

AFSSRN members are invited to participate in the 5th Asian Fisheries Forum to be held at the Lotus Hotel Pang Suan Kaew, Chiangmai, Thailand from 11 to 14 November 1998. The AFSSRN plans to organize a section meeting which will discuss papers on fisheries and aquaculture socioeconomics and management. A network meeting is also planned immediately after the forum on 15 November 1998. Members of the network who have submitted papers and will be attending the forum please get in touch with me in writing: Dr. K. Kuperan Viswanathan, Chairman, AFSSRN, Faculty of Economics and Management, Universiti Pertanian Malaysia, 43400 Serdang Selangor, Malaysia; tel: 603-9486101 ext. 1654, Fax: 603-9486188, E-mail: kuperan@econ.upm.edu.my

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Mangrove Rehabilitation and Coastal Resource Management: A Case Study of Cogtong Bay, Philippines¹

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Abstract

The Cogtong Bay experience represents a bold attempt to pursue a shared responsibility between the government and local residents for rehabilitating coastal resources. Some of the factors that provided the impetus to co-management arrangements were the recognition of resource management problems, dependence on coastal resources for livelihood and the desire for more sustainable resource use. This paper draws attention to the importance of legitimate user/property rights, vigilant law enforcement efforts, common commitment among stakeholders and continuing support from local leadership in viable co-management arrangements.

Introduction

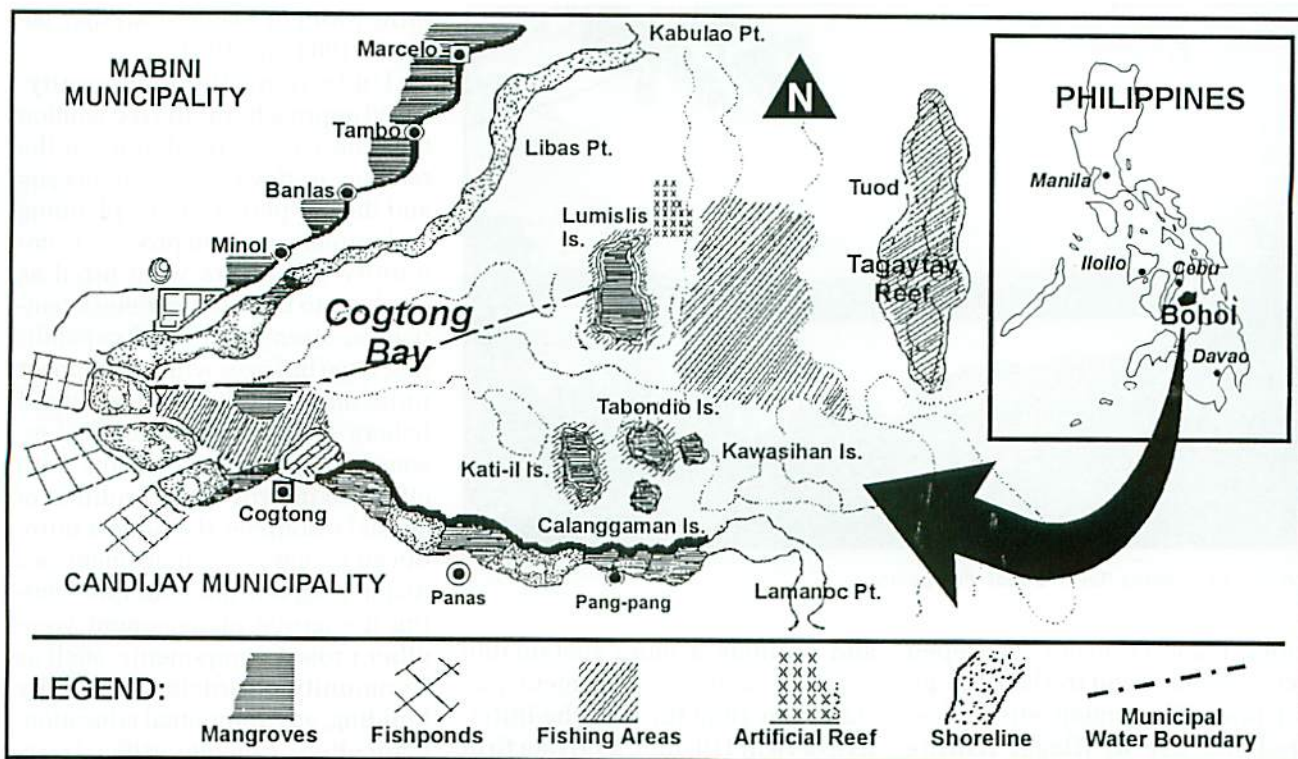
As part of its Fisheries Co-management Research Project, ICLARM is evaluating several case studies throughout Asia on successful co-management arrangements. The case studies are conducted using an institutional analysis research framework. This framework links contextual variables with the system of rights and rules and with the incentives to cooperate in resource

