The Department of Fisheries (DOF) was responsible for overseeing the scheme. Professional fishers participated in a catch sharing arrangement, where they retained 40 per cent of the harvested fish. This was 15 percent higher than that allowed by the leaseholders. The scheme, however, was unable to achieve its goal due to poor management, insufficient fingerlings and limited funds. After independence, fisher cooperatives were formed in 1971 to allow fishers to participate in the auctions for the lease of water bodies. However, the cooperatives came under the influence of local elites, who reduced the role of ordinary fishers to mere workers.

In 1980, the DOF launched the World Bank-assisted Ox-bow Lakes Project I (OLP I), which sought to increase fish production and improve the socio-economic conditions of the fishing villages. Each ox-bow lake was managed by a DOF manager with fishers treated as wage laborers for a stocked capture fishery. The OLP I served as an experiment in government management of public water bodies. However, it did not foster self-sustaining fisheries management due to the lack of involvement of the resource users in fishery and ancillary operations.

In 1985, the DOF initiated the Ox-bow Lakes Small-Scale Fishermen Project (OLP II). The objective of the OLP II was to transfer the culture-based fisheries management of ox-bow lakes to the fishers themselves by creating appropriate institutions and a mechanism for guaranteeing security of tenure. The project, which actually took off in 1991, was a social fisheries project that became the first experiment in fisheries co-management at Ox-bow Lakes. It was funded by the International Fund for Agricultural Development (IFAD). The Danish International Development Agency Danida) provided technical assistance while a local NGO, known as the Bangladesh Rural Advancement Committee (BRAC), mobilized the fishers and strengthened local management capacities. BRAC is one of the oldest and largest NGOs in Bangladesh.

The project was designed to augment the production of the lakes and to ensure that fishing rights (security of tenure) go directly to the fish producers and catchers. Fishers’ groups were formed from the ranks of license holders and those who were prepared to invest in the productive capacity of the lakes. In line with this, the government provided long-term access and harvesting rights that lasted from five to ten years. At the core of the OLP II was the concept of self-help.

With the implementation of the OLP II, the fishers were given the right to manage natural water-bodies near their village. The government of Bangladesh issued licenses to fishers and provided technical support to enable them to invest in the productive capacity of the lake. Under this project, the DOF is the leaseholder of the lakes; the fisheries user right is in the hands of the respective lake management groups (LMGs), which consist of the LFT (comprising a number of fishery teams) plus the fish farming group (FFG), comprising a number of pond groups managing the FFG ponds constructed on public land at the edges of the ox-bow lake. The LMG pays an annual lease fee to the MOL through the sub-district fisheries officer of the DOF, who in return issues fishing licenses to fishers.

The project area for the OLP II is in Jessore in southwestern Bangladesh (Figure 20). The area has a wide alluvial plain intersected by numerous rivers. The receding and shrinking rivers have left behind water-logged areas. The OLP II covered 23 natural ox-bow lakes. Case studies of co-management were undertaken in three lakes: Porapara, Saster and Nasti. Among these lakes, Porapora Lake represents the best case of co-management in terms of the outcomes.
Porapora Lake

Porapora Lake has an area of 89 ha. It is one of the larger ox-bow lakes with good water quality. Its water remains greenish throughout the year, which is excellent for fish culture. The lake is also used for jute retting and irrigation, but these uses do not pose a threat to fish culture.

The fishers of Porapora are heterogeneous in terms of religion, but not in ethnicity. The Muslims, who comprise the majority, are engaged in both fishing and farming activities. The Hindus, who belong to the minority, depend solely on fishing. In fact, Muslims are newcomers who have decided to engage in fishing due to the absence of other livelihood opportunities. Most households in the community have been caught in a low-income trap, partly due to the exploitative social structure, lack of education, limited technical know-how, and no access to credit.

Figure 20. Map of Ox-bow Lakes, Southwestern Bangladesh
Brief history of resource management at Porapora Lake

Prior to the OLP II, Porapora Lake was almost fully covered with different species of floating aquatic and semi-aquatic vegetation. The lake was managed by leaseholders who introduced stocking of Indian carps on a limited scale.

Traditionally, fishing was done with kochai or a seine net. At the beginning of the project, very few fishers were skillful in fishing with brush shelters, locally known as komar fishing. Over time, their number grew as a result of their participation in project training activities.

Changes in resource management

Under the OLP II, the lake was brought increasingly under carp culture. The Lake Fishing Teams (LFTs) received fingerlings from private suppliers, many of whom were previous leaseholders who were ready to supply for any amount on credit. Before the provision of credit by the OLP II through the BRAC, these private suppliers were the only sources of fingerlings. At that time, the fishers generally had no knowledge of fisheries management; they were dependent on their leaders who carried out all activities, including purchasing.

There was an instance in 1992-93 when a local leader drew an amount of money for the fingerlings. However, no purchase was made and no stocking was done. As a consequence, the local leader lost his title. A positive outcome was the entry of local residents into the trade of supplying fingerlings, which used to be a monopoly of outsiders. A new generation of fingerlings traders emerged among the villagers. At present, most of the suppliers belong to the locality and are known to the fishers. This situation, along with the development of the fingerlings trade in the locality, has helped curtail corruption and misuse of funds.

Incentives to cooperate

For the fishers, the primary incentives to work together are dependence on the lake’s resources, possession of legitimate user rights, equitable benefits from managing the stocked fishery and democratic decision-making. For the DOF and the BRAC, the motivating factor is their commitment to increasing the direct participation of fishers in resource management.

Fishers are among the poorest groups in Bangladesh. Muslim and traditional Hindu fishers belong to the same low economic stratum and share characteristics that are common to those who have lived in the same villages for generations. Their dependence on a common resource base for their livelihood has provided a motive to collaborate in fisheries management. This was stimulated by assistance from the government and the BRAC, along with use rights, credit access (for stocking and fishing gear), and tangible benefits from participating in collective resource management. By forming a group and having access to important services, stocking and fish harvesting became much easier for the fishers to undertake. The project prohibited members from seeking election to the management committee for consecutive terms, curbing the hold of traditional leaders and enabling new leaders to emerge.

There were, nonetheless, cases of conflict between resident fishers and rich, non-resident fishers. Most resident fishers wanted to drop the latter group because they engaged in a private lease outside Porapora, about 11 km away. Fishers were polarized into two groups. Non-resident fishers got together to fight the Porapora fishers, but did not win in the election. This somehow drove a wedge into the overall group solidarity. Eventually, however, constant participation in guarding, stocking and fishing drew the fishers together again, reducing estranged feelings in the process.
Outcomes of co-management

The OLP II affirms that the resource users and the government can collaborate in achieving higher fish yields from the lakes, building local capacity for direct participation in fisheries management and introducing more equitable arrangements. Overall, the average fish yield improved from 450 kg./ha\(^{-1}\) to almost 700 kg./ha\(^{-1}\). The Ox-bow lakes have adopted equal remuneration for equal work, which is a basic principle of the project for income sharing. All groups pool their day’s catch and share the proceeds, irrespective of their status in the group. Because of this arrangement, fishers have reportedly been able to own land and increase their credit standing. Disparities in the size of rooms within household dwellings also decreased. Before, only leaders lived in spacious rooms. Now, even members can afford to have large rooms.

Fishers, moreover, have acquired the ability to frame operational rules for governing resource use and implementing them. Rules regarding stocking, harvesting and marketing are laid out, along with rules on illegal entry and poaching. All members are involved in decision-making on the lake fishery. An opinion survey involving a comparison of pre-project and current situations indicates that fishers strongly believe that they have the necessary skill to participate in fisheries management and to influence decision-making. They also feel that the sharing of income from fishing has become more equitable.

The experience at Ox-bow Lakes is an example of how access to the fishery has shifted from the privileged few to the broader group of fishers who need to survive and earn a decent livelihood. The heavy dependence of village residents on fishing and the limited opportunities for alternative livelihoods have given external agents and the government a reason for concern and for taking action.

The experience shows that the proximity of the lake to the households is important. Fishers who live near the banks tend to have a closer affinity with one another and a greater involvement in collective resource management than those who live in distant villages. Moreover, the Ox-bow Lakes experience affirms that legal and policy support from the government is vital in providing legitimacy to use rights and law enforcement efforts, as well as in reducing encroachment into lake fisheries by the elite.

6.3 Indonesia

The case studies in Indonesia cover coral reef management of Jemluk Island, Bali (Nikijuluw 1996b), indigenous coastal fisheries management in Sulawesi, Maluku and Irian Jaya (Nikijuluw 1998), sasi laut management system in Maluku Province (Novaczek and Harkes 1998), and a non-traditional management system in West Sumatra Province (Susilowati 2000).

6.3.1 Management of coral reef areas in Jemluk Village, Bali

Jemluk is a village in northeastern Bali, Indonesia (Figure 21). It is part of Abang District, the Regency of Karang Asem. Its coastline spans a length of about two km.

The waters within 400 m from the beach are designated for activities of the villagers. The water bottom consists of living coral, sandy coral, muddy coral, and black sand.

The physical condition of the inshore waters cannot be separated from that of open waters. During August, relatively cooler and higher salinity water from the Banda Sea passes by the Jemluk area to the Java Sea. During February, mud from the Jemluk river floods the sea, explaining the existence of muddy coral and black sand at the bottom of the Jemluk waters. The waters, nonetheless, are clear because of the circulation process of tidal waves.
Of the many tourist destinations in Bali, Jemluk is known for its coastal waters which offer sport fishing, scuba diving and snorkeling. Before becoming renowned as a tourism spot, Jemluk was a modest fishing village.

The population of Jemluk in 1996 reached 566 persons, consisting of 279 males and 287 females. An average household has five members. Almost 93 percent of Jemluk’s 117 households are engaged in fishing, while the rest derive their income from agriculture (3.4%), trading (1.8%), and services (1.8%). Fishing is confined to nearshore waters mainly due to the predominance of non-motorized boats or of boats with small engines that are unsuitable for offshore fishing.

In terms of origin, the earliest residents of Jemluk arrived as migrants from Culik village. As tourism developed, people from surrounding villages, such as Tista and Bunutan, also came to live in Jemluk.

The Jemluk fishery is artisanal, multi-gear and multi-species. Most fishers use hand-lines and drift gillnets to fish for their subsistence needs. Other fishers use troll-lines and bottom gillnets and sell their catch, usually comprising mackerel, little tuna, pomfret, snapper and grouper. In Jemluk, troll-lines and hand-lines are the most commonly used fishing gear (261 units each). There are only three units of gillnets and 12 units of drift gillnets. The hand-line is for catching demersal fish and the gillnet is for pelagic fish. The fish are sold in the village market.

Among the 100 fishers in Jemluk, 40 percent are engaged in tourism. They offer their boats for tourist excursions. The frequency of trips has increased steadily, from 324 trips in 1992 to 2,400 trips in 1995.

Figure 21. Map of Jemluk Village, Bali, Indonesia
Brief history of resource management at the site

About 30 years ago, village residents used the living resources of the reef ecosystem mainly for daily subsistence. The international demand for spiny lobster and ornamental fish, however, led to the commercial capture and collection of these marine products. As the demand for building materials increased, corals were used to provide brick and road materials. Despite a provincial decree banning coral collection, rule compliance was low since many village residents had built their livelihood on coral collection.

The ornamental fish industry, along with easy access to the export market through international flights from the capital city of Denpasar, also contributed to the destruction of the coral reef ecosystem. Fishers used cyanide to catch ornamental fish from coral reefs, resulting in resource degradation. The production and number of species of seaweed, mollusk and spiny lobster reportedly declined. At present, coral ecosystems in Bali are regarded as an important asset for attracting tourists.

Changes in resource management: major initiatives

The Provincial Fisheries Service of the Directorate General of Fisheries (DGF), in collaboration with the Research Institute for Marine Fisheries (RIMF), initiated resource rehabilitation efforts at the site in 1991 and 1992. Through the Coastal Waters Development Project, 18 modules of artificial reefs were installed in the waters of Jemluk, covering an area of 217 cubic meters. The main objective was to provide a substitute for destroyed coral reefs and a habitat for fish and other marine organisms. Another objective was to improve the well-being of the villagers.

