

**ANALYZING CO-MANAGEMENT IN
COGTONG BAY, PHILIPPINES**

Marshall William Ring

**Submitted to the Faculty of Graduate Studies in partial fulfillment of the requirements for
the degree of**

MASTERS OF NATURAL RESOURCES MANAGEMENT

**The Natural Resources Institute
University of Manitoba
Winnipeg, Manitoba
R3T 2N2**

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ANALYZING CO-MANAGEMENT IN COGTONG BAY, PHILIPPINES

BY

MARSHALL WILLIAM RING

**A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University
of Manitoba in partial fulfillment of the requirements of the degree**

of

MASTER OF NATURAL RESOURCES MANAGEMENT

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ABSTRACT

Across Asia-Pacific, local level management of common property resources is being replaced by a Western-style centralized administrative authority not well suited for resource management in developing countries. One result has been a shift from traditional common property management to open access. Open access regimes are characterized by uncontrolled entry for resource users and lack of incentives to conserve – the “Tragedy of the Commons”. Coastal resources of Cogtong Bay, Bohol, in the Central Visayas region of the Philippines were common property. Community management of the mangrove forests and fishery began to decline in the late-1960s with the arrival of commercial harvesters from larger market centers. Local residents reported a decreasing catch per unit effort for the fishery and denuded mangrove stands in Cogtong Bay beginning in the 1970s. Centralized government methods of managing the coastal resources through command and control policies were not successful.

This paper analyzes and reports on the success, and characteristics of success, of the Candijay-Mabini Mangrove Rehabilitation and Coastal Resource Management Project (CMMRCRM), a co-management project implemented in the Philippines aimed towards re-establishing local-level management over coastal resources. Beginning in 1989, a co-management system was implemented to manage Cogtong Bay’s mangroves. The national government passed enabling legislation, vesting responsibility of the day-to-day management of the coastal resources with local users. Individuals replanted pre-determined areas of mangrove forest in exchange for 25-year Certificate of Stewardship Contracts.

Although much has been written on the benefits co-management, and much literature also exists promulgating the necessary conditions of successful co-management, very few case studies exist to offer tangible evidence. Recognizing this gap, the co-management experience in Cogtong Bay was researched a) to determine if expected benefits were actually realized and, if so, b) to identify characteristics of successful co-management.

The International Center for Living and Aquatic Resource Management (ICLARM) developed an institutional analysis framework to analyze co-management systems. The theoretical framework, based on Game Theory, neoclassical microeconomic theory, institutional economics, political economy, transaction cost economics and public choice, provided a structured approach to examine and document the origin, current status, operation, and performance of co-management. The fundamental goal of the framework is to understand how rules affect the behaviour and subsequent outcomes of resource user actions. Success of co-management was measured by three performance indicators: efficiency; equity; and sustainability.

The CMMRCRM was implemented in two municipalities located on the shores of Cogtong Bay - Candijay on the south shore, and Mabini on the north. An integrated coastal resource management project, the CMMRCRM established formal property rights for local residents over large tracts of mangrove forest on the shores of Cogtong Bay. The CMMRCRM also organized local resource users into fishers' associations capable of monitoring and enforcing rights of access and harvest. The co-management arrangement was deemed successful from the comparison of key informant interviews and questionnaire results in the two villages, and the comparison of "before" and "after" co-management using the three performance indicators. Nine conclusions were then generated to identify characteristics of success.

- There must be a common reliance on a set of resources, and the boundaries must be clear. Further, the stock of resources must be threatened or diminishing;
- Local level institutions (such as fishers' organizations) capable of assuming an increased role in management responsibility must be present;
- The process of implementing co-management arrangements requires flexibility;
- Trust between the actors must exist;
- Effective local-level participation is required;
- Local resource users must be involved in monitoring and enforcement;
- The project's sustainability is improved if tangible benefits accrue to local resource users;
- Clear geographic boundaries facilitate direct observations of positive results; and
- People's organizations enable institutional development and empowerment that improves a community's means to generate livelihood activities.

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ACRONYMS

ACIPHIL	-	Association Consultants Independent Philippines Inc.
AR	-	Artificial Reef
BORMADEV	-	Bohol Resource Management Development
BOSFA	-	Bonbon Small Fishers Association
BFAR	-	Bureau of Fisheries and Aquatic Resources
BFARMC	-	Barangay Fisheries and Aquatic Resources Management Council
BFD	-	Bureau of Forest Development
CEP	-	Coastal Environment Program
CMMRCRM	-	Candijay-Mabini Mangrove Rehabilitation and Coastal Resource Management Project
COMAGCO	-	Cogtong Mangrove Growers
CRMC	-	Coastal Resource Management Committee
CSC	-	Certificate of Stewardship Contract
DA	-	Department of Agriculture
DANIDA	-	Danish International Development Agency
DENR	-	Department of Environment and Natural Resources
FA	-	Fishers Association
FAO	-	Forestry Administrative Order
FMB	-	Forest Management Bureau
FLA	-	Fishpond Licensing Agreement
GO	-	Government Organization
ICLARM	-	International Center for Living and Aquatic Resources Management
IFM	-	Institute of Fisheries Management
ISF	-	Integrated Social Forestry Program
MAFA	-	Mabini Fishers Association
MAFESFA	-	Mabini Federation of Small Fishers Associations
MDP	-	Mangrove Development Project
NGO	-	Non-Government Organization
NSC	-	North Sea Center
PAGAMACO	-	Coastal Resource Managers of Cogtong <i>(Panaghiusa Sa Gagmay 'ng Mananagat Sa Cogtong)</i>
PD	-	Presidential Decree
PNP	-	Philippine National Police
PTA	-	Parents' and Teachers' Association
RRDP	-	Rainfed Resources Development Project
TNF	-	The Network Foundation
UBF	-	United Barangay Federation
UF	-	The United Federation (another name for MAFESFA)
USAID	-	United States Agency for International Development
WWF-US	-	World Wildlife Fund - United States

CHAPTER ONE: INTRODUCTION

CONTEXT

The following research project is about community-based resource management (CBRM) and co-management of a mangrove area in the Philippines. Across Asia and the Pacific, methods of managing mangroves are changing. Local-level management of many mangrove areas is being replaced by a Western-style centralized administrative authority (Pomeroy 1995) not suited for developing countries with limited financial means and expertise (Pomeroy and Pido 1995; Holling and Meffe 1996). One result has been local communities' common property regimes being replaced with open access regimes (Pomeroy 1994) characterized by uncontrolled entry for resource users, and the lack of economic incentives for users to conserve. The typical result of open access regimes is the "Tragedy of the Commons" and subsequent resource degradation. Conversely, studies on common property resources illustrate that, left to their own social institutions, local communities often use resources sustainably (Berkes 1989). Therefore the current management trend is moving towards a less sustainable alternative.

A possible solution to facilitate conservation of mangrove ecosystems is a co-management plan. Co-management involves the sharing of resource management responsibility and power between local-level resource users, and a centralized government (Berkes 1989). Involvement of government in resource management is commonplace. However, to encourage the involvement of local community members in the management process, property rights need be reorganized and institutional processes built to facilitate the incorporation of traditional ecological knowledge (TEK). TEK is defined as a cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment (Berkes and Folke 1994).

Community Based Resource Management (CBRM) is one method of effectively incorporating TEK and therefore local-level input in resource management. Pomeroy (1994) identifies CBRM as a management system whereby the local community of resource users have the responsibility for managing the resources.

Co-management is an evolving method of managing natural resources. Much literature exists on the theoretical components and benefits of co-management. Comparatively, few co-management agreements have been documented to derive practical applications of resource management policy implications regarding the conditions under which co-management works effectively, and the effects co-management has on the resource and resource users. To further understand the results and components of successful co-management situations, studying effective and operating co-management arrangements will be invaluable.

Beginning in 1995, the Institute of Fisheries Management (IFM) at the North Sea Centre (NSC) in Denmark and the International Center for Living and Aquatic Resources Management (ICLARM) in the Philippines embarked on a five year Worldwide Collaborative Research Project on Fisheries Co-Management. Funded by the Danish International Development Agency (DANIDA), the project aims to build practical experience in research on co-management arrangements and to evaluate the potential of co-management as a management option. Co-management situations will therefore be measured using the criteria of sustainability, efficiency and equity. A further goal of the overall research project will be to develop guidelines for co-management arrangements for use by governments, resource users, non-government organizations (NGOs) and academic institutions the world over. To achieve such lofty goals, the two collaborating agencies have forged links with local research partners to conduct case studies on co-management arrangements throughout Asia and Africa. Specifically, current case study sites are found in Bangladesh, Benin, Cote d'Ivoire, Indonesia, Malawi, Mozambique, the Philippines, the Republic of South Africa, Thailand, Vietnam, Zambia and Zimbabwe. The co-management arrangement this practicum analyzes is a community-based resource management and co-management arrangement for a mangrove area in the Philippines.

The Philippines possesses a number of potential case study sites where there is sufficient experience to begin examining the performance of specific co-management arrangements according to the three measures of sustainability, efficiency and equity. One such area is Cogtong Bay, Bohol, where the Rainfed Resources Development Project (RRDP) supported a coastal resource management (CRM) component in two municipalities on the Bay's shores. The CRM was called the Candijay-Mabini Mangrove Rehabilitation and Coastal Resource Management Project (CMMRCRM). The United States Agency for International Development (USAID) and the Government of the Philippines funded the RRDP from January 1989 to December 1991. To implement the CRM component, the Philippine Department of Environment and Natural Resources (DENR) entered into a contract with the Association Consultants Independente Philippines, Inc (ACIPHIL). After September 1991, ACIPHIL linked up with the Network Foundation, a non-government organization (NGO), to help sustain project initiatives. The project was officially turned over to the DENR on 22 March 1995. No outside agencies managed the project between December 1991 and March 1995. The primary goal of the CMMRCRM was to transform the resource users of eight coastal *barangays* (villages) located in two municipalities on the shores of Cogtong Bay into resource users and managers. The main accomplishments of the CMMRCRM project relative to the primary goal were the establishment of fishers' associations (FA) capable of managing resources more effectively than individuals, and the issuance of property rights to resource users to address the open access problem of the mangroves.

The Cogtong Bay case study takes a holistic approach to examining the events associated with the CMMRCRM. Included in the analysis are the formation, implementation and management of the project as well as the resulting impacts on the ecosystem (including impacts on the people).