management, as well as analyzes the outcomes of co-management arrangements. The choice of Cogtong Bay, Philippines as a case study site was guided by five site selection criteria: 1) existence of co-management arrangements (i.e., actual sharing of responsibility and authority for coastal resource management between the government and the village); 2) dependence of village residents on fishing and other coastal resources; 3) establish-

ment of a resource management technology; 4) existence of property rights and rules; and 5) demonstration of tangible project outcomes.

Cogtong Bay is located in south-eastern Bohol 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. There were 2 000 ha of mangrove forest, of which 1 300 ha are still intact (Janiola 1996).

¹ A more complete discussion of the case study and lessons learned is presented in Fisheries Co-Management Project, Working Paper No. 33: Mangrove Rehabilitation and Coastal Resource Management Project of Mabini-Candijay: A Case Study of Fisheries Co-management Arrangements in Cogtong Bay, Philippines, available from ICLARM.



The remaining 700 ha have been converted to fishponds.

The coastal villages of Cogtong, Candijay and Marcelo, Mabini are inhabited by native Boholanos and other Visayans from neighboring provinces. The village residents are fairly homogeneous in terms of ethnicity, religion and occupation and are heavily dependent on coastal resources for survival and livelihood. Aside from fish, most families gather crabs, shellfish, algae and other marine products for subsistence as well as for sale to local markets. Other families gather firewood from mangrove areas as a part-time livelihood. Mud crabs (*alimango*) and mangrove clams (*imbao*) are caught in mangrove swamps, while shrimps and prawns are commonly caught in the rivers. Seagrass beds yield blue crabs, sea cucumber, seaweed and various types of fish. The Cogtong Bay fishery is multi-species, multi-gear, and mainly artisanal (Katon et. al. 1998). Fishing operations are generally done with small, non-motorized

boats in dispersed fishing grounds, both outside and within the Bay. Small pelagic fishes, 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, handlines, fish corrals, spears, fish traps, squid jiggers and Danish seine.

Historically, Cogtong Bay has been an open access resource, with unrestricted entry to the waters and free-for-all harvesting of coastal products. 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. Mangrove areas were informally designated to care and management of 25 families. These families eventually obtained formal property rights from the national government in the early 1990s.

Pre-project Situation

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 resource use conflicts. The next two decades, however, saw a drastic change in the situation due to three major developments. These were the introduction of fishpond technology in 1965, the arrival of commercial fishers in the 1960s, the entry of commercial mangrove cutters from neighboring provinces in the 1970s, and the integration of Cogtong Bay into the heavily market-driven economies of nearby provinces and urban centers, such as Cebu and Tagbilaran. They hastened the degradation of the Bay's resources and resulted in conflicts



Overview of Cogtong Bay in Bohol, Philippines.

among resource users. The open access resource and the 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 for fishpond development. The situation was aggravated by the fragmentation of resource management functions among national government agencies and a lack of leadership, giving rise to unclear jurisdiction over coastal resource management (Katon et al. 1998).

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 dwindled from about 20 kg in the 1960s, to 10 kg in the 1970s, to 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 (Janiola 1996).

The Change Process

A major effort to reduce resource degradation in Cogtong Bay

and promote a more sustainable coastal resource management was started in 1989 through the initiative of ACIPHIL Inc., a private firm that has actively provided technical assistance to resource management projects in the Philippines, including the Central Visayas Regional Project (CVRP). ACIPHIL entered into a partnership with the Department of Environment and Natural Resources (DENR) 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 CVRP (1984-1992), the project sought to transform resource users into resource managers who are directly responsible for day-to-day resource decisions. It adopted a community-based approach to the problem of resource degradation and poverty in coastal villages along Cogtong Bay (ACIPHIL 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. The Network Foundation, a non-government organization, assisted ACIPHIL in implementing the Mangrove Rehabilitation and Coastal Resource Management Project

(MRCRMP) of Mabini-Candijay between 1989 and 1991.