The project involved the residents of Jemluk in constructing and installing the artificial reefs, as well as in monitoring fish abundance and fish diversity. Old tires and concrete were the primary materials used in constructing artificial reefs. The Provincial Fisheries Service was responsible for providing extension services.

The installation of artificial reefs ushered in an influx of tourists to Jemluk for snorkeling and scuba diving. Although tourism dates back to 1982, the number of tourists increased after the installation of the artificial reefs. Tourism created other economic opportunities as well. Fishers who previously depended on fishing alone were able to diversify their income sources by transporting tourists on their boats to diving and snorkeling areas.

In 1992, the fishers formed the Tunas Mekar Fishers Association (TMFA) in order to deliver better services to tourists and synchronize schedules. In the process, intense competition in tourism-related activities and conflicts among fishers were reduced. The TMFA had 43 members in 1994, comprising fishers who used motorized boats and were committed to the provision of better services. Each member paid a membership fee of Rp 150,000. Owing to the requirement of owning motorized boats as a condition for membership, only 40 percent of the fishing households joined the TMFA. Non-members, nonetheless, were able to derive benefits from fishing in the artificial reefs, particularly when inclement weather prevented them from going out to farther fishing grounds. Actually, they had a greater chance of catching fish when the TMFA members could not fish due to their tourism schedules.

To manage the waters of Jemluk, the village residents initiated basic rules that applied to both TMFA members and non-members. The rules and regulations include the type of allowable fishing gear, area of fishing, and obligations of villagers. Every resident is prohibited from dumping garbage in the sea
and littering on the beach. The provincial government, in a bid to attract more tourists to Bali, intensely promoted cleanliness of the environment. The TMFA members, moreover, agree to clean the beach once a month.

The village residents are involved in monitoring and enforcing the implementation of rules and regulations. Fishers, both TMFA members and non-members, patrol the waters. Local police are responsible for backing up the patrol teams. The executive board of the TMFA is responsible for enforcing the rules and regulations of the organization, as written in the TMFA constitution. The rules dealing with all residents of Jemluk are unwritten. Therefore, unlike TMFA members, there is no penalty system for the non-TMFA members. Nonetheless, the rules are effectively implemented since there are no reported violations.

Incentives to cooperate

Initially, the incentive to collaborate in resource management stemmed from the recognition of coral reef degradation as an alarming problem and the need to take action on fish habitats, given the heavy dependence of Jemluk on the fishery. Over time, new incentives emerged, largely in the form of additional earnings from eco-tourism. The artificial reef areas attracted tourists to Jemluk, particularly those who enjoyed diving and snorkeling. Both the local government and the village realized that it was to their own advantage to keep their beaches pristine and to preserve their recreational areas in order to sustain the tourist business from other countries. These economic incentives, in part, encouraged the village residents to comply with a set of rules that aims to preserve the integrity of the environment and the reputation of the site as a major tourist destination.

Outcomes of co-management arrangements

There was no biological baseline study before the introduction of the artificial reefs. During the project implementation, the results indicated that two months after the first installation of the artificial reefs, the fish were more diverse: 28 families consisting of 114 species of fish. Fish abundance improved from $5.0 \times 10^3$ in 1991 to $61.0 \times 10^3$ in 1992.

The ban on the use of destructive and illegal fishing methods helped restore the opportunity to catch high-value fish from coral reefs. Demersal fish catch increased from 3.9 kg per fishing trip before the project (1990) to 13.3 kg per fishing trip after the project (1995). The implementation of a resource management project brought about a positive impact as fishers landed more fish and the distribution of the catch became more equitable.

In conclusion, the deployment of artificial reefs in Jemluk waters paved the way for local fishers to establish a resource management strategy involving the village and the government. The artificial reefs provided alternative fish habitats and functioned as fishing grounds for small fishers. These reefs also provided a springboard for income diversification to take place through the creation of new livelihood opportunities from tourism.

6.3.2 Indigenous coastal fisheries management system in Sulawesi, Maluku and Irian Jaya

This section is drawn from a description of indigenous systems in Indonesia (Nikijuluw 1998). It is in line with the effort to document traditional systems based on available materials, both published and unpublished.
Indigenous management refers to management systems based on local knowledge. In certain parts of Indonesia, these systems have existed for centuries and have been managed through different modes or structures. In Irian Jaya, management is by village, clan and tribe. In South Sulawesi, it is by family and in North Sulawesi, by community. Management has been associated with rights of access, extraction of benefits, protection of the area and the resources from other users, and transfer of ownership.

In Sulawesi, Maluku and Irian Jaya, fishers’ organizations are vested with traditional authority, whose nature varies with the social organization. Sasi, a type of indigenous management that exists in Maluku, is organized by traditional secular leaders. Sasi is a set of customary practices and rules. It establishes limits on access to collectively controlled or individually owned territory and/or resources. It is closely linked to the prohibition of entry into a certain area during a given season. The village head is normally the leader of a sasi organization. In implementing and enforcing the rule, he is assisted by the traditional village enforcement body (kewang), whose members represent village clans. Villagers are actively involved in reporting violations.

Aside from the village-managed sasi, the church also organizes sasi arrangements. In this type of system, the church leaders provide leadership, but they do not have field controls, surveillance or penalties. Nevertheless, the church-managed sasi is apparently effective.

In North Sulawesi and Irian Jaya, a customary council (dewan adat) sets and implements resource-related rights and rules. The council consists of the clan head, formal leaders and church leaders. The village head, under the auspices of the council, is actively involved in determining rules and regulations.

In South Sulawesi, the indigenous system involves the recognition of the individual right of the owner of a rumpon or fish-aggregating device (FAD) to access and control the waters. The owner of the FAD has the exclusive right to fish in the area of 10 000 m² surrounding his FAD. This exclusive right is widely recognized by the villagers and fishers. The right to use the waters around the FAD can be bequeathed to another person after the contraption has been destroyed. If other fishers wish to install a new FAD or use an existing one, they must ask permission from the previous owner.

Rules and rights

In Teblasufa, Jayapura, ownership of marine waters is divided into two types: 1) waters owned by the village, and 2) free waters, belonging to everyone. The village waters are further divided among clans. Fishers enjoy rights of access and withdrawal (i.e. harvesting), but the rights of management, exclusion and transfer belong to the head of each clan. The head of the clan can allow fishers outside the clan to enter the territorial waters. The formal head of the village can also permit non-villagers to fish in village waters. However, the village head must secure the consent of the clan heads. The clan head has
the authority to close coral reef areas during a particular period to let the fish grow to a suitable size. Villagers cannot fish in coral reef areas.

The right of management is embodied in different forms of common consent on the fishing season, areas open to fishing, type of fishing gear and equipment, and allowable catch. There are also rules on environmental protection, such as the ban on coral head collection. The enforcement of management rights lies with the village enforcement body or kewang. The kewang has its own rules and organization. At times, it may not be part of the formal village government structure. If this is the case, it is under the control of the villagers and customary leaders.

Members of a clan can catch fish in the waters of another clan, provided they use simple fishing gear such as hook and line or spears. To use modern gear, they must obtain a permit from the customary council. The council, however, must first seek the concurrence of the affected clan.

In the coastal villages of Maluku, communities claim access and withdrawal rights over the waters facing their village. Over time, villagers and their leaders have jointly set rules and regulations. The rules include how, when and where to harvest or collect resources. Present-day regulations are modifications of rules made during the pre-colonial era. Fines, for instance, have been adjusted to reflect current values.

The decision to transfer or share a village fishing permit with non-villagers is arrived at during community meetings. However, it is now common for the formal village government to grant the right to share, sell or lease rights related to resource access and harvesting.

In Christian villages, there is a tendency to transfer property rights from villagers and village governments to church organizations. The church, through its pastors, elders and deacons, stipulates harvesting rules. A percentage of the harvest is given to the church organization. The money is normally used to construct and maintain churches.

Conclusion
Indigenous coastal fisheries management is a local management approach. It is unique in the sense that the same system may not be found in other areas. Comparative studies of different indigenous management systems are called for in order to unearth the contextual variables that influence each system.

Indigenous management systems may be regarded as stepping-stones for the government to increase participation in resource management. By managing resources, local people can broaden their participation to cover economic and community development outside fisheries and coastal zone management. Local rules, moreover, tend to have more legitimacy if nested in formal rules and regulations.

6.3.3 The Sasi Laut System in Maluku Province, Indonesia
Maluku is a province in Eastern Indonesia (Figure 22). It has a population of about 2 million people. About 5.2 percent of the residents depend on fishing. Some of them are artisanal fishers and many more are fisher-farmers.
The small Lease Islands (Ambon, Haruku, Saparua, Seram and Nusalaut) found in Central Maluku hold 12.5 percent of the population of Maluku and are almost ten times more densely populated than the rest of Maluku. In general, the settlements and farming activities are concentrated along the narrow strip of relatively flat coastal land. Artisanal and small-scale commercial fisheries contribute significantly to village economies in terms of employment and income, but villagers are also active in the agricultural sector. Because good farmland is limited and the population is relatively dense, the fisheries sector is viewed as a vital economic sector. The sea is a source of income and food for the household. The average income from the fishery in a typical village ranges from about 12 to 28 percent of the total household income.

The resources of Central Maluku are exploited not only by the local population, but also by boats based in Sulawesi, Java and foreign countries. Fisheries production figures for the commercial fleet show a marked increase over time. In 1974, fisheries production in Maluku was only 59 485 mt. By 1993, fish landings had dramatically risen to 189 081 mt. According to government statisticians, this figure represents only a fraction of Maluku’s potential maximum sustainable yield (MSY). However, in spite of optimistic projections at the national level, fish catches in Maluku have been declining since 1995. Similarly, shrimp landings in Maluku are also declining, and landings of small pelagics are uncertain. Assessments that are more recent estimate that small pelagic catches in Central Maluku are already down to 80-90 per cent of MSY. Because of a shortage of baitfish, pole-and-line catches of larger pelagics are also static or declining.
Figure 22: Map of the Maluku Islands, Indonesia

- Seal dentic only
- No seal dentic
- Seal dentic and hunt
- Seal dentic and hunt with local boat
- Seal dentic and hunt with hired boat
- Seal dentic and hunt with foreign boat

The map indicates various locations and the activities of seal hunting and dentic in the Maluku Islands.
History of Sasi in Maluku

In some Maluku communities, control over the land and marine territory (petuanan) including its resources is vested in a social institution that has a code of conduct, rules and regulations. This institution is known as sasi. Sasi is not simply an institution designed to regulate resource use. It also has a significant cultural role. “It is an encompassing body of meaningful relations between people, the natural environment and gods, ancestors and spirits." Local legend speaks of sasi being in place in the 14th century and perhaps earlier. Others maintain that sasi developed in the 16th century in response to the needs of clove traders. Sasi is based on customary law and ritual practices (adat) and, over the past decades, has functioned to control exploitation of natural resources.

The “spice wars" among foreign fleets (Portuguese, Dutch and British) that continued until the twentieth century had stimulated militancy and mobility in the people of Maluku and fostered their strong attachment to their territories. This could have been positive in terms of reinforcing adat. On the other hand, however, the colonization and introduction of western religions affected the sovereignty of local leaders. In some cases, massacre (as in Banda) and forced evacuation alienated people from their territories. In general, adat culture is believed to have reached its zenith in the mid-1600s. The pattern since then has been one of the decline of adat, punctuated with periods of resurgence.

During the occupation and Christianization of Maluku by the Dutch, sasi was initially discouraged, along with other “pagan superstitions and rituals.” However, the Dutch subsequently revived and revised sasi to control and maximize harvests of valuable spice crops, regulate land tenure and provide a means of social control. In its revised form, the emphasis on spiritual aspects declined, while economic aspects became prominent. During this period and into the 1900s, native Mollucans were often resentful rather than supportive of the Dutch style of sasi. It was perceived as an imposition of Dutch ethics and a burden to poorer members of society. Under Dutch influence, what had been purely an adat institution became integrated to some extent with the village leadership supported by the colonial government. At a later point, the church also came to play a role in sasi, transforming the institution into a religious institution in which government and adat leaders worked together.