Although valuable lessons can be learned from the analysis of this one case study, the case study is meant to be one part of a larger research project being implemented worldwide. To accept the lessons learned from this one case study as indicative of all co-management arrangements would be premature as the environmental setting of the

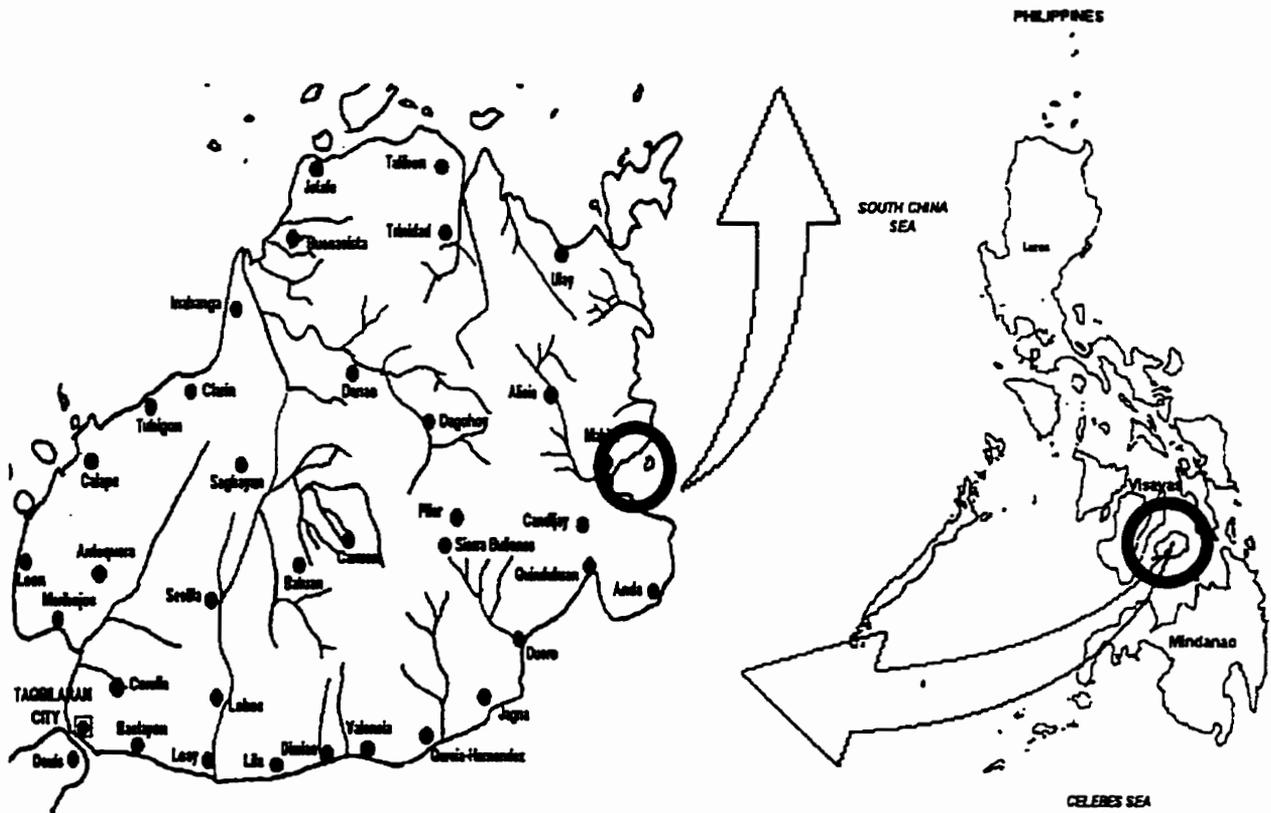
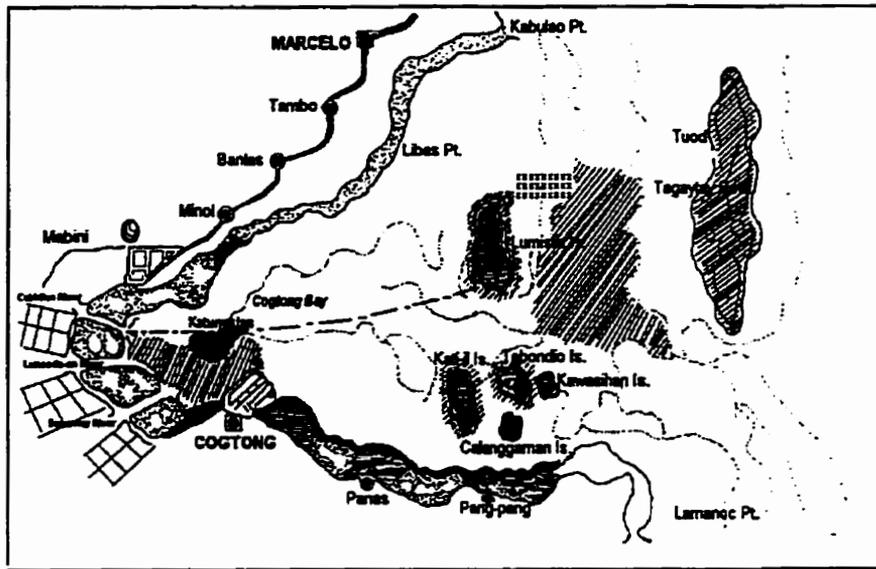
Cogtong Bay arrangement is unique to Cogtong Bay. Further, co-management agreements can occur anywhere within a wide range of possibilities where responsibility of managing the resource is shared between the government (at a variety of possible levels e.g. local, provincial, national) and the local resource users. As such, the possibility that any two co-management arrangements will be vested in the same initial distribution of power sharing is unlikely. Therefore, it is important to recognize that the case study of Cogtong Bay belongs within a larger comparative analysis between other co-management arrangements in the Philippines, other Asian countries, and Africa.

1.1.0 BACKGROUND

1.1.1 OVERVIEW OF COGTONG BAY

Cogtong Bay is a shallow bay located on the eastern coast of Bohol, an island province in the Central Visayas region of the Philippines. The Bay's northern limit is Cabulao point while Lumanok demarcates the southernmost extension. Limestone hills and a thin fringe of mangroves border the outer limits and encompass the extensive mangrove stands, irrigated rice fields and coconut lands of the Bay's interior (Janiola 1996). Two municipalities, Mabini on the north shore and Candijay on the south, border Cogtong Bay. Two types of primary economic activity prevail within the barangays of both municipalities. The majority of inland barangay residents are farmers, while those in coastal barangays are mainly fishers.

Figure 1. Cogtong Bay



The combined population of Candijay and Mabini is 52,000, 85 percent of whom are self-employed. Most of the self-employed are farmers (68%) or fishers (9% in Candijay and 15% in Mabini) (Janiola 1996). The average annual household income of Candijay and Mabini in 1988 was about P4,800 or US \$228¹, well below the Philippines per capita GNP of US \$1,630 (Mehra, Alcott and Baling 1993). Candijay is more of a commercial center than Mabini with many small stores, mills and public markets. Commercial activity in Mabini is very limited.



Picture 1. Fishing Community. Cogtong, Candijay

Historically, a well-defined system of coastal resource tenure did not evolve in Cogtong Bay, perhaps because of the abundance of fish that were available. Prior to World War II, fishers in Cogtong recalled thick mangrove stands and rich coastal resources such as fish and shells. Generally only residents of Candijay and Mabini harvested the resources, using low-intensive fishing and cutting methods. Therefore there was not a great need for formal coastal resource management plans. Property rights and rules did not exist for the fishery, but a few mangrove stands in Barangay Cogtong were recognized as belonging to family units. Most mangroves however, remained open access.

¹ Conversion rates from Philippine Pesos to US dollars are at a ratio of 21PHP:\$1 US.

After World War II, a flux of migrants from other parts of Bohol settled around Cogtong Bay because of the Bay's rich coastal resources. Also after the war, an abundance of cheap black powder entered the market and blast fishing within the Bay began. However, the ecosystem's health was strong enough to handle these perturbations and fishers reported fish catches did not suffer in the late-1940s and 50s.

Pressure on the mangroves was not felt until the mid-1960s. In 1965, Dr. Lim, a native of Iloilo, moved to Barangay Cogtong in Candijay and brought with him the technology for making fishponds. The process involved clear-cutting large areas of mangroves. Witnessing the success of Dr. Lim's fishpond, other individuals (residents and non-residents alike) also began clearing mangrove areas for fishpond development in Cogtong. Hundreds of ha of mangroves throughout the Bay fell victim to such "development".



Picture 2. Fishpond Development. Cogtong Bay

The late-1960s also marked the entry of large-scale commercial fishers to Cogtong Bay from areas outside of Candijay and Mabini. The early-1970s, saw heavy commercial fishing in Cogtong Bay. Adding to the stress on the coastal resources, commercial woodcutters also arrived in Cogtong Bay in the early-1970s. Large boats from neighbouring towns cut the mangrove wood for sale in larger market centers such as

Tagbilaran and Cebu. Fishers around Cogtong Bay began to notice a declining fish catch by the mid-1970s. The average fish catch of artisanal fishers reportedly declined from 15-20 kg per fishing trip in the 1960s to about ten kg in the mid-1970s. The downward trend continued in the late-1980s, and by 1988, or just before the CMMRCRM started, the average fish catch per trip had dwindled to seven kg. The seven kg in 1988 represented less than one half of the average catch per trip in the 1960s.

Recognizing the importance of the fishery to their respective areas, the Municipal Councils of Candijay and Mabini increased efforts to conserve fishery resources. The Mabini Municipal Council established a marine park in 1978 where the only legal fishing method was with longline gear and for fish intended for consumption. Both Municipal Councils also began passing more legislation beginning in the 1980s restricting environmentally harmful fishing methods. However, the Bay had already become a haven for illegal fishers and cutters. Acting on their own, the Municipal Councils could not deter violators.

The national government was largely uninvolved in Cogtong Bay until 1984 when, as part of the Integrated Social Forestry (ISF) program, some mangrove areas were replanted by residents of Barangay Cogtong. In exchange, the planters received Certificate of Stewardship Contracts (CSC). Despite being well received by local residents, the project terminated within a year.

From 1984 until 1989, the Municipal Councils in Candijay and Mabini continued a half-hearted fight against illegal fishers while the steady erosion of mangroves through illegal cutting and clearing for fishponds, household construction and commercial use continued. January 1, 1989 marked the official beginning of the CMMRCRM in Cogtong Bay. The project was patterned after the 1984 Central Visayas Regional Project Nearshore Fisheries Component (1984-92) that used community-based coastal resource management to address coastal marine resource degradation and the associated poverty of resource-dependent coastal residents.

The community-based approach recognized that the coastal residents make the day-to-day decisions on how to use the resource. As such, the goal of the CMMRCRM was to change the coastal resource users from merely resource users to both resource users and managers. The project was accordingly composed of four components: 1) Community Organizing; 2) Mangrove Rehabilitation (150 ha); 3) Coastal management, and; 4) Mariculture. Monitoring and enforcement with newly formed *Bantay Dagats*, (literally meaning Guardians of the Sea) information campaigns and coalescing national government policies regarding mangrove planting and fishpond development also became key and necessary activities of the project.

The staff from the Association Consultants Independente Philippines Inc (ACIPHIL), Department of Environment and Natural Resources (DENR), and Department of Agriculture (DA) all worked with the municipal and barangay government personnel as well as the various fishers associations (FA) organized by the CMMRCRM between January 1, 1989 and September 1991. When ACIPHIL's contract expired in September 1991, ACIPHIL entered into a joint memorandum of agreement with the Network Foundation (TNF) to sustain the project until December with a grant from the World Wildlife Fund (WWF-US). The project was finally turned over to the DENR on March 22 1995.

In the post-project phase, village fishers continued to actively patrol their mangrove areas. Fishers also pushed for new resource management initiatives, such as a fish sanctuary at Lumislis Island, and for the continuing recognition of communal mangrove areas to protect the livelihood of marginalized firewood gatherers. Some fishers' associations entered into new mangrove reforestation contracts with the DENR. However, the weakening of local government support for law enforcement activities due to a change in political leadership and to budgetary constraints led to the resumption of illegal cutting and illegal fishing activities in Cogtong Bay. The dissatisfaction of coastal residents with the implementation of existing rules emerged, affecting the extent of perceived changes in the overall well-being of coastal resources. Fishers' associations,

nonetheless, have reaffirmed their concern for coastal resource management and for the sustainability of their resource base, upon which their survival depends.

1.1.2 OVERVIEW OF CASE STUDY COMMUNITIES

To achieve an understanding of the factors that are associated with successful co-management arrangements, two barangays were selected as study sites. Barangay Cogtong was selected in Candijay, and Barangay Marcelo in Mabini. Both barangays satisfied five selection criteria: 1) actual sharing of responsibility and authority for coastal resource management between the government and the barangay; 2) dependence of barangay residents on fishing; 3) establishment of a resource management technology; 4) existence of property rights and rules; and, 5) sustainability of coastal resource management interventions after project completion and demonstration of tangible outcomes.

Barangay Cogtong is a coastal barangay in the Municipality of Candijay that depends heavily on fish resources to provide food and income to village residents. Of the 445 households in the village, 65 percent of household heads' employment comes from either fishing or fish trading. Despite active involvement during the CMMRCRM, the FA in Barangay Cogtong disbanded after the project ended in 1991. Joint enforcement efforts stopped and illegal fishing resumed. Illegal cutting however has not been as rampant as the pre-CMMRCRM period since individual CSC holders continued to monitor their areas.