Underlying the community-based approach was the recognition that the coastal residents are the real day-to-day resource managers and the key players in the planning and implementation process. 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, concrete artificial reefs and project facilities. Among the project's accomplishments were the organization of 13 fishers' associations, issuance of 265 Certificates of Stewardship Contracts (CSC), rehabilitation of 110 ha of mangrove areas in Mabini and Candijay, and installation of 265 modules of concrete artificial reefs (ACIPHIL 1991; Janiola 1996).

Central to the implementation of the project was the provision of secure mangrove tenurial rights to local fishers. Thus, the project ushered in the redefinition of access to mangrove areas and the establishment of formal tenurial rights through the issuance of 25-year Certificate of Stewardship Contracts (CSC). Before proceeding with planting activities, each CSC applicant developed a farm plan that detailed areas for new and enrichment planting, planting species to be used, and maintenance procedures. The national government, through the Department of Environment and Natural Resources (DENR) gave CSC holders the right to manage their mangrove areas and harvest their trees, provided they replanted each tree cut. Non-CSC holders were not allowed to cut mangrove trees in CSC-covered areas.

During project implementation, a closer coordination between the DENR and the Bureau of Fisheries and Aquatic Resources (BFAR) became imperative to resolve conflicting policies on resource use and fishpond development. At the time BFAR 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 (Janiola 1996). The struggle between FLA holders and village fishers was resolved in 1991 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 enforcement facilities, police officers and local legislation. Joint patrol teams regularly guarded the coastal waters and mangrove areas. Although the prevention of illegal fishpond development 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 reducing blast fishing in the Bay.

Incentives and Disincentives

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; 2) heightened environmental awareness as a result of information campaigns and community organizing efforts of the MRCRMP; 3) desire for better coastal resource management on the part of government organizations and nongovernment organizations; 4) concern for improving the socioeconomic condition of poor coastal residents; 5) legitimacy of property rights; and 6) realization of the need for collective action against illegal fishing and illegal mangrove cutting to avert further resource degradation (Katon et al. 1998).

Disincentives to cooperate were initially rooted in conflicting government policies and the indifference of some local government officials to strict law enforcement. These were eventually resolved when the project focused attention on these problems 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. 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

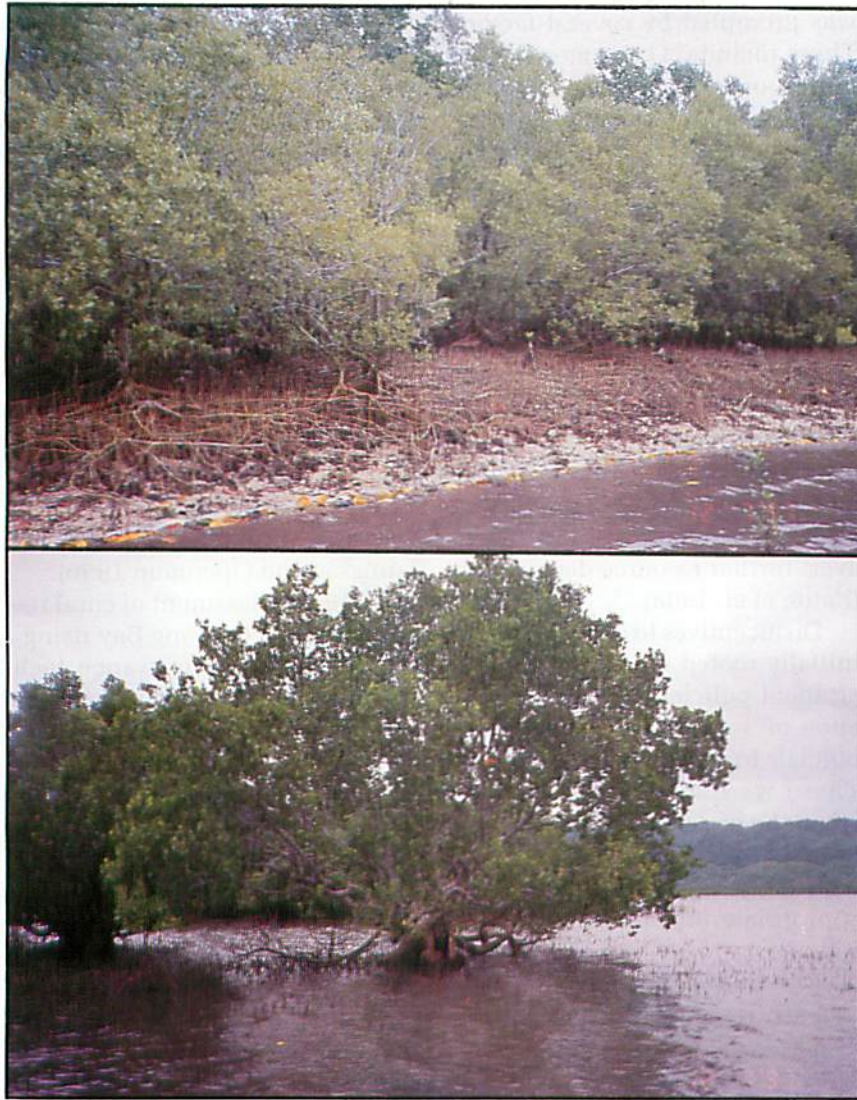
A post-project mangrove assessment done by ICLARM researchers in July 1997 showed a total basal area of 6.82 m²ha⁻¹ at the project reforestation site. The relatively good mangrove growth seems to have been influenced by the site's shallow depth, protection from waves, muddy substrate, and extensive water run-offs. Due to the absence of baseline data on Cogtong