From 1880 to 1893, Dutch Resident Reidel attempted to abolish sasi. He wanted to break the power of traditional leaders over the spice trade and abolish their rights to enforce sasi rules. In spite of his efforts, the sasi institution continued to survive and evolve in many villages. In 1921, the Dutch actually supported sasi by formalizing the institution with a decree.

During World War II, the Japanese occupation posed an extreme threat to all adat institutions. Later, the Indonesian independence brought about a civil war in Maluku, during which many leaders were killed and clans scattered. Integration into the new nation of Indonesia meant a further blow to local languages and culture because Bahasa Indonesian became the language of compulsory education. Subsequent decades of civil strife and political turmoil at local and national levels continued to challenge the strength of local culture. In more recent decades, cultural change intensified as economic development proceeded. Although weakened over time, sasi never disappeared. Sasi rules developed at the community level are still used by communities to control and maximize harvests as well as to regulate aspects of social behavior.

The purpose of sasi has been debated. Although there may be spin-off benefits in terms of resource sustainability, sasi is largely perceived as an institution for managing social interactions, mediating
tenure disputes and maximizing economic returns, rather than as a resource conservation and management institution per se. On the other hand, sasi was clearly aiming to protect the resources in the 1920s, when the use of poisons in the fishery was banned under sasi rules. Today, sasi is again undergoing change, with a renewed emphasis on conservation aspects.

The application of sasi to marine resources may have never been as widespread as sasi on land crops. Marine sasi has been speculated to apply only to pelagic fish, with the objective of protecting migratory fish and maximizing harvests for local consumption. In the decades following the 1930s, the emerging international markets for Trochus shell (lola) and sea cucumber appear to have prompted the development of additional types of marine access prohibitions and related ceremonies in places such as the Kei Islands in Southern Maluku. Similar rules are evident in central Maluku today and appear to date as far back as the 1960s.

In Maluku Province, certain marine tenure rights and management responsibilities are a part of culturally embedded institutions and traditions. Under adat law, coastal villages typically claim de facto rights of access and withdrawal over fairly extensive land and marine areas. While some or all the land portion of the petuanan is divided up among local clans, the marine area is communally owned. On the Lease islands, marine territories usually extend to the edge of the reef slope, but in Southern Maluku, the petuanan in some cases extends to the farthest limits from which the land can still be discerned. Access and withdrawal rights in the marine petuanan were originally restricted to and shared among community residents. However, exclusive rights of access and withdrawal for particular areas or species may also be sold or auctioned by the village government to individuals or companies. In some cases, control over the marine petuanan is vested in an organization called the kewang, which is part of the sasi institution.

A basic principle involved in the resource management aspect of sasi is one of closed and open seasons. Areas of land and sea, particular crops or marine species, are placed under a harvest prohibition for varying lengths of time. Different species are regulated in specific villages, depending on the available resources, market prices and fishers' preferences. While sasi is in effect, these areas or resources may not be harvested without the permission of the kewang and kepala desa (village head). However, exemptions are made in cases of dire economic need or to provide resources to support a local cultural or religious celebration.

Incentives to cooperate

Under sasi, the incentives to cooperate are varied. They comprise a combination of religious, socio-cultural, and economic incentives. Fear of retribution from God or being made a social outcast appears to be a powerful reason for fishers to comply with local rules within their village territories. Even so, sasi fishers are pragmatic. In times of need, they reserve the right to apply for exemption from the rules and expect leniency in enforcement because they have to eat fish.

A respect for adat and elders plays an important role in the legitimacy and popularity of sasi, and is an incentive for people to comply with sasi arrangements. Village heads that descended from the raja line have a strong incentive to support sasi because of social prestige and legitimacy. A village head from a non-royal family can also benefit from the legitimacy associated with the adat authorities. Participation in sasi ritual or showing interest in reviving sasi is a strategy to stabilize leadership. The church, by cooperating with and supporting adat leaders, enhances its own positive image as a useful,
practical player interested in improving community well-being through sasi.

For village governments, the incentive lies in the collection of revenues from sasi. However, this must be approached with some sensitivity as the majority of fishers strongly object to the sale of access and withdrawal rights to outsiders or the village elite. There is also resistance to any scheme that replaces direct benefits to harvesters with indirect benefits provided through local government projects.

Village tenure over a defined land and marine area is strongly entrenched in the culture and recognized as legitimate by fishers even in the absence of a formal law. This legitimacy of traditional tenure is an incentive to cooperate within sasi, particularly when it is accompanied by security of access or guaranteed benefits for local people. Sasi is generally perceived to be useful and beneficial, particularly in terms of higher levels of cooperation and social harmony. This perception that sasi is a good thing for society is generally an incentive to comply with the rules.

Dependence on the fishery is a strong economic incentive. When land crops fail or prices slump, the fishery provides a secondary income. For instance, the use of marine resources intensified in the aftermath of the 1990-91 collapse of clove prices in Indonesia. Earlier, a large part of the village income was derived from the spice trade. The Lease Islands and Ambon were prosperous. However, between 1991 and the price revival in 1998, many people who formerly harvested cloves for a living turned to the sea as a source of income.

Disincentives to cooperate, however, also exist. Among these are a very low regard for the police and lack of respect for local governments that do not enjoy legitimacy. The individualism of fishers and the predominance of family-centered culture in Maluku are strong disincentives for them to cooperate with outsiders within a resource management framework. The inferior position of women in village decision-making is another hindrance to full participation of stakeholders in fisheries management.

The government-promoted national ethics of non-questioning obedience to the central authority is another powerful disincentive to village leaders who otherwise might institute reforms or introduce new village-level management structures. When all actors down a hierarchical chain wait for some higher authority to take responsibility for decisions, very little gets done outside of the official, centrally programmed activities. A second disincentive arising from the centralized national policy is the lack of approval of any non-governmental, grassroots fishers’ organization. In the post-Suharto era of reformation, this has changed.

Outcomes of sasi

Fishers consider control over resource management to be tight in sasi villages, and rule compliance to be high. Where marine resources under sasi are harvested as a communal crop and distributed equitably among the population, fishers accept this as fair and do not complain about restrictions to their individual rights of withdrawal. With sasi being fundamentally male-dominated and paternalistic, women are excluded from decision-making; thus, sasi is inequitable in this sense. In most cases, however, the general populace does not question arrangements intended for the greater public good and enforced according to traditional law and culture.

Sasi has significant social impacts in terms of relatively high levels of interaction around community issues, a strong tradition of collective action, and less conflict among resource users. In relation to economic and ecological benefits, the benefits emanate from rules that restrict access and limit harvest
seasons. For example, Lola (trochus), currently on Indonesia’s endangered species list, could have been extinct in Maluku were it not for sasi. A survey of several habitats indicated that trochus were only found inside or close to the sasi area in Nolloth, where they are under local protection. None were found in non-sasi villages, where commercial exploitation had taken place in the past. The same finding holds true for sea cucumbers.

The possible impact of sasi on the broader (pelagic) fisheries resource is not clear. There is a general lack of “fit” between sasi and the modern fishery that is geared to deep water pelagics. Fishers’ perceptions of declining stocks pertain to the impact of all forms of resource management in Maluku and not specifically to sasi. It is unlikely that the protection of small areas of coral reef and sea grass beds under sasi provides an incremental and indirect benefit to the larger fishery, unless these inshore areas happen to be critical spawning or nursery habitats for the pelagics. However, the ethics underlying adat and sasi, and the example of management provided by functional sasi laut may well have positive psychological impacts on fishers. Through their familiarity with sasi, fishers of all kinds are introduced to fundamental and important management concepts packaged in a culturally acceptable way.

In conclusion, sasi is an institution embedded in local culture and, therefore, not transferable as a unit to other cultural contexts. Nonetheless, it illustrates a clear example of a local resource management system that has successfully enforced local rules on gear types, access, closed areas and harvest seasons in coastal villages over several centuries. Distinct to sasi are the ethics of working together for the benefit of the community, attachment to a cultural tradition, and the tendency to comply with sanctions based on religious beliefs. Sasi also provides an alternative to the western concept that local management must be highly participatory and democratic.

6.3.4 Analysis of fisheries co-management in West Sumatra: a case study of Ikan Larangan

The ikan larangan is a community-based fisheries management system operated by the Minangkabau tribe in West Sumatra. Ikan means fish and larangan means forbidden to do an activity. Ikan larangan is a resource management system that has multiple objectives to address food security in the community. For example, it may be used for establishing a closed season for taking fish from a portion of a river, pond, or other area in Minangkabau communities. There are three general types of ikan larangan in West Sumatra – traditional, semi-traditional and modern. The classification is mainly based on whether there is a pawang (local leader) to direct the system.

There are seven ikan larangan systems in West Sumatra province. This case study was undertaken at three sites to represent the three general types of ikan larangan – Lubuk Landur (Pasaman district) to represent the traditional system; Kayu Tanam (Padang Pariaman district) to represent the semi-traditional system; and Pasir Lawas (Padang Pariaman district) to represent the modern system.

Brief history of resource management in the ikan larangan system

This study identified four objectives of the ikan larangan system. While originally designed to protect food security in the community, the system has been expanded in recent years to address other objectives as well, namely environmental, economic, social and political objectives. Environmental objectives include ridding the river of domestic garbage and conserving fishery and other natural resources. Economic objectives include ensuring food security and increasing income and economic development. Social objectives include reviving the system and encouraging co-management among
stakeholders. Political objectives include enhancing political stability with an emphasis on unity and sharing problems and benefits among community members.

The ikan larangan system has been in existence since the Dutch colonial period. The most unique characteristic of all three general types of ikan larangan is that community members voluntarily provide a very high commitment to surveillance and resource management. The three general types have different characteristics.

1. Traditional. This type, locally called ikan diniatkan, was established during the Dutch colonial period by local community members. Its operation follows myth and legends passed down through generations. The system is directed by a pawang or community leader who determines the open and closed season. Boundaries are established by magic (spells). The season is opened and closed once a year. The big harvest is after the Muslim fasting month celebration (Idhul Fitri). Traditional fishing gear is allowed but not the use of electric fishing.

2. Semi-traditional. This type was established during the 1990s by community members. It is a revival of the traditional system. Similar to the traditional system, this system is directed by a pawang and boundaries are established by magic (spells). The purpose is to obtain economic and environmental benefits. The season occurs twice a year. The water bodies are stocked to increase production. Allowable fishing gear includes longline with bait on days 1-3 and other fishing gears, including use of electric fishing, on days 4-7. The big harvest occurs after the Haj celebration.

3. Modern. This type, called lubuk larangan, was established during the 1990s by community members. This is a new system that is directed not by a pawang, but by a village organizer. The purpose is to obtain economic and environmental benefits. Boundaries are established using both natural and man-made reference points. The fishery is opened and closed twice a year. There is no time specification for the big annual harvest. The water bodies are stocked to increase production. Allowable fishing gear includes long-line with bait on days 1-3 and other fishing gears, including use of electric fishing, on days 4-7.

Changes in resource management: major initiatives

The ikan larangan is supported by several other local institutions. The head of the sub-district (camat) provides a formal governmental support for the system operated in the area. The Pemuka Adat – KAN provides customary supervision to encourage support for the system. The Pemuka Adat also determines the penalty or sanction for people who violate the rules. The religious leader (buya) provides assistance in setting boundaries for the ikan larangan, using spiritual or magic powers. They also assist in setting the opening and closing of the area. The village head (kepala desa) serves to coordinate the operational activities of the ikan larangan by helping to establish the sharing system and allocation of revenue. The community members help to maintain and enforce the rules and run the harvest activities.