Barangay Marcelo, in the municipality of Mabini is similar to Cogtong. Marcelo is also a coastal barangay and has a long history of fishing. The 727 residents live in 140 households. Fishing is the primary source of income for the majority of village residents. Both of the FAs in Barangay Marcelo, as well as the United Federation of all the FAs established by the project in Mabini, continued to operate and have since been actively involved with the DENR's Coastal Environment Planning (CEP) program. If one single event can be recognized as the main incentive to continue with the CMMRCRM's goals, then such an event in Marcelo would be the return of aquatic life such as shells, crabs,

shrimps and fingerlings around the reforested mangrove stands a few years after the project ended. Once tangible benefits were seen, all community members became conscious of the importance of mangroves. Since that time, there has not been one complaint of illegal cutting within the barangay.

Despite problems in both project sites at the municipal and barangay level, and continuation of illegal fishing, the CMMRCRM set in course a chain of events that continue to this day. The CMMRCRM instilled in the residents a sense of empowerment and environmental awareness. Since then many more positive changes have been introduced to Cogtong Bay. Two of the most notable are the establishment of fish sanctuaries by both municipalities. As well, the FA in Barangay Cogtong has since been re-activated to pursue other reforestation contracts. Both FAs in Marcelo have also been involved in subsequent reforestation activities. The CMMRCRM shows that even the most dismal of situations can be improved through a partnership with the local residents.

1.2.0 ISSUE STATEMENT

There is a need for rapid and substantial adaptation of existing common property resource management strategies to support sustainable resource use. A more dynamic partnership using the capacities and interest of local community resource users, complemented by the ability of the national government to provide enabling legislation and other administrative assistance has been evolving. Such an arrangement is called co-management.

1.3.0 OBJECTIVES

The general objective of the study is to describe and characterize the key factors which influence the successful implementation of institutional and organizational aspects of co-management arrangements, so that generalizations about the type of co-management arrangements appropriate to different situations can be made. As part of the overall objective, the co-management arrangement was evaluated. Three measures of sustainability, equity and efficiency were used as criteria to measure success.

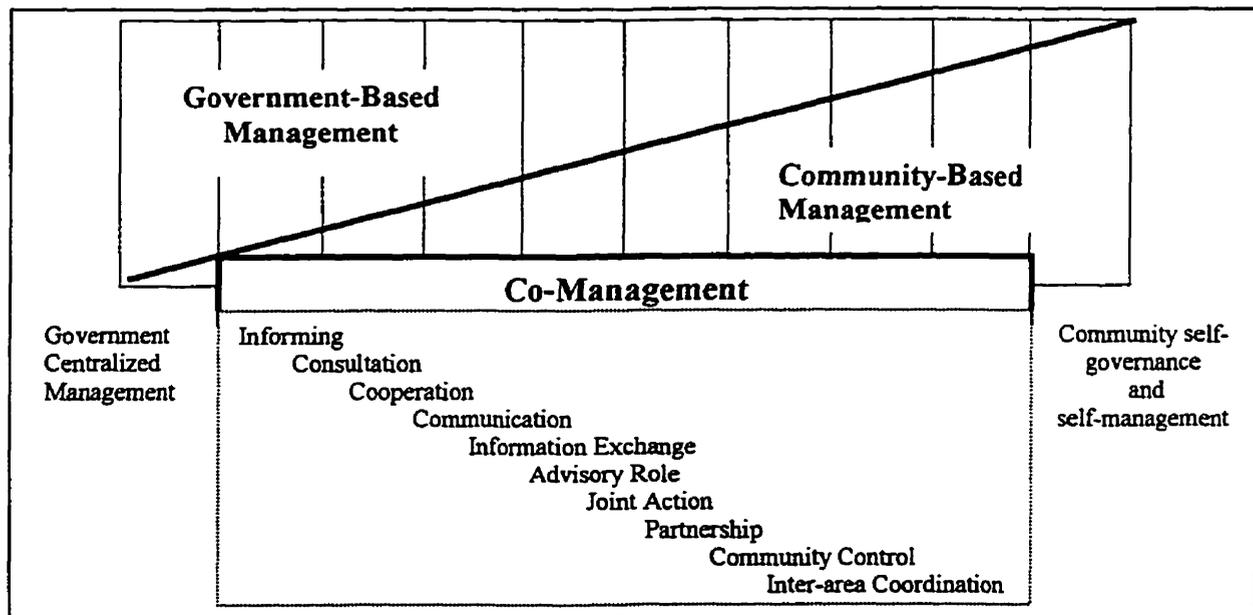
Specific objectives of the study were:

- to identify the existing property rights system to determine rights of access and withdrawal, as well as obligations associated with resource use;
- to identify the scale and degree of user group involvement to determine ways in which user groups can, or do participate in co-management; and
- to identify if co-management increases the resilience of the local social-ecological system.

1.4.0 RESEARCH FRAMEWORK AND METHODOLOGY

Co-management refers to the sharing of management responsibility and/or authority of a resource between the government as owners of the resource, and the local community as users of the resource (Pomeroy and Williams 1994). Co-management arrangements blend together the two “pure” management alternatives of state-level management and “local-level management” (Berkes, George and Preston 1991). There is no one set form of co-management. For example, the power and responsibility of managing the resource is not always distributed to where the government has 50% of responsibility for managing the resource and the local users also 50%. Rather, co-management occurs across a broad spectrum of possibilities of power sharing depending on country and site-specific conditions. For example, a co-management agreement can exist where the government maintains almost all management responsibility for the resource and merely consults the local users before decisions are made. Likewise, a co-management situation can also exist where the local resource users design, implement and enforce laws and regulations with mere advice from, or consultation with the government (Pomeroy and Berkes 1997). Usually co-management agreements exist somewhere between the two extremes just presented.

Figure 2. Co-Management Scale



Adopted from Berkes (1994)

The arrangement in Cogtong Bay is an interesting co-management situation. The CMMRCRM as a whole was a coastal resource management project. The primary objective of the project was to transform the coastal residents from coastal resource users, to coastal resource users and managers. An integral element of achieving this goal was to give Certificate of Stewardship Contracts (CSC) as an instrument to promote tenurial security to mangrove growers. However, the ultimate goal of the majority of local project adapters is a healthy and abundant fishery. The situation provides an excellent opportunity to determine if co-management is a management option suitable only to single species management or if co-management can provide ecosystem management.

Since the project addressed coastal resource management, one single resource can not be used as an indicator of how well the co-management agreement has achieved the criteria of sustainability, efficiency and equity. Rather, because the project deals with coastal resources management, a more holistic perception must be attained. Both the mangroves, and the fishery will therefore be assessed together. An analysis of mangroves and mangroves users is necessary because the main instrument of the CMMRCRM in establishing a co-management situation was distribution of mangrove stewardship contracts. An analysis of the fishers and the fishery is necessitated because a healthy fishery is the goal of the local level project implementers. The reader should also be aware of the unique relationship between mangrove rehabilitators and fishers. The relationship is that almost all mangrove rehabilitators are fishers. However not all fishers were involved in replanting the mangroves. Therefore fishers were the primary demographic group for the study. Household surveys for example, were conducted with individuals whose primary economic occupation was fishing.

An analysis of co-management is usually conducted within the theoretical realm of common property. Common property, or common pool resources, are resources for which exclusion is difficult and joint use involves subtractability (Berkes 1989). Resource analysts in the past promulgated that all common property resources would ultimately be overexploited by rational acting individuals (Hardin 1968). However, upon further study, social scientists realized that there are a variety of property rights regimes

in which common property resources are held which mitigate the potential for unsustainable use: communal property, state-held property, and private property. Open access is the fourth style of property rights associated with common property, and of the four has the highest potential for resource degradation. Co-management arrangements therefore often attempt to address the problems associated with managing common property resources, especially open access resources, by instituting or formalizing property rights over the resource.

Much literature exists detailing what is needed for co-management to be successful. However, much less literature exists in assessing co-management arrangements to determine the effects of co-management as a resource management option. Building on a framework developed by the Workshop in Political Theory and Policy Analysis at Indiana University, USA, ICLARM has adopted a methodological approach labeled institutional analysis to study co-management arrangements.

Described in NSC/ICLARM Working Paper No.1, the institutional analysis research framework is designed to examine the set of rights and rules (institutional arrangements) governing the use of common property resources and to assess the way in which these institutional arrangements affect the resource users. Resource users are affected by institutional arrangements in terms of incentives to coordinate actions with other users; cooperate or contribute to the formulation, implementation, or enforcement of resource management regimes; and, in their methods of resolving conflicts over resource use.

Institutional analysis uses concepts from economics, political science, anthropology, biology and law. The theoretical foundations are based on game theory, neoclassical microeconomic theory, institutional economics, political economy, transaction cost economics and public choice.

There are three interrelated parts to institutional analysis. Institutional arrangement analysis is the first aspect and provides a framework to describe what is occurring in the action situation as well as specifying relationships between institutional and

organizational arrangements. Institutional arrangement analysis links the set of contextual variables - namely: biological, physical and technological; market; stakeholder and community composition; community institutional and decision-making arrangements; external institutional and organizational arrangements; and exogenous attributes - with the local management system of rights and rules. The purpose of linking the contextual variables to the local system of rights and rules (institutional arrangements) is to determine the incentives and disincentives influencing how resource users interact in resource management.

The second level of institutional analysis, institutional and organizational performance, evaluates the outcomes of the co-management institutional arrangements according to the measures of sustainability, efficiency and equity. The measures are applied to the impact the co-management arrangement has had on the systems which operate and affect the resource (the systems include human such as social as well as ecological functioning).

The final level of analysis determines characteristics of successful co-management. Opinions are generated from a complete understanding of the first two levels of institutional analysis. For a more complete discussion on institutional analysis, the reader is directed to IFM/ICLARM Working Paper No. 1 titled "Analysis of Fisheries Co-Management Arrangements: A Research Framework (1996).

CHAPTER TWO: REVIEW OF LITERATURE

Mangroves and seagrass beds are recognized as two of the most productive ecosystems on earth (McVey 1988). Mangroves are responsible for many vital ecological functions such as: aiding in soil formation by trapping debris; filtering land runoff and removing terrestrial organic matter; providing habitat for fish, invertebrates and birds, and; as major producers of detritus (Fortes 1988). Detritus is formed when mangroves recycle nutrients from leaf decomposition (Smith and Berkes 1993). Other benefits mangroves provide include shoreline protection, availing a renewable resource to local residents (forestry), and as a location for permanent settlements (McVey 1988).

Mangroves are further important because of the biodiversity such ecosystems possess. Biodiversity is important for storing the information database for ecosystem organization (Kay and Schneider 1994). All living systems go through constant cycles of birth, death, and regrowth. Most organisms living within an ecosystem are adapted specifically to a set of environmental conditions. A method for preserving information about what "works" and what "does not work" is crucial for the continuance of life. Biodiversity fulfills this role at an ecosystem level (Kay and Schneider 1994).

The Philippines is a country largely dependent on coastal resources. Viles and Spencer (1995) report 65% of the country's population live in coastal areas, and note the ten largest cities in the Philippines are all coastal. Population densities such as these in a country of over seventy million people places considerable stress on the natural coastal ecosystem. Mangroves and coral reefs are recognized as two particularly stressed areas of coastline (Viles and Spencer 1995).

Despite the importance of mangroves, globally as much as one million ha of mangrove forest may be lost annually (Smith and Berkes 1993). Throughout the Philippines, large

tracts of mangroves have been, and are being cut by commercial harvesters and fishpond developers. The Philippines has about 106,000 ha of mangrove forest area remaining, but 176,000 ha of mangrove have been converted to brackish aquaculture (Viles and Spencer 1995). Proportionately, the Philippines has converted a larger percentage (45%) of mangrove forests to aquaculture than any other Southeast Asian country (McVey 1988), and the long-term sustainable use of the region's resources are at risk (Thia-Eng and Kessler 1988). Large areas of environmentally important coral reefs and mangroves have already suffered irreparable changes as a result of overexploitation and population pressures (Thia-Eng and Kessler 1988).