Bay which could provide a comparison of the pre-project situation with the present situation, a comparison was done instead with other areas in the Philippines where overharvesting and mangrove conversion to aquaculture led to mangrove denudation. The total basal area of the reforestation site along Cogtong Bay is slightly higher than San Miguel Bay (6.53 m²ha⁻¹, Vega et. al. 1994), suggesting that rehabilitation results are similar. However, it is lower than Carigara Bay in Leyte (9.84 m²ha⁻¹, Bonga et. al. 1996) and Panguil Bay in North-western Mindanao (9.08 m²ha⁻¹, Lumasag and Openiano 1990).

A 1997 assessment of coral reef conditions in Cogtong Bay using a manta tow reconnaissance technique indicates a percentage live coral cover of 11-50% (poor to fair) on the eastern side of Lumisli Island. Tagaytay reef, which lies near the mouth of the Bay, has a higher percentage of live coral cover at 51-75% (good). Corals normally grow well in well-oxygenated, warm and clear waters that are free from suspended sediments and pollutants. It is difficult to conclude, however, that the reefs are in a better condition now due to the absence of benchmark data. Additional reef assessments are warranted in the future.

In relation to fish catch trends over time, key informant interviews on average catch per unit effort (CPUE) indicated a progressive downward trend from about 20 kg in the 1960s to 1-3 kg in the 1990s for various types of fishing gear (i.e., longline, fish pot, handline, spear gun and squid jigger). The only exceptions apply to gillnet and fish corral, where the CPUE appears to have stabilized. The CPUE associated with gillnet and fish corral in 1997 was close to 10 kg, similar to the CPUE in the 1980s. This figure, however, is equivalent to only half of the average fish catch in the 1960s (Katon et al. 1998).

A baseline independent technique for impact assessment was



Mangrove areas along Cogtong Bay, Philippines.

used to compare perceived social and economic conditions before the project (1988) and after the project (1997). This technique was adopted due to the absence of baseline data and the difficulty of finding a similar site with no project intervention for an analysis of "with and without project" situations. Project performance was based on user perceptions of impacts using a visual, self-anchoring, ladder-like scale which allowed ordinal judgement, placed little demand on the respondent's memory, and could be rapidly administered (Pomeroy et al. 1996). The respondents were shown a ladder-like diagram with 10 steps, where 1 represented the worst possible scenario and 10 the

best possible scenario for every indicator. For example, with respect to the overall well-being of coastal resources, the respondent was informed that Step 1 indicates a situation without any fish, mangroves and other coastal resources. Step 10 corresponds to a situation where fish, mangroves and other coastal resources are abundant. The respondent was asked to indicate where the situation was before and after the project. The research team conducted a random sample survey of 108 fishing households in Cogtong, Candijay and Marcelo, Mabini.