The rules of the ikan larangan are unwritten and are passed on among the community members by words of mouth. The rules include:

- Fishing is prohibited during the closed season.
- All community members are responsible for monitoring and surveillance.
- Community members should provide their time, effort and money for management.
• Revenue earned is allocated for village development.
• Benefits are allocated to all the community members.
• Sanctions or penalties will be imposed on violators.
• Opening and closing of the season for the traditional and semi-traditional type is done by the pawang and religious leader. For the modern type, opening and closing is done according to stock assessment.
• Rules are designed by the community members.

There is no written legalization of the system by the government. With the implementation of Law No. 22 in 1999, the role of the district government in resource management became more important. One of the considerations of the law was implementing regional autonomy and supporting local resource management systems, such as ikan larangan. The government, however, is still assessing the ikan larangan system. Implementation is guided by local custom rather than any government legal mandate.

**Incentives to cooperate**

The primary incentives to cooperate under the ikan larangan system are to conserve fisheries resources, ensure food security, and produce income for individual and community needs. While the majority of respondents in the three studied communities did not think that ikan larangan itself would ensure food security and resource conservation, they felt that it could serve as an alternative to increase community welfare. Many respondents in the two communities with the traditional and semi-traditional types were not familiar with the ikan larangan, while respondents in the community with the modern type were more aware and supportive of the ikan larangan to sustainably manage fisheries.

**Outcomes of co-management**

In all three communities, there was high compliance with the ikan larangan. The community members enforced the rules using a combination of traditional sanctions, mystic curses, and monetary penalties. In all three communities, there was an overall positive perception of the system that is could lead to increasing community income and regional development. Community commitment was stated to be very high. The system is still evolving from a community-based system to a co-management system in which responsibility and authority are shared with the government. There is hope that there will be a formalization of the ikan larangan system by the government. This is supported by increased decentralization under Regulation No. 22 of 1999.

6.4 Thailand

Two case studies were conducted in Thailand. These are Ban Laem Makhaam (Masae et al. 1998) and Phang-nga Bay (Pimoljinda and Boonraksa 2000).

6.4.1 Fisheries co-management in Ban Laem Makhaam

Ban Laem Makhaam is a coastal village on the western coast of Southern Thailand (Figure 23). It is one of the six administrative villages in Khao Mai Keaw, Sub-district, Sikao District, Trang Province. The village is located on an island-like cape. Three other villages share the entire cape area.
The early settlers, who were very skillful at sailing, are believed to have arrived in Ban Laem Makhaam some 200 years ago. They came from coastal communities in Penang and Langkawi in Malaysia and Satun in Thailand. The majority of the present residents of Ban Laem Makhaam are descendants of the early settlers. The rest are either migrants who had kinship and marriage ties with the descendants or were workers in charcoal factories who came to the village during the 1940s because of employment opportunities.

Overall, the village residents are largely homogeneous in terms of ethnicity and religion. About 97 percent of the households are Thai-speaking Muslims. At present, the village has a population of 593 persons (118 households). Only three households are Buddhists. In terms of livelihood, the majority (83%) of the households are engaged in fishing. Others derive their earnings from rubber plantations, fish trading and grocery shops. The existence of close kinship ties has contributed to a relatively harmonious social environment in the village.
Fishing within 3000 meters from the shoreline is restricted to non-destructive types of fishing gear, such as gill net, fish trap, squid trap, and hook and line. The major products caught from the waters of Sikao are shrimps, prawns, squid, cuttlefish, mackerel and trashfish.

Brief history of resource management at the site

Fish were largely caught for subsistence until the late 1960s. The entry of an outside fish dealer marked the shift to a market-oriented fishery, after the local fishers realized that they could sell their marine products to regional markets. The expansion of commercial fishing, however, brought about a tremendous change in fishing technology and marketing. Efficient fishing methods, some of which were destructive (i.e. blast fishing, push nets, trawl nets and set bag or pong pong) were introduced to meet the demand for fish from a growing external market. The open access nature of the fishery allowed commercial fishing boats from outside to enter the fishing grounds and compete with local fishers, contributing to the degradation of the fishery resources. Such degradation was also closely linked to the exploitation of mangrove forests for charcoal production that began in the early 1940s. Although mangrove cutting for charcoal production was done under concessions, the concessionaires did not really adhere to the rule to replant mangrove trees on a rotation basis.

When the problem of resource degradation worsened in the 1980s, some fishers voiced their concerns about their livelihood. They began to reflect on the causes of degradation and the ecological interaction between fishery and other resources, especially mangroves, coral reef and sea grass. Informal group discussions began in 1982.

Changes in resource management: major initiatives

Fisheries co-management in Ban Laem Makhaam emerged from a search for solutions to resource degradation in the village. In the beginning, there was no specific project for implementing co-management arrangements. The starting point for the active involvement of village residents in fisheries management was the entry in 1985 of the Yadfon Association (YFA), a local non-governmental organization. A group of development activists with a strong participatory orientation in rural development began to work in a few coastal villages in Sikao District, where poverty incidence was relatively high. The YFA sought to improve living standards in coastal villages and promote self-reliance. Initially, it sent volunteers to live in the village to obtain an in-depth understanding of problems there.

The close interaction between the YFA field workers and the village leaders led to the realization that fisheries and coastal resources needed more attention. There was a close link between coastal resource conditions and other aspects of village life, including power relations and socio-economic problems. In 1986, the YFA introduced sea bass and grouper cage culture and raised people’s awareness of destructive fishing. It established a strong partnership with influential village members, such as the village headman and his assistants, the main Islam religious leader (imam), and some active fishers. It also encouraged the village fishers to organize themselves. After several informal discussions and dialogues, an agreement was reached to ban all destructive fishing methods. The influential village members took it upon themselves to encourage compliance with the agreement.

From 1987 to 1988, conflicts on resource uses occurred at two levels: among village residents and between residents and outsiders. The YFA used these situations to motivate the local leaders to be more active in protecting community rights and to raise the environmental awareness of the village.
residents. An exchange of ideas took place among interest groups, supplemented by studies of academic institutions on the dangers of resource devastation. In 1989, the village and the YFA decided to pursue mangrove rehabilitation, followed closely by a ban on destructive fishing within 3,000 m from the shoreline. On the opening day of the Community Mangrove Rehabilitation Project, several high-ranking government officials, local academics and journalists were invited. Work on coastal resources management in the community gained due recognition. Active campaigns took place to support mangrove rehabilitation, as well as to stop destructive fishing activities. The YFA staff served as catalysts, facilitators and advisors to the local leaders.

Historically, the policy-making and public administration systems of Thailand are highly centralized. Local initiative for resource management in Ban Laem Makhaam was initially NGO-driven, enhanced by the presence of external change agents and academics who were interested in promoting sustainable resource management. Government support came later, upon the request of the local fishers and the YFA. The YFA has been influential in creating local awareness of the coastal ecosystem and empowering village residents to protect their resources and livelihoods. Beyond the village level, it has been instrumental in developing a network of small-scale fishers and bringing together the government representatives and the fishers to address collective concerns.

Support from the Department of Fisheries (DOF) came in the form of the allocation of related development projects, protection of the fishing rights of small fishers, and enforcement of laws and regulations. The DOF approved the ban on all destructive fishing methods within 3,000 m from the shoreline, providing livelihood protection for small-scale fishers. The government also pursued more widespread law enforcement activities that helped reduce illegal fishing practices, not only within the village, but also in neighboring villages. This was in response to the request of the village leaders and the YFA to ban destructive fishing methods in all nearby villages.

Incentives to cooperate

The decision of the resource users and other stakeholders to cooperate was largely a result of an awakening process at the village level that made the residents aware of the consequences of resource devastation on their income and livelihoods. Being dependent on the fishery, the resource stakeholders felt that they had to ban destructive fishing methods, which accounted for most of the resource degradation. They had to act collectively to fight fishers from other areas who deployed illegal and destructive fishing gear in their coastal waters. Support from external organizations, which provided technical, legal and financial support, also reinforced the incentives to cooperate, making fishers feel that they were not alone in their fight for sustainable resource management.

Outcomes of co-management

Ban Laem Makhaam represents a case of harmonious co-management arrangements in a setting that is characterized by ethnic and religious homogeneity. A survey of pre-project and post-project perceptions affirms that village fishers perceived improvements in the resolution of resource use conflicts. The fishers, likewise, perceived positive changes in sustainability indicators, such as abundance of fishery resources, knowledge of the fisheries, information exchange on fisheries management, and rule compliance. These changes may be regarded as a direct result of the shift to non-destructive fishing practices after the establishment of co-management arrangements.
Fishers have observed that shrimps, crabs and other marine species increased within two years of enforcing the ban on destructive fishing methods. They have attested to an improvement in their catch per fishing trip, as well as to the introduction of more development projects in the village after co-management arrangements were established. Government officials quickly saw the village residents’ capacity of working together with other organizations, both governmental and non-governmental.

The fishers, moreover, perceived behavioral gains, particularly in terms of participation and influence in a number of vital areas (i.e. mangrove management, fisheries management, and general community affairs), manifesting the extent to which they have become involved as partners in development. The experience of Ban Laem Makhaam provides an inspiration to resource users, government and other stakeholders in their quest for viable and practical solutions to pressing resource management problems, and in their effort to make co-management work.

6.4.2 Community-based fisheries co-management in Phang-nga Bay

Phang-nga Bay is located in the middle of the Andaman Sea Coast of Thailand. The Bay is bordered by three provinces – Phuket, Phang-nga and Krabi. Numerous islands are scattered throughout the Bay and provide for a diversity of coastal habitats. The Bay is extremely productive in terms of fishery resources. The Bay serves as a major spawning and nursing ground for several economically important marine species such as shrimp, blue swimming crab, mud crab, short necked clam, sand whiting, anchovies, Indo-Pacific mackerel, and other species. Fishing and tourism are the major source of livelihood and employment for those living around the Bay.

Brief history of resource management at the site

Marine capture fisheries in Phang-nga Bay have been traditionally conducted by small-scale fishers employing artisanal fishing gears such as bamboo stake traps, hook and line and fish traps. During the last two decades, the increasing demand for fishery products for export and local consumption has led to over-investment, increased efficiency of fishing gears, and competition in the commercial fishery sector. Many types of commercial destructive fishing methods, such as trawlers, light luring techniques and push nets, have been introduced into the Bay. The artisanal gears have been forced to parallel increasing numbers and efficiency, with the main gears shifting to trammel nets, crab gill nets, sand whiting gill nets and fish traps. As a result, fishery resources have declined drastically. The increased competition for access to resources and fishing grounds has resulted in a situation of constant conflict among the fishers operating in the Bay.
In order to conserve marine fishery resources and ecosystems in the Bay, various Ministerial regulations and laws have been established. Apart from the main Ministerial regulation prohibiting the operation of trawls and push nets within 3 km from the shoreline all over Thailand, the most significant specific regulations in force in Phang-nga Bay include:

1. The Ministerial regulation issued on 1 August 1979 prohibiting the fisheries in Phang-nga Bay of any type of trawler and push net operated by a motorized boat.

2. The Ministerial regulation issued on 11 April 1985 prohibiting the fishery within the Bay of every type and size of trawler, purse seine and encircling gill net with mesh size less than 4.7 cm during the period between 15 April and 15 June every year.

3. The Ministerial regulation issued on 14 December 1998 prohibiting the fishery within the Bay of every type and size of trawler, purse seine and push net with a motorized boat.

Apart from these regulations, the government of Thailand has implemented various project activities in the Bay through the Department of Fisheries and in collaboration with regional and international...
organizations such as FAO and SEAFDEC. These activities include protection and rehabilitation of the resources, improvement of the livelihood of small-scale fishers, construction of fishery and village infrastructure, deployment of artificial reefs, and education of the fishers on resource management and regulations.

Changes in resource management: major initiatives

Despite these regulations, the degradation of fishery resources and coastal ecosystems and conflict among fishers has continued and increased. This was due to poor enforcement of the regulations and lack of participation and cooperation of fishers. To address this issue, the government of Thailand initiated a paradigm shift in fisheries management through the Community-based Fisheries Management (CBFM) System. The essence of the CBFM system is that fishers, fisher organizations, and the government should share the responsibility for fishery management measures.