2.1.0 CAUSES OF MANGROVE DEPLETION

The fact mangroves are being destroyed despite their importance to the ecosystem and sustainability of the environment begs the question - Why? Two main factors can be attributed to perpetuating mangrove destruction. The first cause is economic pressure, the second is a combination of the physical nature of mangroves and the associated property rights.

2.1.1 ECONOMIC PRESSURES

An increase in population coupled with desires for economic growth and an improved standard of living have resulted in severe stress on the region's marine ecosystem (Thia-Eng and Kessler 1988). Natural capital has been harvested or destroyed for profit. Under normal circumstances, clearing mangrove areas is an environmentally unsustainable venture. However, the problem is compounded in the Philippines as the pattern of land use which replaces the mangrove area further compromises environmental resilience and ecosystem health. Most of the lost mangrove areas have been converted to brackish aquaculture geared for shrimp production. Shrimp ponds, once developed, must still rely on the recruitment of larvae from the reproductive stock at sea for seasonal restocking and cease to be viable economic enterprises after a couple years when natural recruitment of larvae is no longer possible (Vannucci 1988). New mangrove areas must therefore be cleared to set up new shrimp ponds. The result is a positive feedback cycle - something

resource managers want to avoid (Holling 1993). Short-term economic goals are thus a main cause of mangrove destruction in the Philippines.

2.1.2 PHYSICAL NATURE AND PROPERTY RIGHTS OF MANGROVES

The institutional aspects of how mangroves are managed in the Philippines are the second cause of mangrove depletion. Before engaging in a discussion on resource management, a defining characteristic of mangroves must be recognized. Mangroves are common property resources. All common property resources share two important characteristics: 1) exclusion of users of the resource is difficult; and 2) subtractability. Subtractability means each user is capable of subtracting from the welfare of other users (Berkes and Farvar 1989). For example, if one individual cuts down a tree, that tree is no longer available for use by other users. Nor can other users benefit from future trees that the felled tree may have produced. Understanding both requisite criteria for common property, the discussion can now return to management systems.

Regarding natural resource management, the roles of the national governments of many Asian and Pacific countries have been increasing. An effect has been a decrease in the role of the local-level control exerted by traditional management and custom (Pomeroy 1994). Traditionally, when the community level institutional arrangements regulating the use for common property resources are undermined, the property rights regime that emerge are open-access regimes (Pomeroy 1994). Open-access regimes are characterized as a free-for-all with uncontrolled entry for the resource user and economic incentive for the user to extract as much of the resource as possible before other users do. As previously mentioned, mangroves are common property resources. The result of shifting management regimes from local-level institutional arrangements to open-access, is resource degradation and the "Tragedy of the Commons" as Hardin (1968) professed.

2.1.2.1 Tragedy of the Commons

Garret Hardin argued all common property resources inevitably lead to resource degradation under a scenario labeled the "Tragedy of the Commons". The underlying assumption was that whenever resources are limited and publicly owned, the rational

action of each individual is to overexploit the resource to the point of degradation. As an illustration, Hardin hypothetically described how the process might work. Set in medieval England, Hardin's story was centered on a pasture where many herders each had one cow grazing. The pasture represented the common property resource (albeit incorrectly as grazing fields in medieval England were in fact Crown lands and subject to central government authority). One herder of the group; recognizing the costs of maintaining an additional cow is simply the pasture's fodder borne by the entire group, adds a second cow. The benefits of the second cow however accrue entirely and directly to the individual owner. Seeing the one herder benefiting at the group's expense, other herders also introduce more cattle until the pasture is depleted of fodder and no longer able to sustain the cows and the resource is degraded. So goes the tragedy of the commons as promulgated by Hardin (1968).

Hardin reported only two solutions existed to conserving common property resources. The first solution was to privatize the resource. The second was to keep the resource as public property, but have the rights of entry and use governed by a central authority. Since Hardin's landmark publication, social scientists have observed not all common property resources are subject to the tragedy of the commons and have rejected the notion that the "common" nature of the resource is singularly the problem (ICLARM and NSC 1996). More accurately, the property rights regime combined with the physical nature of the resource (e.g. common property) is more important. Feeny et al (1990) define four different property right regimes:

1. **Open-Access.** Well defined property rights do not exist and access to the resource is unregulated and free to anyone. Hardin assumed all common property resources are held in open access regimes;
2. **Private Property.** An individual or group possess rights to exclude others from using the resource and to regulate the use of the resource. Private property rights are usually recognized and enforced by the state and are usually exclusive and transferable;
3. **Communal Property.** An identifiable community of interdependent users who exclude outsiders and regulate use among members hold the resource. Rights are unlikely to be

exclusive or transferable, and are often rights of equal access and use. Group rights may be formally or informally recognized; and

4. **State Property.** The rights to resource use are vested exclusively in the government which possess decision making authority concerning access to the resource and rules of use.

Identifying four property rights regimes proves Hardin's theory incorrect to the extent that an implicit assumption of the tragedy of the commons was that all common property resources are held under an open-access regime. Common property resources vested in the other three regimes are not necessarily subjected to the tragedy of the commons as all three regimes possess components of Hardin's solution - the resource must be privatized, or controlled by a management body. Further, even common property resources held in open-access regimes are not necessarily bound to follow the tragedy of the commons because of social factors influencing individual actions and discouraging resource competition (Oakerson 1992). However, simply identifying the three other types of property rights regimes does not act as a panacea for all the problems associated with managing common property resources. Examples throughout the world identify that all four of the property rights regimes have led to overexploitation of resources (ICLARM and NSC 1996). Resource managers are now beginning to recognize "...what is needed is a more dynamic partnership using the capacities and interests of local...communities, complemented by the ability of the state to provide...assistance" (ICLARM and NSC 1996). Resource managers and resource management plans should be at a minimum concerned with equality, efficiency and sustainability.

2.2.0 METHODS OF MANAGING RESOURCES

2.2.1 STATE-LEVEL MANAGEMENT

There are many different ways to manage natural resources. One style of management is state-level management. What follows is a discussion on the most prominent ills associated with state-level management. However, the purpose is not to discredit, but rather enhance scientific-based knowledge. State-level management is a more common and accepted form of management than local-level and is growing in application

(Pomeroy 1994). Therefore the following discussion is disproportionately directed towards identifying weaknesses associated with managing resources based solely on scientific knowledge.

Pure state-level management is based on Western scientific data conducted by a centralized authority such as a federal agency; based on scientific data and analysis; and, uses the authority of government laws and regulations for enforcement (Berkes 1994). A defining characteristic of Western scientific knowledge, and therefore state-level management is that only the expert or scientist can be knowledgeable. State-level management is representative of the trend of resource management occurring in Southeast Asia and the Pacific. Using only Western scientific knowledge to manage resources however leads to problems, especially when the inherent management problems of common property resources are accounted for. One of the problems Western scientific knowledge has in dealing with common property resources is lack of experience. The western knowledge system is based on the scientific method, only developed in the 1800-1850's, as the basis of knowledge (Hoare 1993). The subsequent lack of practical application to natural systems has led to a mindset dominated by narrow assumptions such as unregulated access to common property resources and lack of power for a single participant to prevent others from exploiting the resource. A further assumption of Western-based knowledge is that all common property resources are characterized by intense resource user competition and ultimately lead to the tragedy of the commons (Pomeroy 1994). However, regulated access, enforced at the local level through community institutions and social practices are found so often in Asia and the Pacific where local authority still exists, such forms of regulation appear to be the norm not the exception (Pomeroy 1994). Therefore, due to a lack of practical application, the theoretical contextualization of Western scientific knowledge management systems often fails to recognize both, the actual situation, and the benefits of existing management systems.

A second problem with only using Western scientific knowledge to manage resources is the fundamental weakness associated with this type of knowledge. Western scientific

knowledge often separates humans from the system and looks for simple cause and effect relationships - relationships which are not common in complex natural systems. Modern scientific knowledge has been very successful in furthering human understanding and ability to manipulate simple systems based on the world view that humans are apart from, and above the natural world (Gadgil et al 1993). However, ecosystems are complex with no simple answers and traditional Western-based management approaches based on the scientific method need to be re-evaluated (Kay and Schneider 1994). When faced with complex ecological systems, neither the world view which separates humans from the environment, nor the scientific method have been particularly successful. Ecological systems vary on spatial and temporal scales rendering generalizations of positivist science of little use in providing practical solutions to sustainable resource use (Gadgil et al 1993). The end result of state-level management actions is often a simplification of complex ecological systems leading to overuse and ultimately environmental degradation.

An example that indicates the difficulties the scientific method will have when applied at an ecosystem level is the paradox of the second law of thermodynamics. The second law of thermodynamics states "...when energy is transferred or transformed, part of the energy assumes a form that cannot be passed on any further" (Smith 1992:361). Translated to natural systems, the second law of thermodynamics states the world should be running down; but such is not the case. Left alone, ecosystems - and life - proliferate, not run down. Therefore, a fundamental law of the scientific method stands in direct opposition to a basic element of ecosystems - regeneration.

Partially based on the paradox of the second law of thermodynamics, further arguments against using only the traditional scientific method in dealing with ecosystem management have been developed. For example, catastrophe theory focuses on necessary and unpredictable changes in ecosystems which are not accounted for in Western scientific knowledge. Catastrophe theory predicts systems will undergo dramatic, sudden and unpredictable changes in a discontinuous way. (Kay and Schneider 1994). An example is a person's heartbeat, or emptying of their bladder. Both events are

discontinuous, occur suddenly, and are necessary for that person's survival. At the point of change however, (the catastrophe threshold) several potential changes are possible. The particular change that manifests itself can not be known *a priori*. For example, an animal such as a dog establishes a territory around itself. Encroaching on the territory is a catastrophic event. The animal will either attack or retreat, but which one is not known. A complex system of environmental factors will influence the decision (Krebs 1989). When only two variables are involved, fairly accurate predictions can be made, but complex interrelationships within and between ecosystems make predictions more difficult as any one of a vast number of potential possibilities could manifest.

Kay and Schneider (1994) applied the catastrophe theory to a discussion at the ecosystem level. Natural systems rest in equilibrium with a constant exchange of energy. Systems reach catastrophe thresholds when excess energy is applied to the system and shift toward a new coherent behavioural state to achieve a new equilibrium. However, nature resists moving away from equilibrium (Holling 1993). The system's response is a spontaneous emergence of organized behaviour that spends the excess energy so equilibrium can be maintained (Kay and Schneider 1994). For example, tornadoes form when there is an excess of energy. After the tornado dissipates, the excess energy has been spent and the natural system is restored. The form of self-organization that is manifested is not predictable because the process of self-organization is catastrophic. Inversely, systems that do not receive enough energy cannot be supported and self-organization does not occur. Systems maintaining equilibrium therefore have a sustainable trade-off of all forces acting on the system. Energy which flows into the system is spent at the same rate.

When humans are viewed as part of the natural system, the community's methods of resource use are also included as factors which influence the environment (Gadgil et al 1993). With too much development of one type of structure, the system becomes overextended and brittle and unable to take full advantage of available resources and energy (Holling 1993). Left to nature's devices, a more optimal (better adapted) system or structure will displace the brittle one (Kay and Schneider 1994). Therefore, if local

methods of managing and harvesting resources have existed for long periods of time, the argument can be made that such methods are optimal because no other system or structure has displaced the traditional practices.

State-level management that often focuses on maximizing one resource (such as aquaculture) and does not account for ecosystem functions, is neither optimal nor sustainable. The top-down system of management analogous with a central administrative authority is often not well suited to developing countries with limited financial means and expertise to manage resources in widely diverse harvest areas (Pomeroy 1994). A reductionalist cause and effect world view, unable to deal with the reality of self-organization in non-equilibrium systems is incapable of supplying a sufficient explanation on how the world works (Kay and Schneider 1994). Related to the minimum goals of equity, efficiency and sustainability, "pure" state-level management systems are not an effective tool when used alone..