Table 1 shows that fishers in the two villages perceived positive and statistically significant changes in

all indicators, except in the overall well-being of coastal resources. Larger improvements were perceived in knowledge, information exchange, conflict resolution, resource control and influence. These could be attributed, in part, to the interactive discussions pursued by the project and to deliberate efforts to involve village residents in local affairs, which provided a sense of empowerment. The lack of a statistically significant improvement in the overall well-being of coastal resources could have been influenced by less vigilant enforcement efforts on the part of the municipal government during the post-project phase, return of illegal fishing activities due to weaker support for patrolling operations from newly-elected municipal officials, and an observed decline in fish catch over time for most types of fishing gear.

In the post-project phase (1992-1997), the CSC holders continued to patrol their respective mangrove areas to prevent illegal cutting. The members of the fishers' association (FA) and the village officials pushed for new resource management initiatives, including a new fish sanctuary at Lumisli Island in 1995 and new mangrove reforestation contracts with the DENR in 1994. In Marcelo, Mabini, the FA members took turns to patrol the new fish sanctuary, but financial constraints precluded them from covering areas beyond the sanctuary. Village residents have continued to recognize communal mangrove areas to protect the livelihood of displaced firewood gatherers.

Lessons Learned

Recognition of a Resource Crisis/Resource Management Problem

The Cogtong Bay experience affirms that the recognition of resource management problems (i.e., declining mangrove stands, lower fish catch, disappearance of high-

Table 1. Perceived pre-project to post-project changes in performance indicators for Cogtong and Marcelo respondents: before the project (1988) and now (1997).

	Member					Non-member					All				
	Today		Before			Today		Before			Today		Before		
	(T ₂)	(T ₁)	T ₂ -T ₁	P	SD	(T ₂)	(T ₁)	T ₂ -T ₁	P	SD	(T ₂)	(T ₁)	T ₂ -T ₁	P	SD
Equity															
a. Participation in community affairs	5.27	2.70	2.57	<0.01	1.66	4.63	2.90	1.73	<0.01	1.45	4.98	2.79	2.19	<0.01	1.62
Participation in coastal resource management	5.38	2.67	2.72	<0.01	1.74	4.73	2.81	1.92	<0.01	1.72	5.09	2.73	2.36	<0.01	1.77
b. Influence over community affairs	5.55	2.88	2.67	<0.01	1.96	4.98	2.85	2.13	<0.01	1.67	5.30	2.87	2.43	<0.01	1.85
Influence over coastal resource management	5.52	3.15	2.37	<0.01	1.63	4.85	2.83	2.02	<0.01	1.26	5.22	3.01	2.21	<0.01	1.48
c. Control over resources	5.33	2.67	2.67	<0.01	2.03	4.83	2.52	2.31	<0.01	1.57	5.11	2.60	2.51	<0.01	1.84
d. Fair allocation of harvesting rights	5.67	3.03	2.63	<0.01	2.37	5.23	3.60	1.63	<0.01	1.79	5.47	3.29	2.19	<0.01	2.18
e. Satisfaction with mangrove management	5.53	2.85	2.68	<0.01	2.44	7.25	5.58	1.67	<0.01	2.00	6.30	4.06	2.23	<0.01	2.30
f. Benefits from mangrove areas	5.73	3.17	2.57	<0.01	2.47	5.42	3.79	1.63	<0.01	2.31	5.59	3.44	2.15	<0.01	2.43
g. Household well-being	4.77	3.55	1.22	<0.01	2.51	4.58	3.67	0.92	<0.05	2.30	4.69	3.60	1.08	<0.01	2.41
h. Household income	4.72	3.62	1.10	<0.01	1.95	4.79	3.77	1.02	<0.01	1.90	4.75	3.69	1.06	<0.01	1.92
Efficiency															
a. Collective decisionmaking	5.45	2.87	2.58	<0.01	1.95	5.46	3.48	1.98	<0.01	1.83	5.45	3.14	2.31	<0.01	1.91
b. Quickness of resolving conflicts	5.72	3.10	2.62	<0.01	1.76	5.42	3.21	2.21	<0.01	1.38	5.58	3.15	2.44	<0.01	1.61
Sustainability															
a. Overall well-being of coastal resources	4.72	4.02	0.70	>0.05	2.75	4.73	4.13	0.60	>0.05	2.46	4.72	4.06	0.66	>0.05	2.61
b. Compliance-mangrove rules	5.22	2.72	2.50	<0.01	1.95	5.31	3.02	2.29	<0.01	1.54	5.26	2.85	2.41	<0.01	1.78
Compliance-fishery rules	5.52	3.13	2.38	<0.01	1.90	5.15	3.42	1.73	<0.01	1.67	5.35	3.26	2.09	<0.01	
c. Knowledge of mangroves	5.97	2.77	3.20	<0.01	2.01	5.63	3.00	2.63	<0.01	1.48	5.81	2.87	2.94	<0.01	1.81
d. Information exchange: mangrove management	5.82	2.83	2.98	<0.01	1.76	5.38	3.02	2.35	<0.01	1.42	5.62	2.92	2.70	<0.01	1.64
Information exchange: fisheries management	5.92	3.12	2.80	<0.01	1.73	5.35	3.23	2.13	<0.01	1.52	5.67	3.17	2.50	<0.01	1.67