With the adoption of the CBFM system, some responsibilities for coastal resources management have been delegated to coastal villages along the Bay. Village committees, whose members include fishers and village leaders, have been established to implement resource management. The Andaman Sea Fisheries Development Center (AFDEC) of the Ministry of Fisheries has provided guidance and support to the coastal villages and village committees to hold monthly meetings to discuss resource management issues. The village committees have demonstrated their unity, initiative, and responsibility for resource management.

Two villages were selected initially for the CBFM system. These are Ban Bang Chan and Ban Haad Sai Pleug Hoy. These two villages were selected after an initial workshop in 1996 that brought together representatives from the government, the private sector, NGOs, fishers and village leaders. The workshop raised awareness and understanding among the key stakeholders about the CBFM. It also brought about acceptance and commitment of the key stakeholders to engage in the CBFM program.

The AFDEC staff worked with village leaders and fishers to organize a village committee. The problems faced and needs of the villages were discussed and converted into activities to be implemented by the village committee. The activities implemented emphasized enhancing capacity of the villagers and fishers in fishery management, rehabilitation of fishery resources and ecosystems, and improving the socio-economic conditions in the villages.

Incentives to cooperate

In both communities, all respondents agreed that the fishers should be involved in decision-making related to fisheries management. It was agreed that the fishers and government should be jointly responsible for fishery management. The incentive to cooperate and improve fisheries management is the high dependency on capture fisheries for livelihood and employment. The fishers were seriously concerned about the degradation of the fishery resources and coastal ecosystems, as well as conflicts among fishers. This was due in part to inappropriate methods of management, lack of participation of fishers, and poor cooperation among them in the past.

Outcomes of co-management

In order to measure outcome and performance of the co-management system, fishers’ perceptions regarding the co-management activities were compared before the start of the project, during the
project, and five years after the project. Seventeen indicators measuring participation, equity, efficiency and sustainability were used. In both communities, all indicators were perceived to have changed positively between the pre-project time and the present. The results indicated that the fishers felt that co-management had produced good overall outcomes, especially in terms of participation and equity. Fishers are convinced that co-management will continue to produce positive results in the next five years. However, increased collaboration with government agencies is needed in the future.

6.5 Vietnam

This section is based on the case study done in Can Gio, Vietnam by Pham and Phung (1999). Can Gio is the only coastal district in Ho Chi Minh City, located some 65 km from the city center (Figure 25). Its coastline spans a length of 14 km. Can Gio is bordered by the Nha Be district to the north and by the East Sea to the south. Found at its eastern border is the Tan Thanh district and at its western border, Can Giouc and Go Cong districts.

Can Gio has an area of 71 361 ha, accounting for one third of Ho Chi Minh City's total land area. It has a forested land area of 39 355 ha, or about 95 per cent of the city's overall forest area. Most of this forest is classified as mangrove forest (26 909 ha). The mangrove forest is a source of firewood and housing materials. It is also valuable for brackish water fisheries and aquaculture.

In 1995, Can Gio had a population of 54 846 people. Most households derive their income from mangroves (32%), employment in the service sector (20%), fishing (18%), trading (14%) and farming (10%). The rest (6%) earn their income from government employment. Most households have secondary income sources to cope with crop failure and other calamities. Supplemental income comes from salt-making, sale of fruit crops, aquaculture and raising livestock, among others.

Fishing may be classified as inshore, inland and offshore. Of the total fish production of 20 675 mt in 1996, inshore and inland fishing accounted for 50 per cent and 3 per cent, respectively. The balance of 47 percent came from offshore fishing. For inshore and inland fishing, the major types of fishing gear used are bottom stationary net and small gillnet. For offshore fishing, the trawl and gillnet are used.

The residents of Can Gio are homogeneous, belonging to the Kinh ethnic group. They originally came from other provinces in Vietnam.

Brief history of resource management at the site

Historically, Can Gio was covered with a dense mangrove forest. Before 1964, resource use was basically dictated by meeting the needs of the household, rather than by a commercial market demand. The period from 1964 to 1975, however, saw a rapid exploitation of the forest for firewood and charcoal. The dramatic devastation of mangroves and other wildlife may also be attributed to a defoliant called Agent Orange that was used by the Americans during the Vietnam War.

After the country's reunification in 1975, the Government of Vietnam and the ruling Party recognized the significance of the mangrove forest in protecting the coastal environment. From 1978 to 1990, the government pursued a number of forest rehabilitation programs on a large scale and issued policies to protect mangrove forests. There was a perception, however, that the activities of the local population were harmful to the forest. Consequently, all mangrove areas were allocated to 17 state forest enterprises.
The government completely banned local residents from entering the mangrove forest, depriving them of resource access privileges and treating them as outsiders rather than as partners in resource management. As a result, illegal logging became rampant during the 1980s. At its worst, about 10,000 ha of mangrove forest were destroyed within a short span of two years (1988-89).

Figure 25. Map of Can Gio District, Vietnam

Changes in resource management: major initiatives

In 1989, the Government of Vietnam, the Ministry of Agriculture and Rural Development, and the People’s Committee of Ho Chi Minh City decided to re-think their management strategies. This time, they wanted not only to protect the mangrove ecosystem but also to improve the socio-economic conditions of the local residents.

In 1990, Tam Thon Hiep commune was chosen as a pilot site for plantation farms. The government offered land and forest to local residents, backed by 30-year contracts that stipulated the benefits, responsibilities, and penalties of the participating households. In addition, each household received five ha for a homestead, as well as for aquaculture and salt-making uses. The households received a monthly allowance for protecting the forest. Moreover, about 5-6 forestry staff lived in the forest together with the households, giving them a better understanding of its problems and solutions.

In May 1991, the government officially declared the forest of Can Gio as a protection forest. This move was partly prompted by the recognition of the forest as a buffer against the onslaught of wind and waves. From a military standpoint, it was also a means of securing and defending the area against intruders.

In the same year, the Duyen Hai Forestry Plantation Farm changed its name to the Management Board for Protected and Environmental Forest (MBEF). At present, the Board is under the supervision of the Ho Chi Minh Agricultural Service and is directly responsible for mangrove forest management.
Since 1991, the Board has carried out a land allocation program that focuses on the participation of households. It has allocated the mangrove forest area to various uses. Out of 27,000 ha, about 11,474 ha went to local households and 12,274 ha to forest farms. The remaining area fell under the management of the Can Gio Controler Station. This marked the beginning of community-based mangrove management in Can Gio.

The shift to community-based management of mangrove forests was enhanced by government policies that encouraged user participation in resource management, as well as by financial and technical assistance from international and local organizations. The policies were embodied in a 1991 national regulation that permitted the People’s Committee to distribute mangrove areas. Decree 100 of 1991 allowed households to participate in production contracts, and the Land Law of 1993 granted households land use rights of 5-30 years. Two external organizations -- OXFAM America and the Japanese Voluntary Organization -- extended assistance in the form of agricultural production loans and shrimp larvae. Favoring community-based mangrove management was the provision by the Board to secure forest use rights for participating households. This was carried out in cooperation with the Can Gio’s District People’s Committee and Communal People’s Committee. For the mangrove forest, 30-year contracts were given to the households. For fast-growing forest species, the contract holder received a 20-year lease. For slower growing perennial species, a longer period of 50 years was granted.

Contract holders are allowed to share in the proceeds from thinning and pruning activities, resulting in direct economic benefits to the holders. The holders get 65 percent of the pruned products. Others get 35 percent for their labor as well as by-products (i.e. branches and small stems), if they do not receive a monthly allowance. If the contract holder reforests the area himself, he is entitled to all the products. He can decide on the price and choose his marketing outlets. The rights associated with these contracts may be transferred to the heir, in case the household head dies while the contract is still in force. In case the contract holder can no longer comply with the terms of the contract, the rights may be granted to another household, provided the contractor agrees to the transfer.

Contract holders are also given the right to report illegal mangrove cutting and to turn over illegal mangrove cutters to the court. Punishment for non-compliance with the rules starts with a warning or gear confiscation. For more severe offenses, imprisonment is imposed. Since the establishment of community-based resource management, no large-scale violation has been reported.

Incentives to cooperate

The incentives to cooperate on the part of resource users in Can Gio were largely driven by economic benefits from mangrove management. The provision of use rights and the clear delineation of obligations, moreover, have helped strengthen the enthusiasm of local households to participate in local mangrove management.

On the part of the government, the incentives lay in its concern for the environment, for internal security, and for better management methods. Vietnam emerged from the war against the United States with heavily devastated forests. Such forests had been a traditional source of income for many local residents as well as a source of fuel and housing materials. The recognition of their significance played a key role in the decision of the government to pursue large-scale reforestation programs in Can Gio.
On the part of the People’s Committees, the underlying reasons to cooperate were associated with compliance with management responsibilities and promotion of an equitable sharing of benefits from mangrove products.

Outcomes of co-management arrangements

The co-management strategy of Can Gio, Vietnam is a response to widespread devastation of the mangrove forest over time, which resulted from heavy reliance on the forest for fuel requirements, use of a defoliant by the Americans during the Vietnam War, and rampant illegal mangrove cutting in reforested areas during the post-war era. The subsequent shift in government policy from state ownership of mangrove forests to community-based mangrove management paved the way for village residents to care for their mangrove resources with a spirit of stewardship, and reduced the incidence of illegal mangrove cutting.

A household survey conducted in Can Gio in 1997 affirms that the respondents perceived significant improvements after the implementation of the mangrove rehabilitation program. In particular, they felt that gains were achieved in control over resource use, resolution of mangrove-related conflicts, compliance with the rules, and resource access. These reflect positive perceptions of the decision on the part of the government to allow Can Gio residents to gain access to mangrove areas and to share in the responsibility for resource management. The experience shows that co-management of mangrove resources has been associated with perceptions of positive changes in rule compliance and conflict resolution. Where a sense of partnership prevails and where residents are assured of sharing in the benefits of resource management, there is an observed willingness to follow rules and reduce conflict-ridden situations.

Also significant are increases in satisfaction with the management of the mangrove forest and in knowledge of mangroves. These are directly linked to the mangrove management training activities provided by the Board for the households and the active exchange of information among village residents. In addition, information campaigns were helpful in raising knowledge about mangrove ecosystems.

In conclusion, the Can Gio experience demonstrates that the introduction of community-based co-management systems must go hand in hand with capacity building, provision of legitimate use rights, and incentives to cooperate. Also important are supportive policies on resource management, existence of coordinating structures for implementing mangrove management, and provision of financial and technical support.

6.6 Typology of the co-management case studies in Asia

This section summarizes the contextual variables found in the twelve case studies to arrive at a typology. Sulawesi was excluded from the typology due to the paucity of information on contextual variables. The variables are grouped into five categories, namely: 1) physical, technical and biological characteristics; 2) market attributes; 3) socio-economic and cultural attributes; 4) institutional and organizational arrangements; and 5) exogenous events. Tables 1 to 5 provide insights into the diverse settings under which co-management arrangements have taken place.
6.6.1 Physical, technical and biological characteristics

The case studies affirm that co-management can work in diverse aquatic environments, ranging from coral reefs (Philippines and Indonesia), mangroves (Philippines, Thailand and Vietnam), lakes (Bangladesh), rivers (Indonesia) and marine fisheries (Indonesia and Thailand). In almost all countries covered by the case studies, resource-related problems such as declining harvests and deteriorating habitats were experienced. Worsening resource conditions provided a compelling stimulus to re-examine resource management practices and to take collective action to reduce the threat to livelihoods and food supply.

The co-management sites in Asia are associated with differing geographic locations. Forty per cent of the sites are on islands, another forty per cent are located along gulfs, and about twenty per cent are inland. Common to all co-management sites is the existence of clearly defined physical boundaries in managed areas. Buoys and visible markers often serve to delineate boundaries.