2.2.2 COMMUNITY-BASED RESOURCE MANAGEMENT (CBRM)

Recognizing that centralized top-down management of resources using only Western scientific knowledge is not a great management option is the first step to managing resources more equitably, efficiently and sustainably. The next step is to implement a management technique capable of addressing the weaknesses associated with Western scientific knowledge. An alternative is local-level management. Pure local-level management systems are decentralized, and when necessary use customary authority. Rule-making and enforcement are conducted at the local-level relying on consensus, self-regulation and social sanctions to operate. Additionally, local-level management systems are based on traditional ecological knowledge (TEK) (Berkes 1994). TEK is a cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment (Berkes and Folke 1994) and is increasingly being recognized as an effective management tool. Just as traditional knowledge of medicinal plants is no longer taken lightly, traditional practices in common property resource management are

also being taken seriously as Western scientific knowledge recognizes the vast knowledge TEK possesses (Berkes and Farvar 1989).

One system of local-level management that has been developed is called community-based resource management (CBRM). CBRM is a management system whereby the local community of resource users have the responsibility of managing resources including the planning, implementation, monitoring and enforcement (Pomeroy 1994). CBRM strives for more active local level participation in the planning and implementation of resource management by investing property rights with the local communities (Pomeroy 1994).

Investing the ability for local communities to improve their standard of living by redefining property rights has several advantages. Economically, despite high implementation costs, CBRM is less expensive because of lower administrative and enforcement costs as the local communities are responsible for monitoring and enforcement. Administrative costs of top-down management tend to be very high, especially where an external manager is distant and lacks on-the-ground expertise (Berkes, George and Preston 1991). Additionally, absentee management results in high transaction costs and induces rent-seeking behaviour by resource users and yield uncertain benefits (Berkes, George and Preston 1991). Further benefits of vesting decision making authority with the local community are that management strategies developed are specifically aimed at addressing the needs of the local community. A result is greater rule compliance and more flexible management regimes better suited to handle changes to the resource (e.g., floods, plague) (Pomeroy 1994). Also, benefits of instilling a sense of ownership over the resource to local resource users often results in more sustainable resource use. Over fifty well-documented cases of successful fisheries problem-solving by local bodies in pre-industrial and post-industrial settings exist (Berkes 1989; Cordell 1989; Schlager and Ostrom 1993; Dyer and McGoodwin 1994; Wilson et al 1994).

Therefore CBRM achieves the goals of increased equity as local resource users develop management plans themselves. Efficiency is increased because of replacing the “red tape” associated with absentee management with site specific decision making and at the same time generating greater compliance. Sustainability also improves compared to state-level management when the resource users have property rights to the resource. However, CBRM is still very often not an effective management tool if used in isolation because local-level institutions are not yet well enough developed to handle the responsibility of planning, implementing and enforcing resource management programs.

2.2.3 CO-MANAGEMENT

A management system is needed that complements the capacities and interests of the local community, with the ability of the national government to provide enabling legislation and other needed assistance (Pomeroy 1994). Such a system exists and is termed co-management. Co-management blends the two “pure” management alternatives of state-level management and local-level management (Berkes, George and Preston 1991). According to the literature, returning management decisions to local-level managers under co-management arrangements will led to more equitable, efficient and sustainable resource use. Gadgil et al (1993) note literature exists asserting the traditional social methods of resource use of communities involved with hunting and gathering, agriculture and aquaculture were more in tune with the natural ecosystem. Further, Berkes (1994) notes a common feature of many traditional local-level management systems was communal control of the resource much like what is advocated in co-management. Berkes, George and Preston (1991) further state co-management benefits extend beyond environmental sustainability. Social health and economic well being ensure cultural sustainability are also fostered under co-management agreements.

Mankote mangrove in St. Lucia, Jamaica serves as an example of the positive effects co-management can have. The management of the mangrove in Jamaica shifted from an open access regime to a communal property regime that is now used by an organized community of limited numbers under a co-management arrangement. The result has been a reversal of an overall trend of tree cover degradation (Smith and Berkes 1993).

2.3.0 CONCLUSIONS

If seemingly so much is known on mangroves, management systems, and the role of co-management, why are more studies needed? The answer is because many questions on managing common property resources still remain unresolved (ICLARM and NSC 1996). For example, why are some co-management arrangements successful and others not? How can the success rate of co-management arrangements be improved? What components of co-management are essential and which ones trivial?

Various scholars have made contributions to our understanding of the requirements for successful co-management, but the necessary conditions are not complete and continued research is needed to reveal more about co-management agreements and the factors leading to successful performance (ICLARM and NSC 1996). Studying co-management with an institutional analysis arrangement will hopefully provide, at least, answers to these questions and hopefully many more.

CHAPTER THREE: METHODOLOGY

3.1.0 THEORETICAL FRAMEWORK

The International Center for Living Aquatic Resources Management (ICLARM), the North Sea Center (NSC) and National Aquatic Resource Systems (NARS) are working collaboratively on the Fisheries Co-Management Research Project. Research on mangrove co-management is being conducted in conjunction with ICLARM's association with the Fisheries Co-Management Research Project. Therefore methods followed the methodological framework used by the Fisheries Co-Management Research Project as outlined in ICLARM and NSCs working paper (1996) entitled *Analysis of Fisheries Co-Management Arrangements: A Research Framework*.

The research framework that was used is called institutional analysis. Adapted from theoretical and empirical work on the Institutional Analysis and Development framework developed by researchers at the workshop in Political Theory and Policy Analysis at Indiana University, institutional analysis uses concepts from economics, political science, anthropology, biology and law. The theoretical foundations are based on game theory, neoclassical microeconomic theory, institutional economics, political economy, transaction cost economics and public choice. The aim of institutional analysis is to provide a common analytical framework so data can be analyzed systematically to facilitate generalizations on what conditions are conducive to successful co-management and enable comparisons with other co-management agreements. The institutional analysis research framework provides a structured approach to document and evaluate the origin, current status, operation, impact and performance of fisheries co-management institutions. Institutional analysis is effective as an evaluative tool to describe a collective action situation, a diagnostic tool to prescribe solutions to modify an action

situation, or a design tool to develop and implement a new action situation (Oakerson 1992).

Understanding how rules affect the behaviour and subsequent outcomes of resource user actions is a fundamental component to reaching the goal of providing common analytical framework arrangements. To achieve such an understanding, the various elements and interactions leading to outcomes must be understood. The underlying societal institutions (rules) must be separated from the strategy of players and organizations. In so doing, the institutional analysis framework can examine how institutional arrangements affect user behaviour as well as incentives of the resource users to be involved in the formulation, implementation and enforcement of management regimes.

An important theoretical element of institutional analysis; that of institutions, was just presented and warrants brief discussion. Institutions are societies' "rules of the game". The rules can be formal (written down, e.g. government laws and regulations), or informal (codes of behaviour), but are understood by everyone and govern human interactions. Among a fishing community, institutional arrangements are a set of rules that define what actions can be utilized in the fishery. Rules are vested in rights and act to give rights substance. "Rights" refer to particular authorized actions (Ostrom 1991) such as authorization for a fisher to operate within a geographic area. The right however does not specify how the right is to be exercised. Rules define specifically required, permitted and forbidden actions. For example the type of fishing equipment which can be used, time of season fishing is permitted and amount of fish which can be harvested are rules pertaining to the right to fish. Institutional arrangements therefore refer to the rules which organize the individual actions of community members.

Three levels of closely linked institutional arrangements or social rules were identified by Ostrom (1991): operational rules; collective choice rules and; constitutional choice rules. Operational rules interact directly with resource use affecting daily decisions of the resource user. Examples applied to a fisher include when, where, and how to harvest fish.

Collective choice rules influence the operational rules. Decision makers implement collective choice rules when deciding how the fishery should be managed. For example rules such as qualifications for participation in the management organization and what proportion of the group of fishers must agree implement new or amend existing rules. Another critical example is determining arrangements for monitoring and enforcing compliance of operational rules.

Both operational rules and collective choice rules are affected by constitutional choice rules. Constitutional choice rules determine eligibility to participate in the system and establish the rules and processes collective choice rules must follow to be passed, enforced or modified. A firm understanding of the role of institutional arrangements is imperative before delving further into the methods.

The fisheries co-management project breaks down the institutional analysis framework into three parts each of which build on one another. The institutional arrangement analysis is the first component and provides a framework to describe what is occurring in the action situation as well as specifying relationships between organizational and institutional arrangements. The second element, institutional and organizational performance assesses how well the management institution is performing and associated impacts. The third element studies characteristics which lead to successful co-management.

3.1.1 INSTITUTIONAL ARRANGEMENT ANALYSIS

The institutional arrangements analysis links contextual variables with the local fisheries management institutional arrangements (rights and rules). Contextual variables characterize both; the key attributes of the resource (biological and physical elements), and resource user (technology, market, social, cultural, economic and political).

A causal relationship exists between local institutional arrangements structured by contextual variables and the actions of resource users. Institutional arrangements shape

the incentives and disincentives which in turn shapes the patterns of interaction which ultimately are responsible for outcomes of the action situation.

The basic strategy is to: separate and dissect the parts of the action situation (contextual variables, incentives, patterns of interactions and outcomes); identify and collect data on the attributes and conditions of each part and; examine the relationship between and among the attributes and conditions of each part. Below is a brief discussion of the contextual variables

3.1.1.1 Contextual Variables

Biological, Physical and Technological Characteristics

The nature of interactions among resource users are often structured by the biophysical and technological environment associated with the resource. To understand the actions resource users have taken and institutions that have been developed requires and understanding of the mangrove such as species abundance, cutting activity, boundary conditions and harvesting technology.

Oakerson (1992) identified three conditions to analyze the biological, physical and technological attributes of a fishery.

- i) The relative capacity of the fishery to support many fishers simultaneously without mutual interference and/or without diminishing the aggregate yield of the fishery for the group.
- ii) The degree or relative ease of exclusion.
- iii) Spatial boundaries of the fishery determine the minimal scale on which effective coordinated resource management can occur.

Two other additional concerns have been recognized by Schlager and Ostrom (1993).

- iv) Technological problems occur when fishers are physically interfering with each other. For example nets can become tangled with crowding of prime fishing areas.
- v) Assignment problems arise when the management system fails to allocate resource users efficiently across spots leading to conflicts.

The basic forms of fishery management are fundamentally shaped by the five characteristics just presented. The assessment of mangrove management followed the same principles.

Market (supply and demand) Relationships

Market attributes such as price, structure and stability can affect the incentives for resource use activities effort levels and compliance with rules so must be recognized to determine the effect on patterns of interaction and outcomes.

Fisher, Stakeholder and Community Characteristics

The third group of attributes regarding Institutional Arrangement Analysis include religious beliefs and practices, traditions and customs, sources of livelihood as well as many other variables affecting community behaviour and outcomes. Such an analysis is attempted to understand the behaviour a representative individual will adopt in a certain situation.

Fisher and Community Institutional and Decision-Making Arrangements

Decision-making arrangements are concerned with how institutional arrangements, rights and rules are made. Representation, relevance and enforceability are important elements to be considered.

External Institutional and Organizational Arrangements Attributes

Institutional and organizational arrangements external to the community can affect institutional arrangements. For example some international, national, regional or municipal arrangements and agreements may have to be considered.

Outside Influences on the Resources

Factors exogenous to the resource use can impact institutional arrangements. Exogenous factors are beyond the level of control of decision makers and are surprises or shocks to the system. Examples include typhoons, civil unrest or elections. Exogenous factors can

provide an indication of how well the institutional arrangements are functioning and surviving through its capacity or resiliency to handle change.