value fishes and conflicts between resource users) prompts resource users to enter into collective arrangements. The project hastened the awakening process by drawing attention to the importance of sustaining the Bay's resources and challenging the coastal residents to take action. Thus, co-management requires some impetus. It does not occur automatically.

Extent of Dependence on Coastal Resources

A heavy dependence on coastal resources places the livelihood of village residents at risk if nothing is done to avert progressive resource deterioration. Such dependence is partly responsible for inducing

coastal residents to participate in coastal resource management.

Involvement of Resource Users in Law Enforcement Efforts

Resource users who have a greater stake in sustaining their resource base must be actively involved in monitoring illegal mangrove cutting and illegal fishing activities. Key interviews with village residents and ex-project implementors suggest that directly involving resource users in monitoring and enforcement tends to foster rule compliance due to the sense of ownership of management arrangements and the opportunity to have a personal stake in resource management.

Government intervention, nonetheless, is warranted in the enactment of enabling legislation, apprehension and punishment of violators and provision of enforcement facilities. Often, coastal resource management cannot operate in a vacuum. Government fills a special role by providing legitimacy and accountability through co-management. The need for active government participation is affirmed by other case studies (Katon et al. 1997; Agbayani and Baticados 1998). For instance, the success of the San Salvador marine sanctuary Masinloc, Zambales, Philippines is closely linked to the legitimacy provided by the local government and the vigilant enforcement of rules and regulations, along with the willingness of village residents to adhere to non-destructive fishing practices.

Provision and Enforcement of Legitimate Property Rights

In Cogtong Bay, legitimate property rights were required to optimize resource use and conservation, particularly for mangroves. The holders of CSCs took it upon themselves to manage their reforested mangrove areas and protect them from illegal cutters, even after the project was completed. When user rights are clearly specified and enforced, there is a greater chance that the intervention will be sustained. Regression analysis for the two villages indicates that the possession of property rights is a key explanatory variable that influences perceptions of positive changes in the overall performance of co-management. It is also associated with a perceived improvement in resource control, satisfaction with mangrove management, rule compliance, information exchange and knowledge of mangroves (Katon et al. 1998).

Continuing Support from Local Leadership

Continuing support from local leadership is crucial to viable co-management arrangements. During the project, the active partnership between the municipal government and the village fishers in law enforcement was a potent force in the reduction of illegal fishing and illegal mangrove cutting. The lack of vigilance in law enforcement during the post-project phase and budgetary cuts in patrolling operations have threatened the stability of co-management arrangements. By themselves, poor artisanal fishers are ill-equipped to fight illegal activities and to sustain day-to-day patrolling operations with their limited financial resources. Sustainable resource management in poor communities tends to be difficult when the local political structure is not supportive.

Shared Commitment to Sustainable Coastal Resource Management

Formal legislation must be complemented by advocacy of sustainable resource management, capability building, environmental education and actual sharing of responsibility between the government and resource users. The experience of Cogtong Bay affirms that coastal communities, if empowered to plan and implement their own resource management decisions, can take action on issues that directly affect their survival and livelihood. This finding is shared by other community-based coastal resource management projects in the Philippines (Pomeroy et al. 1996; Katon et al. 1997; Gilman 1997; Katon et al. 1998; Alcalá 1998). In spite of formidable odds, improved resource conditions can be achieved if resource users and stakeholders have a common commitment to sound resource management and are willing to take decisive action.

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