The fisheries at the sites are predominantly artisanal, rather than industrial. Multiple species and multiple gear are distinct characteristics of the fisheries. The major types of fishing gear used include: hook and line, fish corrals and gillnets. In some cases, purse seine, compressors, muro-ami, trawls, and bag-nets are used. Fishers generally use small, non-motorized boats for their operations. Fishing patterns tend to be dispersed, rather than localized. This partly reflects the search for better fishing grounds, given the progressive decline in fish catch in most areas covered by the case studies.

6.6.2 Market attributes

The fisheries of the sites are primarily market-oriented. Although fish are also caught for household consumption, these are usually small fish that command relatively low prices in the market. Highly marketable fish, such as snappers, groupers, and carp, are often caught for income rather than for subsistence.

Fish caught for income are usually sold in domestic markets. Aquarium fish, on the other hand, are primarily exported to the international market, particularly Europe and the United States.

Fishers are not entirely dependent on just a few buyers/traders. Buyers, however, tend to have more control over price determination if a credit-marketing relationship exists. Otherwise, the fishers are free to sell their fish to anyone at prevailing market prices.

Women are often engaged in important subsistence and income-generating activities that are directly linked to the use of aquatic resources, such as shellfish gleaning, selling fish to traders and consumers, and making nipa palm shingles. Women also process simple products, such as dried fish, smoked fish, fish paste, and other items.

6.6.3 Socio-economic and cultural attributes

The Asian experience shows that homogeneity is a positive force in successful co-management arrangements. About 70 percent of the case study sites are homogeneous in terms of ethnicity, religion and fishing gear, while the rest are heterogeneous. Nonetheless, co-management is possible even among heterogeneous sites. Where heterogeneity exists, experience shows that community organizing activities, social preparation and value formation are important in fostering and sustaining collaborative efforts. Positive attitudes toward collective action also help in the pursuit of co-management arrangements.
The absence of a tradition of collective action in resource management is not a setback. Prior to the establishment of co-management regimes, 80 percent of the case study sites had no prior experience with formal resource user organizations. Collective arrangements for resource management were not in place. A heavy dependence on the fishery alongside a perceived resource crisis, however, proved to be a potent force in pushing resource users to take collective action. It provided a bond that brought resource users together to address threats to their livelihoods and survival.

Indigenous knowledge of the fishery before co-management took place was relatively high for fish capture, but low in terms of the biological aspects of the fishery. Consequently, training on stock management, sustainable coastal ecosystems and non-destructive practices became an imperative activity at co-management sites. Complementing this were information campaigns, capacity building for sustainable resource management, and information exchange.

### 6.6.4 Institutional and organizational arrangements

In 70 percent of the case studies, the primary initiative for co-management was NGO-driven. This is true of the Philippines, Bangladesh and Thailand. It took external agents to raise common awareness of resource problems and challenge resource users and stakeholders to collectively embark on appropriate action. Government-driven initiatives were fewer, accounting for 20 percent of the cases (i.e. Bali, Indonesia and Can Gio, Vietnam). Two cases were tradition-driven (i.e. sasi in Maluku, Indonesia and ikan larangan in West Sumatra, Indonesia), where century-old practices have continued to influence resource management arrangements.

At NGO-driven co-management sites, the NGOs were responsible for working with the resource users on a day-to-day basis. They have been instrumental in raising environmental consciousness, developing local leaders, building up collective capacity for resource management, and facilitating access to resources and other important services. They have also played a key role in motivating resource users to push for more equitable and sustainable management practices.

At government-driven co-management sites, the government has been in the forefront of issuing enabling policies, protecting use rights, providing funds for implementing actual programs and projects at the sites, and extending technical assistance in relation to the adoption of new technologies. It has also been active in enforcing laws on resource use and management in cooperation with the community of resource users. Based on the documented cases, the NGOs appear to have practically no role.

In terms of management modes, the role of the government at the case study sites may be regarded as cooperative, advisory, consultative or informative. It is cooperative where the resource users and government are active partners in making decisions and implementing resource management interventions (i.e. Philippines and Bangladesh). It is advisory in cases where resource users inform the government of decisions to be made and ask for formal endorsement from the government in order to obtain legitimacy for resource management actions (Maluku, Indonesia; Orion in Bataan, Philippines; and Bhan Laem Makhaam and Phang-nga Bay, Thailand). It is consultative where mechanisms exist for the government to confer with resource users, but decision-making rests primarily with the government (i.e. Can Gio, Vietnam and Bali, Indonesia). At the tradition-driven sites of Maluku and West Sumatra, Indonesia, the role of the government may be regarded as informative. Under the informative mode, user groups have the authority to make decisions. They merely inform the government of these decisions. Often, they are more powerful than the formal village government in terms of resource management decisions.
Of the various countries covered by the case studies, the Philippines has the most extensive experience with co-management and community-based management of coastal resources. It also has strong laws supporting devolution and co-management. The new Thailand constitution and national development plan explicitly support community-based management initiatives. The Master Plan for Fisheries Development to the Year 2010 in Vietnam and the policies of the Ministry of Fisheries encourage local user rights and participatory approaches to resource management. In Bangladesh, the government and non-governmental organizations are jointly promoting sustainable use of lakes through the active participation of resource users in management. In Indonesia, the national development plan encourages fishers to be more active in their involvement in economic development. In addition, there is increasing support by local governments and NGOs to revitalize traditional resource management systems through co-management arrangements.

The primary stimuli for collective arrangements at the case study sites were socio-economic and biological forces. To date, co-management arrangements have existed for several years. Among the 12 case study sites, six sites have had 6-10 years of co-management; three sites have more than 10 years; and the other three sites have 1-5 years.

A common denominator of all co-management sites is the existence of property rights and rules. These define resource access, resource uses and harvesting (withdrawal) methods. In all case studies, the rights of access, withdrawal, management and exclusion are present. Normally, access to the waters comes with a license from the government (Philippines, Bangladesh, and Thailand) or church authorities (Maluku, Indonesia). Resource user associations that oversee marine reserves, guard marine sanctuaries, install artificial reefs and care for mangrove areas often exercise exclusion and management rights. In these areas, some groups are deliberately kept out and are not allowed to extract resources. At case study sites where mangrove rehabilitation has been pursued, transfer rights allow the steward/contract holder to pass on his privileges and responsibilities to his successor.

Co-management usually involves arrangements for monitoring and enforcement of fishery-related rules and the imposition of penalties for rule infractions to enforce compliance among resource users. At all co-management sites, rules exist on where, when and how to harvest fish, on characteristics of the fish to be harvested, punishment for non-rule compliance, procedures in decision-making, and settlement of disputes, among others.

Across co-management sites, the legitimacy of local leadership is a shared attribute. This legitimacy comes either with the election by constituents or with tradition, where lineage is honored. In Indonesia, culture and tradition are closely linked to the legitimacy of leadership at the village level. In other countries, a formal election to positions of authority confers legitimacy to the new leadership.

In certain cases, however, the empowerment of new leaders undermined the influence of traditional leaders who were used to making decisions for the fishers and enjoyed most of the returns from the fishery in the past. This holds true for Bangladesh, where tension and internal conflicts within the user organization resulted from the emergence of new leaders, requiring the intervention of third parties to diffuse the conflict and prevent the disintegration of the group.

6.6.5 Exogenous events

Various exogenous events have taken place at the co-management sites, both negative and positive.
Negative events are linked to the occurrence of natural calamities (i.e. floods, typhoons and diseases) that adversely affect the returns from the fishery. Other negative events are the integration of the village economy into external markets, which accelerates resource exploitation, and in-migration of people who bring in destructive methods that lead to resource degradation.

Positive events include the introduction of new policies by the government, the arrival of external change agents, and the pursuit of new projects to improve socio-economic conditions and avert resource degradation. These have triggered a chain of events that dramatically altered resource management practices at the sites and paved the way for the establishment of co-management arrangements.

6.7 Synthesis

The Asian case studies affirm that there is no single blueprint for co-management. They portray the operation of various partnership arrangements and degrees of power sharing. Thus, co-management may be viewed as a flexible management strategy where the level of responsibility and authority in resource management varies.

Co-management in the Asian context initially reflected a search for better management methods, largely shaped by the dynamic interaction among contextual variables. It has ushered in new management processes and arrangements in support of the objectives of sustainability, equity and efficiency.

Co-management is not static. Partnerships are redefined at various times in the co-management process. It adjusts to changing conditions over time and addresses aspects of democratization, social empowerment, and power sharing. The process, in some instances, may disturb the status quo. It may upset existing arrangements or undermine the influence of traditional leaders, as in the case of Bangladesh. This requires conflict management, given multiple stakeholders and multiple interests.

The case studies show that co-management can work in diverse aquatic environments. Dependence on the resource, threats to livelihoods and survival, and the desire to improve socio-economic conditions are strong motivating factors in the decision of resource users, stakeholders and government to collaborate. The existence of homogeneous groups and a prior tradition of collective action are desirable in co-management regimes. They foster harmony and consensus building. However, their absence is not a deterrent to the establishment of co-management arrangements, as the case studies show.

With co-management, new paths were charted in resource management. This was evident in the introduction of new and non-destructive technologies, delineation of boundaries of areas to be managed, enforcement of property rights and rules, capacity building, development of new local leaders, and availability of mechanisms for resolving conflicts, among others. Supportive policies, enabling legislation and law enforcement, moreover, provided legitimacy to co-management arrangements.

In terms of outcomes, positive changes were associated with co-management regimes in various Asian countries. Perceived changes after co-management generally indicated significant improvements in equity indicators such as participation in resource management, access to resources, resource control, benefits from the managed area, and overall well-being of the household. Gains were also perceived in efficiency indicators such as conflict resolution and ease in collective decision-making. Moreover, perceptions of positive changes were linked to sustainability indicators, which include overall status of resources, rule compliance, information exchange, and knowledge of resource management. Resource users perceived that significant changes took place after co-management arrangements were established.
In conclusion, co-management in the context of the Asian experience represents a joint effort to rehabilitate aquatic resources, reverse destructive practices, and provide equitable resource access. It is a concrete response to deteriorating resource conditions that accompany open access to aquatic resources. It is also a demonstration that partnerships between the government and the community of resource users can succeed in diverse environments. Co-management, in some cases, is an attempt to grant resource users and stakeholders a voice in planning and decision-making as well as to equip them for their role as responsible resource managers. Thus, resource management has ceased to be a concern of the government only or of the resource users only. It is a collective responsibility that demands the commitment and valuable support of various stakeholders.
<table>
<thead>
<tr>
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<th>Indonesia</th>
<th>Vietnam</th>
<th>Thailand</th>
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<td>• Along the bay/gulf</td>
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<td>• Stable harvest</td>
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<td>XX</td>
<td>XXX</td>
<td>X</td>
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<td>Vietnam</td>
<td>Thailand</td>
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<td>• Industrial fishery</td>
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<tr>
<td>• Combination of artisanal and industrial</td>
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<td>xx</td>
<td>xx</td>
<td>x</td>
<td>xx</td>
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<td>xxx</td>
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<td>Main Types of Fishing Gear</td>
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<td></td>
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</tr>
<tr>
<td>• Traditional (hook and line, fish pots, fish corrals)</td>
<td>xx</td>
<td></td>
<td>xxx</td>
<td>x</td>
<td>x</td>
<td>7</td>
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<tr>
<td>• Others (bagnet, seine, trawl, muro-ami, etc.)</td>
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<td>xx</td>
<td>xx</td>
<td>x</td>
<td>xx</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>• Dispersed</td>
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<td></td>
<td>xx</td>
<td>x</td>
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<td>• Localized</td>
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NOTE: one x = one site or area
### Table 34. Typology of the case studies: market attributes