3.1.1.2 Incentives to Cooperate and Coordinate

Contextual variables shape individuals incentives to take certain actions. The focus of the second level of analysis is to determine how rules are advised, what the rules contain, whether users consider the rules legitimate and if rules are enforced. Primary concerns are to determine the degree of consistency for individuals to adhere to management conditions. If individuals are assured of reciprocal behaviour from other members, then the likeliness of adhering to the co-management rules increase (Berkes 1994).

3.1.1.3 Patterns of Interactions Among Resource Users

Even if incentives to cooperate exist, compliance among stakeholders is not guaranteed. The ways resource users interact with each other and as well as individual and group behaviour will also affect the outcomes. The analyst must determine reasons for non-cooperation where incentives exist. To achieve such an understanding the researcher must systematically analyze the contextual attributes which combine to shape the incentive and constraint structure faced by the resource users.

3.1.1.4 Outcomes

Outcomes are produced as a result of patterns of interaction which are, in turn the result of the strategies employed by the resource users. Studying outcomes can disclose the effect of a difficulty manifested behaviourally in patterns of interaction. The source of the difficulty however is the lack of congruence between the first two sets of attributes: a mismatch between the technical and physical nature of a commons and the decision making arrangements used (Oakerson 1992).

3.1.2 Institutional and Organizational Performance

The outcomes of co-management institutional arrangements can be evaluated in terms of meeting management objectives and impact on the resource and resource users. Two levels of analysis facilitate measuring performance. The first level studies the overall

institutional performance of co-management in meeting stated advantages versus other types of management arrangements. Measurable advantages include equity, being less costly to administer and enforce, an increased sense of ownership of the resource by users, self-management, higher acceptability and rule compliance, improved information about the resource, and more public participation.

The second level relates to performance in meeting specific management objectives and impacts at the operational level. Three evaluative criteria; efficiency, equity and sustainability are commonly used at the second level. Other measures can also be used in addition to the three standard measures in evaluating objectives at the operational level. Feeny, (1992) identified four methodological standards additional operational measures, as well as the three standard measures should meet before being applied. The criteria must be able to be used by different observers to evaluate the same situation and provide similar answers. Second, the criteria must be applicable in different settings. Validation, the third criteria is achieved if results are correlated with a previously validated measure. Finally, other measures must be able to cope with change and provide stable results in situations which do not change. Examples of possible measures include the “match” of the size of organization to the size of resource use area. Increases in information and the level of rule compliance are also common additional measures

Efficiency is the first standard measure which should be applied. Various measures of efficiency have been identified. For example the first measure is if fishers have achieved an optimal rate of use of the fishery, or at least are not exceeding sustainable yield depending on the criterion for efficiency. A second measure is a minimal efficiency criterion. Benefits of operating and maintaining the co-management system must exceed the full set of direct and indirect costs. A third measure is a comparative efficiency criterion and states the difference between benefits and costs of co-management institutional arrangements must be equal to, or exceed those of similar arrangements elsewhere (Ostrom 1992).

Equity, the second common measure, refers to the fair treatment of all people involved in managing, governing and using the resource. Hanna (1995) identified four main components of equity:

- 1) Representation - a more equitable management regime should represent and accommodate the full range of interests in the resource.
- 2) Process Clarity - the management process should have a clear purpose and transparent operation.
- 3) Homogenous expectations - the extent to which participants have similar expectations concerning the management process objectives.
- 4) Distributive Effects - the management process should address the distributional changes embedded in the proposed options.

The components can be measured in several ways. For example, the proportional return of benefits compared to costs among all individuals is one measure. A second measure is to determine if there are different patterns of distribution fishers wish to achieve. Answers can be gleaned from questions posed to the resource users based on their levels of satisfaction.

Sustainability is the third common measure of equity and can be divided into stewardship and resilience. Stewardship, defined as the tendency for resource users to maintain productivity and ecological characteristics of the resource can also be divided into smaller components: time horizons; monitoring and enforcement. For effective stewardship, time horizons should be long term, and agreements monitored and enforced.

Resiliency is the second component of sustainability. Resiliency is defined as the magnitude of disturbance that can be absorbed before a system changes its structure by changing the variables and processes that control behaviour, and the ability of a system to absorb perturbations (Holling 1993; Berkes and Folke 1994). Performance indicators (presented in section 2.1 of this chapter) were developed to capture the information regarding equity, efficiency and sustainability.

3.1.3 CHARACTERISTICS OF SUCCESSFUL CO-MANAGEMENT INSTITUTIONAL ARRANGEMENTS

The research framework provides a means to identify attributes which lead to successful co-management from those which lead to failure. For example specific contextual variables such as boundary definitions or a certain level of social homogeneity may be more critical factors than the institutional arrangements themselves for successful co-management. By identifying the attributes and then examining their relation with patterns of interactions and outcomes, it is possible to specify conditions and propositions which can lead to successful development and maintenance of fisheries co-management institutional arrangements.

3.2.0 FIELD RESEARCH METHODOLOGY

3.2.1 Data Collection and Sampling

The field research component of the study can be divided into three periods. The first period was an initial 21 day visit to the case study area. The second component was a 21 day period in Manila. The third segment consisted of a one-month stay at the case study area. Two main research tools were used. The first was a household survey. The survey was completed by a random sample of all household heads in Barangays Cogtong and Marcelo and generated much baseline information. Respondents were given a series of responses from which the most accurate was selected. Some open-ended questions were also included. The second primary research tool was key informant interviews. The key informant interviews focused on open-ended questions and were administered to individuals that were involved in the project implementation or were directly affected by the project.

Essential to the success of the Institutional Analysis Framework is the participation of local residents in providing information. An initial 21 day visit to both Candijay and Mabini was the first step of field research. The initial visit provided an opportunity to make contacts in the towns and be seen by local residents. An initial visit was important as visitors from outside the Philippines to the villages are rare. The initial visit was essential to ease anxieties residents had and provide a period of habituation before

questions pertaining to their livelihood should be asked. Both town mayors were visited to explain the research goals and ask formal permission to conduct research in each municipality. The initial three week visit also provided an opportunity to select two project sites (barangays) that possessed the criteria deemed desirable. A test run of the household survey was conducted during the initial visit and casual interviews were also undertaken.

The second aspect of the field research involved refining the household surveys and key informant interviews based on what was learned during the initial visit. Refinement of the research tools took place at ICLARM headquarters in Manila.

The final leg of the field research was again conducted in Candijay and Mabini. In Cogtong Bay, the research team conducted a household survey to gather data on contextual variables and assess the performance of the co-management regime. The performance indicators, divided into three major categories, are:

-
- a) **Equity**
 - Participation in community affairs
 - Participation in coastal resource management
 - Influence over community affairs
 - Influence over coastal resource management
 - Control over mangrove resources
 - Fair allocation of mangrove harvesting rights
 - Satisfaction with mangrove management
 - Benefits from the mangrove area
 - Overall well-being of the household
 - Household income
 - b) **Efficiency**
 - Collective decision-making on policies/rules governing the use of mangrove resources
 - Quickness of resolving community conflicts on mangrove issues
 - c) **Sustainability**
 - Overall well-being of coastal resources
 - Community compliance with mangrove-related rules
 - Community compliance with fishery-related rules
 - Knowledge of mangroves
 - Exchange of information on mangrove management
 - Exchange of information on fisheries management

On site, twelve field enumerators were trained to gather household data. The sample size of 54 was based on power analysis described by Cohen (1988). Two sample groups of 27 people each were developed by random draw from members and non-members of project beneficiary associations that are dependent on fishing as a primary or secondary occupation. The sample was separated to compare differences in members and non-members. Power analysis concerns the probability of detecting a statistically significant relationship in a sample when in fact there is a notable difference in the population. To increase the probability that the research design can find a statistically significant difference, if one exists, the concept of "power" is used to determine sample size.

Prior to conducting the power analysis, the following assumptions were made: 1) the *alpha* is set at 0.05, two-tail and 2) the sample size for each group equals 27. With the sample size of 27 in each of two groups, the power of the statistical design -- or probability that any given sample would have statistically significant differences -- exceeds 0.93 using a two-tailed test. Applying a one-tailed statistical test increases the power to more than 0.97 (Table 1).

The research team used an updated list of village households by occupation to draw up the sample of respondents for the survey. Respondents were further classified into members and non-members of project beneficiary associations. From these groups, random selection was employed to arrive at the final sample of respondents.

Table 1. Power Analysis for Different Sample Sizes

Group size	Two-Tail	One-Tail
25	.93	.97
23	.91	.95
21	.88	.94
19	.85	.92
17	.80	.99
15	.75	.85
13	.68	.80
11	.60	.73
9	.51	.65

The research team then conducted key informant interviews to probe into the project experience and to investigate organizational and institutional arrangements before, during, and after project implementation. Key informants included village officials, past and current officers of beneficiary associations, members of beneficiary organizations and other community-based organizations, fish traders, community organizers, field staff and other project implementers, and various personnel of local government units (LGUs) at the municipal level. Secondary data, including local legislation/ordinances, socio-economic-demographic profiles, project preparation documents, progress reports, and published articles, were collected to support the primary data.

3.2.2 DATA ANALYSIS

Descriptive and inferential statistics, both univariate and multivariate, were used to summarize and analyze primary data. The descriptive analysis covered frequency counts, percentages, means and standard deviation to provide a distribution of respondents across contextual variables.

The remainder of the report presents the contextual variables - a holistic analysis of the action situation first in Barangay Cogtong and then in Barangay Marcelo followed by a discussion on the incentives to cooperate and patterns of interaction. Results of the household survey are then presented to determine the outcomes/performance of the co-management arrangement. The following sections include a synthesis of the major findings and conclusions on the characteristics of successful co-management. Results and discussion of the findings are located throughout the contextual variables section

3.2.3 TEAM RESEARCH AND DIVISION OF LABOUR

I was very fortunate to be part of a research project nested within a larger network of research projects conducted by ICLARM. Specific benefits included adopting a sound methodological approach and much “in-kind” support from the ICLARM staff.

Essentially, I was part of a larger research team dedicated to answering similar questions on co-management. Therefore, an acceptable division of labour was agreed to so that

both parties could maximize the benefits each had to offer. Below is a table that details the division of labour.

Box 1. Division of Labour

Contribution	Team Member
Methodology	• R.S. Pomeroy and Brenda Katon
Household Surveys	• R.S. Pomeroy and Brenda Katon • Refined by Marshall Ring after initial visit
Key Informant Interview Questions	• R.S. Pomeroy and Brenda Katon • Refined by Marshall Ring after initial visit
Key Informant Interviews on Biological Characteristics	• Jocel Mayordomo and Len Garces
Write-up Biological Characteristics	• Len Garces
Key Informant Interviews on Remaining Characteristics	• Marshall Ring
Majority of Write-up	• Marshall Ring
Statistical Data Coding (computer input)	• Jocel Mayordomo • Chel Gamo
Statistical Data Results (computer output)	• Chel Gamo • Brenda Katon
Statistical Discussion and Tables	• Brenda Katon
Summary Tables and Timelines	• Marshall Ring
Synthesis	• Brenda Katon
Conclusions	• Marshall Ring
Editing	• Brenda Katon • R.S. Pomeroy

*where multiple contributors are reported, names are presented in vertical heirarchy in terms of time contributed. Names on the same line indicate equal time.

CHAPTER FOUR: *BARANGAY COGTONG*

CONTEXTUAL VARIABLES

Contextual variables refer to the key attributes of the resource, resource user, and management arrangements. There are six variables: 1) physical, technical and biological attributes; 2) stakeholder, community and fisher attributes; 3) market characteristics; 4) fisher and community institutional and organizational arrangements; 5) external institutional and organizational arrangements; and, 6) exogenous (macroeconomic, political, social and natural) attributes.