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<th>Philippines</th>
<th>Bangladesh</th>
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<tr>
<td><strong>Orientation</strong></td>
<td></td>
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<tr>
<td>• Subsistence</td>
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<td>XX</td>
<td>X</td>
<td>X</td>
<td>XX</td>
<td>11</td>
</tr>
<tr>
<td>• Market-oriented</td>
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<td></td>
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<tr>
<td><strong>Market destination of fishery products</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Domestic</td>
<td>XXX</td>
<td>XX</td>
<td>X</td>
<td>X 1/</td>
<td>XX</td>
<td>9</td>
</tr>
<tr>
<td>• International</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Both domestic and international</td>
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<td><strong>Power relation between buyers and sellers</strong></td>
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<td></td>
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<td></td>
<td></td>
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<tr>
<td>• Buyers have more control over price determination</td>
<td>XXXXX</td>
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<td>XX</td>
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<td>• Fishers have more control over price determination</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Role of women</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Active</td>
<td>XXX</td>
<td>XX</td>
<td><em>X</em></td>
<td>X</td>
<td>X</td>
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</tr>
<tr>
<td>• Not active</td>
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NOTE: one x = one site or area

1/ for fresh fish only
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<td>Degree of homogeneity</td>
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<tr>
<td>• Heterogeneous</td>
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<td>x</td>
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<td>Tradition of collective action in resource management</td>
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</tr>
<tr>
<td>• Absent</td>
<td>xxxx</td>
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<td>x</td>
<td>x</td>
<td>xx</td>
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<tr>
<td>• Present</td>
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<td>Dependence on the fishery for livelihood</td>
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<tr>
<td>• High (60% and above)</td>
<td>xxx</td>
<td>x</td>
<td>xx</td>
<td></td>
<td>xx</td>
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<tr>
<td>• Medium (30-59%)</td>
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<td>x</td>
<td>x</td>
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</tr>
<tr>
<td>• Low (below 30%)</td>
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<td></td>
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<tr>
<td>• Primarily owned</td>
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<td>xx</td>
<td>xx</td>
<td>x</td>
<td>xx</td>
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</tr>
<tr>
<td>• Rented/borrowed</td>
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<td></td>
<td></td>
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<td>x</td>
<td>2</td>
</tr>
<tr>
<td>• Commercial</td>
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<td>x</td>
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<td>• Negative</td>
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<td></td>
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<td>• Neutral</td>
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<td>Attitude toward the sharing of responsibility for resource management between the government and the village</td>
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<td>• Favorable</td>
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<td>_x</td>
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<td>xx</td>
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<tr>
<td>• Unfavorable</td>
<td>–</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Neutral</td>
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### Table 35. Typology of the case studies: socio-economic and cultural attributes

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<td>• High</td>
<td>X</td>
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</tr>
<tr>
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<tr>
<td>• Low</td>
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### Table 36. Typology of the case studies: institutional and organizational arrangements

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<td>• Government-driven</td>
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<td>• Donor-driven</td>
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<td>• Village-driven</td>
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<td>X</td>
<td>3</td>
</tr>
<tr>
<td>• Tradition-driven</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>XX</td>
<td>2</td>
</tr>
</tbody>
</table>

| Primary stimulus for co-management                   |             |            |           |         |          |       |
| • Socio-economic                                     | XXXX        | XX         |           |         | X        | 10    |
| • Biological                                         |             |            |           |         | X        | 3     |
| • Cultural                                           |             |            |           |         | X        |       |
| • Political                                          |             |            |           |         | XX       |       |

| Duration of co-management arrangements               |             |            |           |         |          |       |
| • 1-5 years                                          | X           |            |           |         | X        | 3     |
| • 6-10 years                                         | XXXX        | X          |           |         | X        | 6     |
| • More than 10 years                                  |             |            |           |         | X        | 3     |
### Table 36. Typology of the case studies: institutional and organizational arrangements

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Philippines</th>
<th>Bangladesh</th>
<th>Indonesia</th>
<th>Vietnam</th>
<th>Thailand</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary role of government 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Instructive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Consultative</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>• Advisory</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>• Cooperative/active partner</td>
<td>XXX</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>• Informative</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td><strong>Leadership/power structure of user groups</strong></td>
<td>X</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>10</td>
</tr>
<tr>
<td>• Formal/legitimate</td>
<td>X</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>10</td>
</tr>
<tr>
<td>• Informal</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>10</td>
</tr>
<tr>
<td><strong>Existence of property rights</strong></td>
<td>X</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>10</td>
</tr>
<tr>
<td>• Access rights</td>
<td>X</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>10</td>
</tr>
<tr>
<td>• Withdrawal rights</td>
<td>X</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>• Management</td>
<td>X</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>10</td>
</tr>
<tr>
<td>• Exclusion</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>10</td>
</tr>
<tr>
<td>• Transfer</td>
<td>_X_X</td>
<td><em>X</em></td>
<td><em>X</em></td>
<td><em>X</em></td>
<td>_</td>
<td>4</td>
</tr>
<tr>
<td><strong>Decision-making process</strong></td>
<td>X</td>
<td>XX</td>
<td>XXX</td>
<td></td>
<td>XXX</td>
<td>11</td>
</tr>
<tr>
<td>• Democratic/participatory</td>
<td>X</td>
<td>XX</td>
<td></td>
<td>X</td>
<td>XXX</td>
<td>2</td>
</tr>
<tr>
<td>• Autocratic</td>
<td>XX</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. **Instructive**: there is minimal information exchange between the government and the resource users. The mechanisms exist for dialogue with users, but the process itself tends to be a case of government informing users on the decisions they plan to make.

2. **Consultative**: mechanisms exist for the government to consult with the users, but the government makes all decisions.

3. **Advisory**: mechanisms exist for the government to interact with the resource users. The users advise the government of decisions to be taken and the government endorses these decisions.

4. **Cooperative/active partner**: the government and the resource users/stakeholders are partners in decision-making and the actual implementation of resource management interventions/initiatives.

5. **Informative/delegated**: the government has delegated authority to make decisions to user groups that are responsible for informing the government of these decisions.

Note: These categories were adopted from Sen and Raakjaer-Nielsen (1996).
### Table 36: Typology of the case studies: institutional and organizational arrangements

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Philippines</th>
<th>Bangladesh</th>
<th>Indonesia</th>
<th>Vietnam</th>
<th>Thailand</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existence of rules on fisheries management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Operational rules</td>
<td>XXXX</td>
<td>XX</td>
<td>XXX</td>
<td>X</td>
<td>XX</td>
<td>12</td>
</tr>
<tr>
<td>• Collective choice rules</td>
<td>XXXX</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>10</td>
</tr>
<tr>
<td>• Constitutional rules</td>
<td>XXXX</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>10</td>
</tr>
<tr>
<td>Rule enforcement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Existence of enforcement arrangements</td>
<td>XXXX</td>
<td>XX</td>
<td>XXX</td>
<td>X</td>
<td>X</td>
<td>11</td>
</tr>
<tr>
<td>• Absence of enforcement arrangements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level of representation of user groups in the decision-making process</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Village level</td>
<td>XXX</td>
<td>XX</td>
<td>XXX</td>
<td>X</td>
<td>XX</td>
<td>11</td>
</tr>
<tr>
<td>• Municipal level</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>• Provincial level</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• National level</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: one x = one site or area
### Table 37. Typology of the case studies: Exogenous events

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Philippines</th>
<th>Bangladesh</th>
<th>Indonesia</th>
<th>Vietnam</th>
<th>Thailand</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural calamities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Flood</td>
<td>XX</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>• Typhoon</td>
<td></td>
<td>X</td>
<td>_X</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>• Disease (i.e. Epizootic Ulcerative Syndrome, red tide, insect infestation of mangrove, etc.)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Arrival of external change agents</td>
<td>XXX</td>
<td>XX</td>
<td></td>
<td></td>
<td>X</td>
<td>9</td>
</tr>
<tr>
<td>Introduction of new projects</td>
<td>XXX</td>
<td>XX</td>
<td></td>
<td></td>
<td>X</td>
<td>10</td>
</tr>
<tr>
<td>Introduction of new fishery-related policies</td>
<td>XXX</td>
<td>XX</td>
<td></td>
<td></td>
<td>X</td>
<td>8</td>
</tr>
<tr>
<td>Introduction of mangrove-related policies</td>
<td>XX</td>
<td>XX</td>
<td></td>
<td></td>
<td>X</td>
<td>1</td>
</tr>
<tr>
<td>Integration of the village economy into external markets</td>
<td>XX</td>
<td>XX</td>
<td></td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Introduction of new technologies</td>
<td>XXX</td>
<td>X_</td>
<td></td>
<td></td>
<td>X</td>
<td>6</td>
</tr>
<tr>
<td>In-migration</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
<td>3</td>
</tr>
<tr>
<td>Arrival of commercial mangrove cutters and commercial fishers from other areas</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

NOTE: one x = one site or area
CHAPTER SEVEN

Fisheries Co-management in Asia: Prospects for the Future

The Fisheries Co-management Research Project had the overall purpose of evaluating the prospects for the successful implementation of fisheries co-management strategies. The project systematically and comparatively documented and assessed strategies and processes of fisheries co-management implementation in Asia, particularly at the national and community levels. This was accomplished largely through comparative case studies, country research and networking.

Over the ten-year life of the project, insights and experience were gained into co-management approaches, methods, processes and impacts. Research activities were undertaken with national research partners in seven Asian countries: Bangladesh, Cambodia, Indonesia, Malaysia, the Philippines, Thailand and Vietnam. A number of research reports, working papers, workshop proceedings, policy briefs, scientific journal articles, popular publication articles, a web site, and an e-mail list server attest to the varied outputs of the project. These outputs were prepared for several audiences including policymakers and government officials, development practitioners, resource users, academics and researchers.

The research activities of the project produced a number of new outputs that have added to the pool of knowledge on co-management. The institutional analysis research framework was developed to provide a common analytical framework in order to compare the results between different components of the project. The use of the common framework allowed data to be collected and analyzed in a standard format so that the results could be compared and generalizations made about co-management. The refined research framework proved to be a useful analytical method that continues to be applied by researchers worldwide.

Several methods for implementing and assessing co-management were either developed or further refined from existing methods. Rapid appraisal was found to be a useful method for documenting the existence, operation and impacts of community-based fisheries resource management systems. A “baseline-independent” method was developed to quantitatively evaluate the impact of community-based management projects on the well-being of the coastal ecosystem, including both human and natural elements. A process for community-based fisheries co-management was developed, based on the experiences of practitioners in Asia. This has served as a guide to implementing co-management.

Several verifiable hypotheses concerning the advantages of co-management, especially as compared to centralized management systems, were analyzed. Although only a few studies were undertaken and the sample sizes used in the studies were small, important new insights about co-management were identified. A study on fishers’ non-compliance behavior with regulations found sufficient support to demonstrate that personal moral development plays a more important role than legitimacy in securing compliance. Under co-management, there is a greater moral obligation on individuals to comply with rules and regulations. Another study found support for the general argument that transaction costs of fisheries management may be lower under a co-management system. This was the first study of its kind to examine transaction costs for a co-management system and, despite some problems, provided a methodological framework for analyzing co-management and some important preliminary results on this issue. A third study on institutional resilience of fisheries management systems found that strong links between certain components of the system – legitimacy, trust, collaboration, transparency – were critical for the system’s ability to adapt to change. Strong relations between the actors in the
system, a shared vision of its relevance, and the social structure of the community all affect the degree to which the management system can mitigate the effects of external perturbations.

The case study analysis of co-management, along with results from other components of the project, allowed for the identification of key conditions that affect the success of co-management implementation in Southeast Asia. Some of these key conditions were already known, while others are new and/or unique to Southeast Asian conditions.

Other project accomplishments include the strengthening of the capacities of research partners to understand the theoretical and conceptual foundations of co-management and to undertake research in this area. A number of training courses and workshops on various social and economic methods of co-management were organized to improve the capacity of research partners. The expansion of linkages with other organizations in the region and worldwide, such as non-governmental organizations, research institutions, professional organizations, policy research centers, development projects and universities, provided for the sharing of information and knowledge. Technical assistance in the policy formulation, planning and implementation of co-management projects was provided in the Philippines and Vietnam. Again, this offered opportunities for sharing information and knowledge on co-management.

Overall, the project has been instrumental in raising the awareness of co-management strategies and arrangements among governments, fishers, non-governmental organizations, academic and research institutions, fisher organizations and other resource stakeholders. A number of development practitioners have replaced community-based coastal resource management strategies with the broader strategy of community-based co-management, in part as a result of interactions with the project. The project, through its publications, training activities and networking, has been instrumental in reshaping government policies to support co-management. For example, an important policy of the Ministry of Fisheries in Vietnam is the development of fisheries management based on the principle of co-management. The Ministry of Fisheries is also supporting the establishment of a co-management pilot site in order to gain additional experience and knowledge.

Both qualitative and quantitative methods have been employed to substantiate the research results. The measurement, for instance, of the biological and socio-economic outcomes of marine reserves and other coastal resource management projects under co-management arrangements provides some of the first quantitative results on the performance of co-management in the region.

Prospects for the future

The central question to be answered, then is whether co-management constitutes a viable fisheries management strategy for Asia? The research has shown that under certain conditions fisheries co-management can be an equitable, efficient and sustainable resource management strategy. However, it has also shown that co-management will not work or be successful in every situation. Nonetheless, co-management can be a viable fisheries management strategy in Asia.

The seven countries of Southern Asia, on which the research of the co-management project focused, share common issues and similar aquatic resource characteristics, both human and ecological. In some countries and coastal communities, fish represents the primary source of animal protein. Fishing and the extraction of coastal resources provide the main livelihood for millions of families. It is now almost universally accepted that many of the coastal fisheries are over-fished. Excess capacity, both labor and
capital, exists in most fisheries. Coastal resources and ecosystems are degraded and in decline due to a variety of factors. The governments of these countries are striving to attain sustainable development of coastal and marine resources and to improve the socio-economic conditions of their coastal communities. However, funds and other resources for these purposes are limited. Although this is not new information, new actions must be taken to deal with these issues. With limited government resources, the people will need to take more responsibility for funding solutions to their problems and needs. The resource users must be involved in making crucial management and development decisions.

The resource users will need to be better educated, informed and empowered to take action. New governance arrangements for fisheries must be examined and put into place. Fisheries policies need to shift from a use orientation to a conservation and resource management orientation.

In Southeast Asia, there does not appear to be any "blueprint" for co-management. A variety of types and models of co-management have emerged and are evolving, depending on the country and community. Co-management in Southeast Asia is still in its early stages of development and new lessons and experiences are emerging daily. However, co-management seems to be driven by the search for better fisheries management. There are several motivating factors for co-management including dependence on the resource, the level of threat to livelihoods as a result of resource decline, the desire to improve the quality of life and standard of living, donor initiatives, the need to reduce conflicts, and the desire of people to be more involved in making management decisions.

The outcomes of co-management included: improved enforcement of rules and regulations, increased participation of resource users in management, higher levels of equity in terms of fair treatment and representation, greater local control over the resource, reduced conflicts, better economic conditions of households, and improvements in ecosystem health. Co-management represents a joint effort in managing fisheries resources. However, in many cases the impetus for co-management is still coming from outside the community through NGOs, and research and development projects.

There is a wide range of types of co-management in the region and at different stages of development. Co-management is still developing, learning, and maturing. A more complete evaluation of co-management impacts and performance in Southeast Asia will need to wait until it has been in place for a longer period of time.

The research has shown that co-management provides a strong institutional structure to address the issues cited above. The advantages and disadvantages of co-management have already been discussed in a previous chapter, and will not be reiterated here. However, there are several key arguments that can be made to evaluate the use of co-management in a particular situation. One of the key arguments for co-management is that it attempts to employ fisheries management systems that are well adapted for local conditions and problems. It recognizes different needs, interests and concerns involved in resource management. It allows for a more active and important role and responsibility for civil society. It also links community-based initiatives with the government's legal, policy and administrative structures. Another key argument is that it allows fishers and fisher organizations to participate in the planning and management process of the fishery, as well as in community development. The commitment of fishers and other stakeholders to a resource management initiative will be stronger if they feel that they have been active in the process. A third key argument for co-management is that it seeks equity in resource management. Co-management involves issues of local power relations and power sharing. Empowerment affects the content and form of social relationships in the community and, in turn,
power relations among individuals and groups. The multi-use, multi-user nature of coastal resources breeds conflict. A fourth key argument is that it involves the process of managing conflicts among resource users. Through a process of dialogue and negotiation, the resource users and stakeholders can explore various options that best suit their needs and circumstances.

The research has shown that the implementation of co-management is costly, complex and long. An enabling legal, policy and administrative structure from government should support co-management. There needs to be a true partnership between the resource users/stakeholders and the government. Trained professionals are required to work with the community to plan and implement co-management.

The research has identified several key factors of communities with successful community-based co-management. These are:

• Clear and recognized boundaries for the area to be managed
• High dependence on the fishery for livelihood
• Individual incentive structure to participate
• Benefits of participation exceeding costs of investment in activities
• Fishers having a sense of ownership of their fishing area
• Existence and enforcement of property rights and rules
• Leadership acceptable and credible
• Fishers unwilling or unable to move out of their fishing area
• Those affected by management decisions able to participate in the decision-making
• Fishers able to declare management rights, whether informal or formal
• Information made available to and shared among partners

Can co-management promote a well-managed fishery? As the case studies illustrate, community-based co-management can lead to maintaining or improving both the quality and quantity of fish stocks and coastal ecosystems. Living standards of fishers and their families can be improved. Fishers can manage their fishery with no or limited outside (government) assistance. Fishers can be empowered to take control of management and development of the fishery and community. Will co-management ensure a well-managed fishery all the time? Not necessary. There are no guarantees of success. The research has identified more failures than successes of co-management (Pomeroy and Carlos 1997). Co-management will not work in every community. The conditions for successful implementation and sustainability of co-management are not present in every co-management. However, the chances of success and sustainability of co-management are increased when people are informed, can participate, and are empowered.

Is there a prospect for fisheries co-management in Southern Asia? The research has shown that the Philippines, Thailand, Indonesia, Vietnam and Malaysia all have an active or planned policy and/or program of co-management. Strong central control of fisheries management is giving way to either active implementation or to experiments with community-based management and co-management. Many governments are making a clear commitment to decentralization, the sharing of resource management power among the national government, local government, and fishers and fisher organizations. The process of decentralization is being led by the Philippines. This is in contrast to 1994, when Kuperan and Mustapha (1994) concluded, “The prospects for adoption of the co-management
approach among the countries of Southern Asia are, however, varied with only the Philippines having good prospects for co-management adoption”.

A Research agenda

There are still a number of research issues on co-management that need to be addressed in order to generate more specific information for policy and practical application. These include case studies; empirical studies/hypothesis testing; studies of issues related to process and management systems; legal studies; policy and institutional analysis; and national policy development.

Case studies of co-management. During the project a number of case studies of fisheries co-management were undertaken in Asia using the institutional analysis research framework. These case studies provided valuable information on conditions and factors of co-management. New case studies should be undertaken, but the selection of cases should be dependent on what new information the cases can provide in terms of implementation, process, impact and performance. Selection of the cases should be based on the criteria that the case fills a gap in missing information or that the case is of a type (resource system, type of fishery, approach to implementation) that has not yet been studied. In addition to new case studies, it would be useful to monitor the existing case studies on a periodic basis. Since co-management is a relatively new management strategy in Asia, long-term monitoring of the case can provide a great deal of useful information.

Empirical studies/testable hypotheses. A number of testable hypotheses exist concerning the advantages of co-management, especially when co-management is compared with a centralized management strategy. A number of these hypotheses were addressed in the project. Additional research on these issues is warranted. Priority areas to be examined include:

- Legitimacy: increased authority of the organization, regulations, and management system
- Transaction costs: overall reduction
- Incentives: behavior modification
- Enforcement and compliance improvement
- Institutional resiliency: flexibility and adaptation of institutional and organizational arrangements
- Conflict management: improvement
- Ecosystem health: biological improvement
- Rationality: increased knowledge, data and information sharing
- Democracy (empowerment, representation, choice): reduction of political equity problems
- Stewardship: improvement

Studies of issues related to process and management systems

A number of crosscutting issues related to co-management exist that are independent of resource systems or other conditions. These include:

- Gender: roles in management and organization
- Organizational framework: most appropriate and effective
- Scale: of institutional and organizational arrangements, ecosystem, community
- Process: institutional and organizational evolution over time (dynamics)
• Structure and content of co-management agreements
• Impact: measurement of short and long term impacts

Legal, policy and institutional analysis. During the project, a series of legal, policy and institutional analyses were carried out in several Asian countries, including the Philippines, Thailand, Vietnam, Cambodia, Bangladesh and Indonesia, to evaluate constraints and opportunities, and to make recommendations in support of co-management. These studies were a mix of legal, public administration and economic analysis. Further research in this area is required with an emphasis on legal and institutional constraints and opportunities for co-management at the local level, to monitor and review changes in national laws and policies and the social context for co-management. The research should be expanded into other Asian countries such as Malaysia and Laos.

National policy development. With increased experience and knowledge about co-management from research and practice, there is a need to support policy analysis for co-management initiatives at the national government level. Research results should be translated into practical policy briefs for policy makers and managers. Research should be focused on factors that motivate governments to implement co-management.

Networking/capacity building. Capacity building of research partners and policy makers should be an ongoing activity. This includes a coordinated network of information exchange, meetings, workshops, publications, training activities and partner exchanges. Since some research partners in certain countries are not as strong scientifically as those in other countries, it may be necessary to conduct training to develop their understanding and scientific capacity to conduct research on co-management.
APPENDIX 1

Fisheries Co-management Project Publications

Research Reports


Paper

APPENDIX 2

Fisheries Co-management Research Project Research Activities Conducted by ICLARM and NARS in Asia

1. Fisheries co-management literature review. IFM and ICLARM staff.

2. Study on the management of fisheries/aquatic resources at the local level in the Philippines. UP College of Public Administration.


5. Enforcement and compliance with fisheries regulations in Malaysia, Indonesia and the Philippines. Kuperan et al.


7. Workshop on experiences and case studies on coastal resource community-based management and co-management in Palawan, Philippines. ICLARM staff.

8. A handbook for rapid appraisal of fisheries management systems. ICLARM staff.


10. Fisheries co-management project brochure.

11. Institutional arrangements in the fisheries co-management in Malalison Island, Culasi, and Antique, Philippines: a process documentation research methodology. SEAFDEC.


13. Analysis of co-management arrangements in fisheries and related coastal resources: a research framework. ICLARM/IFM core staff.

14. Fisheries co-management newsletters.

15. Visayas-wide conference on community-based coastal resources management and fisheries co-management. ICLARM staff and partners.


17. Transaction costs and fisheries co-management. UPM.

19. Pilot site activities in Honda Bay, Puerto Princesa City, Palawan, Philippines. SEAFDEC, SEARCA, Tambuyog and ICLARM. (Resource and Ecological Assessment of Honda Bay, Palawan. L. Garces and D. Bonga)


24. Analysis of policies and policy instruments relevant to the management of fisheries/aquatic resources with emphasis on local level issues and concerns in the Philippines. SEARCA.


29. Case study of the institutional arrangements in the fisheries co-management on Malalison Island, Culasi, Antique, Philippines. SEAFDEC.


31. Measuring transaction costs for fisheries co-management systems. Kuperan and Mustafa.


33. An analysis of fisheries co-management arrangements: a case of a fishing community in southern Thailand. CORIN.

34. Asian regional workshop, 21-23 October, Phuket, Thailand. ICLARM staff.

35. Enforcement and compliance with fisheries regulations in Malaysia, Indonesia and the Philippines. I. Susilowati.


38. Mangrove rehabilitation and coastal resource management project of Mabini-Candijay: a case study of fisheries co-management Arrangements in Cogtong Bay, Bohol, Philippines, ICLARM staff. a


41. Coastal resources co-management research project - Phase 2 planning meeting for NARS-Asia Partners, 9 November, Chiang Mai, Thailand.

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