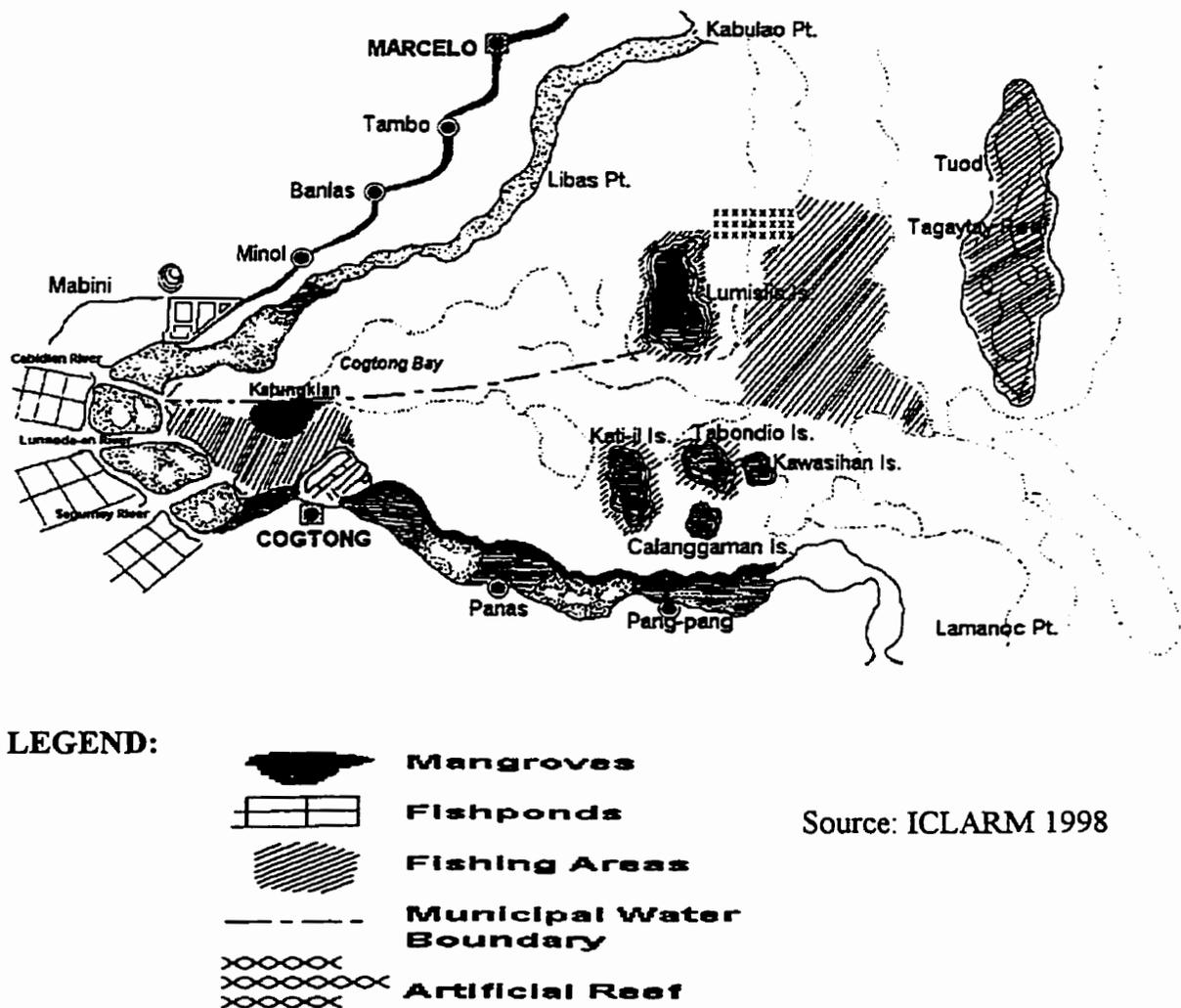
4.1.0 PHYSICAL, TECHNICAL AND BIOLOGICAL CHARACTERISTICS OF BARANGAY COGTONG

The following section discusses the physical, technical and biological attributes of Barangay Cogtong that have influenced coastal resource institutional arrangements over time.

Characteristics of Cogtong Bay. Cogtong Bay has an area of about 10,000 ha and a relatively shallow depth of less than ten meters (5 fathoms). The inner portion is particularly shallow. Mangroves fringe the coastline with an estimated extent of 2,000 ha. Of these, 1,400 ha are intact, while the rest had been converted to other uses, such as fishponds (Janiola 1996). Several mangrove forest reserves have also been established in the Bay such as the mangrove swamp forest reserve extending from Barangay Panas to Lamanok Point in the southern portion of the Bay, the mangrove wilderness areas located on four islands: Lumislis, Kati-il, Tabondio and Calanggaman.

Three rivers empty into the Bay, namely, Cabidian, Longsodaan and Sagumay rivers. Near the mouth of these rivers, fishponds are situated. The estuarine condition and river run-offs may have influenced the extensive mangrove stands at the inner portion of the Bay. Seagrass beds and corals fringe the outer edges of the reef on the north from Kabulao Point to Lumisli Island and on the south, from Lamanok Point to Kawasihan. In Tagaytay reef, located east of Lumisli Island at the mouth of the Bay, corals are also present. Off the northeastern section of Lumisli Island, about 265 artificial reef concrete modules were deployed in the early-1990s during the CMMRCRM phase (Figure 3).

Figure 3. Resource map of Cogtog Bay



PHYSICAL CHARACTERISTICS OF BARANGAY COGTONG

Candijay on the Bay's south shore is accessible by an 85 kilometer, three hour bus ride along mostly paved roads from the provincial capital of Tagbilaran. Composed of eighty ha, Barangay Cogtong is spatially the smallest barangay in Candijay but has the highest population at 2,590. The barangay is 4.5 kilometers away from the *poblacion* (municipal center). Cogtong is able to support a relatively dense population because of the reliance on fishing. Land use in Cogtong can be divided into four main categories. The largest segment, 24 ha or thirty percent of barangay land, is devoted to major agricultural crops such as coconut, banana and rice. Residential areas account for 16 ha or twenty percent of total land area in the barangay while business composes the third identifiable use of land. Thirty percent of the residents and eight ha (10% of total land) are associated with some form of business venture. The remaining 32 ha (40%) of barangay lands are listed as "other uses". Other uses include institutional, forest, swamp, marshland, minerals, and pasture land.

4.1.1.1 Boundaries

Coastal resources of Cogtong Bay have traditionally been open-access. Outside of some mangrove areas informally owned by long-term residents and concession license areas, the mangroves of Cogtong Bay have not had any boundaries. With the exception of a marine park in Mabini waters since 1978, very few restrictions existed on fish harvesting methods and none regulating limits. Anyone could fish in the Bay's water or cut trees in the Bay's mangrove areas. Not even residency within the Bay's municipalities was required. The CMMRCRM marked the first time property rights to the Bay's mangroves were introduced on a large-scale basis. Fishing boundaries have also since been introduced with fish sanctuaries in both Candijay and Mabini.

Customary Boundaries. For the fishery, customary boundaries are non-existent. For mangroves, limited customary rights of tenure date back to the 1940s when some 25 families informally designated mangrove areas under their care and management. Tenurial rights for each mangrove area of about one hectare or less have been enjoyed by three generations of residents. Though these rights were initially informal, after a

complicated process the rights evolved to formal holdings in the late-1980s and 1990s when the DENR entered into 25-year CSC with local mangrove growers. A CSC ensures the DENR recognizes the CSC holders' right to cut the mangroves, provided the area is replanted.

Prior to entering into CSC agreements on the traditionally held lands, the DENR conducted a land survey and asked the users to register their land and pay land taxes. Some users officially filed with the municipal government, others with the DENR, some to both, and some to neither. The ambiguity of the policy on land registration and tax payments led some landowners to complain in the late-1980s about the situation of CSC holders who benefit from mangrove holdings but pay no taxes at all. Under present laws, CSC holders are not required to pay taxes since they do not own their mangrove holdings. They are merely stewards of the resource. Consequently, in 1996, Barangay Captain James Olavides requested the DENR to survey the land again and document the landholder's area. The second request resulted in the issuance of 25-year CSCs to all holders, none of whom had to pay taxes. At the end of the contract, the steward can re-apply.

Political Boundaries. The framework for the management of coastal resources in the Philippines has been described as lacking in central focus, authority, or leadership, and characterized by a fragmentation of functions. Recent initiatives, however, have sought to clarify jurisdictions between the national government and the local government (DENR, DILG, DA-BFAR and CRMP 1997). Management has improved with the passage of the Local Government Code (LGC) of 1991 that devolved to the local governments many responsibilities previously performed by national government agencies.

In 1975, Presidential Decree 705, known as the Forestry Code of the Philippines, placed the jurisdiction of forestland, including that of mangroves, under the DENR. National policies and DENR guidelines for mangrove management are embodied in numerous legal instruments, covering regulatory measures on mangrove protection, award of

mangrove stewardship contracts, and reversion of cancelled or expired fishpond lease areas to mangrove forests, among others. Moreover, the DENR has been involved in policy issuance and programs that focus on the management of mangroves and associated terrestrial and aquatic flora and fauna within the marine zone (DENR, et al. 1997).

The jurisdiction of fishponds, however, remained with the Bureau of Fisheries and Aquatic Resources (BFAR), a bureau under the Department of Agriculture (DA). BFAR's influence as the country's main steward for fishery resources has been influenced by national legislation. Under Presidential Decree 704, or the Fisheries Decree of 1975, BFAR assumed responsibility for the formulation, administration, and implementation of fisheries policies, regulatory measures, licensing, research, and statistical data collection on all aquatic resources, except in municipal waters. In 1986, Executive Order 116 changed the scope of BFAR's jurisdiction over fishery resources in an effort to rationalize the structure and functions of existing government organizations. Only the regulatory and research functions remained with BFAR, along with the provision of policy directions and technical assistance. At present, BFAR exercises jurisdiction over offshore waters and regulates fishery licensing in these waters.

Legally, jurisdiction over municipal waters (waters within 15 kilometers from the shoreline of the municipality) now belongs to the municipal government. The boundaries are stipulated by the LGC. Where two municipal waters overlap, the boundary is equidistant from each municipal shore. Such is the case of Candijay and Mabini.

The passage of the Local Government Code in 1991 effected a structural power shift that placed coastal local governments and cities at the forefront of resource management. With the devolution of management functions to local governments, the DA has been stripped of its mandate to directly establish fish sanctuaries in municipal waters. The DENR, on the other hand, is now faced with strong pressure from local government units (LGUs) to cede authority to manage protected areas established within municipal waters (DENR et al. 1997). No other coastal resource management activity (CRM) is accorded emphasis in the LGC more than the fishery sector.

For other CRM activities such as forestry, mining, land use, and environmental protection, the LGC provides for a “managed” scope of devolution. The DENR remains as the primary government agency responsible for the conservation, management, development and proper use of the country’s environment and natural resources, as provided for in DAO (Department Administrative Order) No. 30, series of 1992. The implementation of devolved functions, moreover, is subject to the DENR’s supervision, control and review.

Under the LGC, mangrove conservation and implementation of community-based forestry projects have been devolved from the DENR to LGUs. Community-based forestry projects refer to developmental projects involving local communities that include integrated social forestry projects, family and community contract reforestation, forestland management agreements, management of communal forests with an area of fifty square km or less, and other similar projects (DENR et al. 1997). On the other hand, the management, protection, and development of all other areas outside communal forests remain with the DENR.

For the fisheries, the devolved functions from BFAR cover a broad range: issuance of fishing licenses for operation of fishing vessels of three gross tons or less, grant of fishery privileges within municipal waters, imposition of penalties on deleterious fishing methods, enforcement of fishery laws in municipal waters, enactment of ordinances for the protection of the marine environment, dispersal of fingerlings for aquaculture, issuance of permits for fish cages, gathering of aquarium fish, and for shelled mollusks, issuance of licenses for establishing seaweed farms and pearl farms, declaration of closed seasons, and amicable settlement of boundary disputes between two or more municipalities.

Historically, the involvement of LGUs in mangrove management has been limited. Prior to 1970 and to a DENR administrative order, a municipal license was required before any individual could harvest mangroves. A DENR cutting license is now required. The

Barangay Council, however, needs to endorse the application to the Municipal Council. The latter, in turn, forwards the application to the DENR for final approval.

Legal Use Boundaries. Mangroves in Cogtong Bay were subject to legal use boundaries before the CMMRCRM. Concession licenses, different from a cutting permit, were the first formal boundaries intended to regulate the cutting of mangroves. Concession licenses were large scale harvesting licenses issued to applicants by the DENR's Bureau of Forestry (later changed to the Bureau of Forest Development). The applicant had to pay for the license which gave the holder "...the exclusive privilege to cut all the allowable harvestable timber in their respective concessions, and the additional rights of occupation possession and control over the same to the exclusion of others...". The most common type of concession license, lasted for four years. Despite a provision of the license stipulating sustainable yield harvesting, holders of the licenses often did not adhere to any limits. Moreover, mangrove cutters in Cogtong Bay did not respect private concession areas and the concession license did not impose any *de facto* control on cutting practices. According to key informants, concession licenses have not been issued for Cogtong Bay area in the last twenty years.

In 1984, Presidential Proclamation 2151 and 2152 respectively declared portions of the Bay's mangroves wilderness and mangrove swamp forest preserve (Janiola 1996). Four islands (Lumislis, Cat-il, Cabundio and Calanggaman) totaling 275 ha were labeled as wilderness areas. An additional 330 ha of mangroves stretching approximately six kilometers along the southeast shore from Barangay Panas to Lumanok Point became mangrove swamp forests according to Presidential Decree 2152. Clasifying lands as either wilderness areas or mangrove swamp forests meant "...entry, sale, settlement, exploitation of whatever nature or forms of disposition..." was not permitted. However without strict enforcement, compliance with the decrees was low.

The DENR introduced additional legal use boundaries governing limited portions of Cogtong Bay's mangroves in 1984 with the first issuance of CSCs associated with the Integrated Social Forestry (ISF) program. In 1989 CSC coverage expanded when the

CMMRCRM distributed additional CSCs. Both the 1984 and 1989 individual CSC holders were vested with rights of access and withdrawal. The contract states “The grantee shall have the right to peacefully possess and cultivate the land and enjoy fruits thereof...”. The contract lasts for 25 years at which time a renewal can be applied for. The contract also formally imposes limits, albeit ambiguous, on the amount of trees that can be cut. The Grantor of the contract (DENR) sets the limits. According to the legal document, the Grantor “...reserves the right to regulate the cutting or harvesting of the timber crops to insure normal balance of forest cover on the land”. Stewards reported their interpretation of the limits were “sustainable harvesting”.

A fairly new legal use boundary in Barangay Cogtong was instituted when the Candijay Municipal Council established a fish sanctuary in 1996 at the Islet of Tabong Dio Cogtong. Municipal Ordinance No. 6 Series of 1996 prohibits all fishing, littering, traveling and swimming within the sanctuary. In addition, “No person or group of persons is allowed to conduct fishing operations within one hundred fifty (150) meters from the boundary of the fish sanctuary”.

Communal Boundaries. Communal use areas for mangrove cutting were established in Candijay. An informal agreement exists whereby all Candijay residents are permitted to cut mangroves within the six Candijay communal areas. However, the cut wood cannot be sold outside the municipality, and for each tree cut, a propagule must be planted.

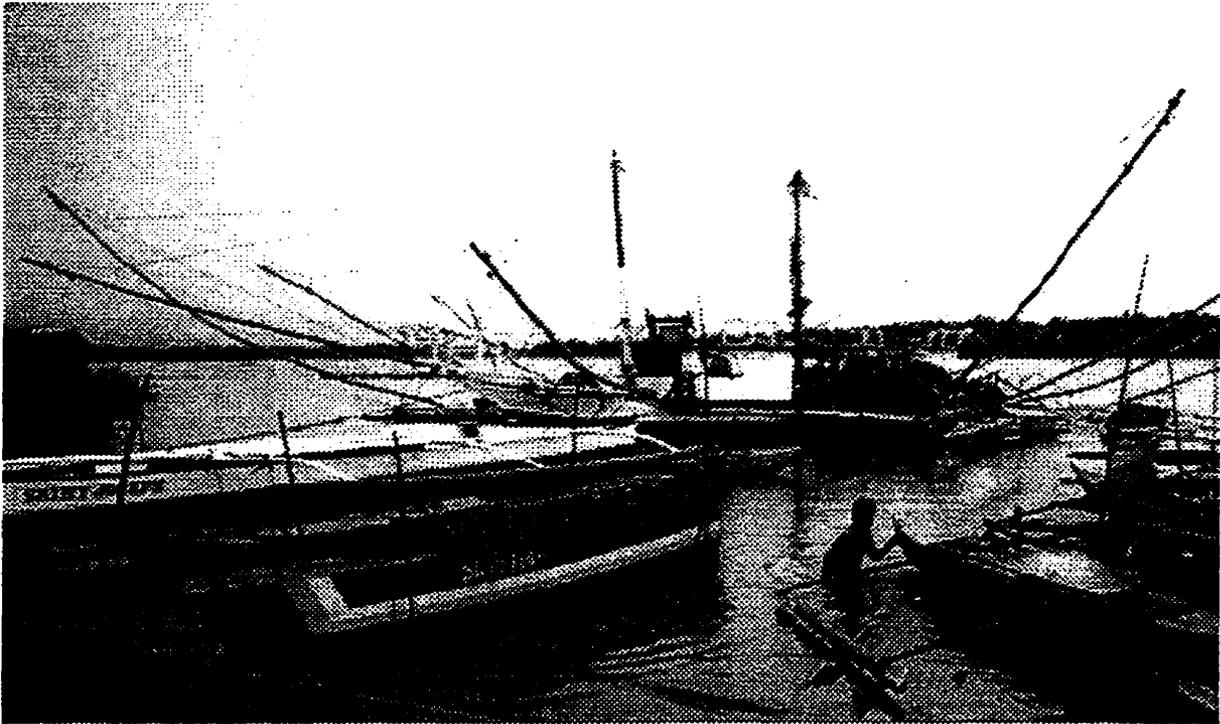
Technical Boundaries. No comprehensive zoning or technical boundary delineation exists in Cogtong Bay in terms of restoration zones, research areas, recreational areas, and multiple use zones. A few areas, however, have been declared as protected areas, such as the mangrove wilderness, swamp forest reserve, and fish sanctuary.

4.1.2 TECHNICAL CHARACTERISTICS

4.1.2.1 Capture Fishery and Fishing Gear

Traditionally, Cogtong fishers have used fish corrals (*bunsod*). The 1970s, however, ushered in gillnets, filter nets, and blast fishing, which intensified fishing operations. The

introduction of Danish seine in the late-1970s and the proliferation illegal fishing operations further hastened resource depletion. Over time, capture fishery in Cogtong Bay has become even more multi-gear. At present, fishers use nine distinct types of gear. The predominant gear types are gillnet or *pukot* (48%), simple handline or *pasol* (22%), and fish corral (11%). Other gear types are squid jigger (*tso-tso*), longline (*palangre*), bagnet (*basning*), speargun (*pana*), fish pot (*bubo*), and Danish seine (*liba-liba*). About 91 percent of the respondents reported that they operate their own gear.



Picture 3. Danish Seine. Barangay Cogtong, Candijay.

Based on key informant interviews on fishing gear operations, gillnets and fish corrals are used year-round (Figure 4). Longlines and squid jiggers are deployed from May to August. Gillnets for crabs are used only from August to December, while gillnets for shrimps are used from April to September. Simple handlines are deployed from September to November.

Cont'd.

Gear Type	Species Caught	Seasonality/Months Used											
		J	F	M	A	M	J	J	A	S	O	N	D
Jigger (<i>Tsa-tsa</i>)	<i>Andohao</i> (mackerel), <i>bilason</i> (fusilier), <i>mangsi</i> (herring), <i>lambiyaoan</i> (treavally), <i>saminan</i> (jack)												
Simple handline (<i>Pasol</i>)	<i>andohao</i> (mackerel), <i>bilason</i> (fusilier), <i>utdan</i> , <i>saminan</i> (jack), <i>bansikol</i> , <i>lambiyaoan</i> (scad), <i>mangsi</i> (herring), <i>bilang-bilong</i> (spotted moonfish), <i>tabudlos</i> , <i>bangsawan</i> , <i>mangko</i> (frigate mackerel), <i>tangigue</i> (frigate mackerel), <i>talakitok</i> (trevally), <i>maya-maya</i> (snapper), <i>ulang</i> (lobster)												
Fish Corral (Bunsod)	<i>timbangang</i> (goatfish), <i>gisaw</i> (mullet), <i>diwit</i> (hairtail), <i>bugaong</i> (tigerfish), <i>pawotpot</i> , <i>kabasi</i> (sardine) <i>babakan</i> , <i>katambak</i> (pargo), <i>molmol</i> (wrasse), <i>sapayan</i> , <i>tigi</i> , <i>sapsap</i> (sliplmouth), <i>libgao</i> , <i>kitong</i> (rabbitfish), <i>danggit</i> (rabbitfish), <i>balo</i> (needlefish), <i>labayan</i> (wrasse), <i>pasayan</i> (shrimp), <i>bilason</i> (fusilier), <i>utdan</i> , <i>saminan</i> (jack), <i>bansikol</i> , <i>lambiyaoan</i> (scad), <i>mangsi</i> (herring), <i>mangko</i> (frigate mackerel), <i>tangigue</i> (frigate mackerel), <i>talakitok</i> (trevally), <i>maya-maya</i> (snapper), <i>ulang</i> (lobster)												

Effective Fishing Time. In terms of effective fishing time, 58 percent of the respondents operate for three to six hours, while 32 percent operate from seven to ten hours. About ten percent fish for more than ten hours.

Manuel Badayos and Eduardo Bajardo, both 49 years of age, share, "*We normally head for our fishing spots at 7:00 a.m. and return at about 1:00 p.m. It takes us one hour to reach our fishing spots, which cover Lumislis, Kati-il, Lunod, Kawasihan, Tagaytay and Banlas. Fishers from Mabini and other neighboring municipalities also frequent these spots. Normally, we would set our fishing gear for about one hour. If there is no catch, we would transfer to another fishing spot.*" They add, "*The length of time we usually devote to fishing has not changed since the 1970s, but our fish catch was higher then.*"

Types of Boats Used and Crew Size. The majority (71%) of the fishers in Cogtong use non-motorized boats, particularly gillnetters. Only 29 percent use motorized boats. Boat ownership in Cogtong is high (92 %).

In terms of the number of persons involved in fishing operations, ninety percent of the respondents operate with a crew of one or two people. This reflects the predominance of simple gear types and of non-motorized boats.

Fish Harvest Sharing System. The sharing of fish harvest in Cogtong depends on the type of gear and ownership of the boat used in fishing. With gillnets, the most common sharing system after deducting all the expenses incurred during the fishing trip is 2/3 of the net earnings to the boat owner and 1/3 to the fisher or crew. If the fisher owns the boat and mobilizes a family member to assist him during fishing operations, the entire fish harvest usually goes to the fisher. For simple handlines and longlines, the sharing system is similar. Users of fish corrals, spears, fish pots and squid jiggers, on the other hand, normally get all the harvest. In other cases, users of squid jiggers simply divide the harvest equally among the fishers involved. Those engaged in bagnet and Danish seine operations usually follow a sharing system of 4/5 to the owner and 1/5 to the crew.

4.1.2.2 Mangroves

Traditionally, mangrove wood was used for constructing houses and fish corrals as well for firewood. The traditional and current technique of cutting mangroves in both Cogtong and Marcelo is with a *bola*, an instrument resembling a machete.

Over the years, the low intensive cutting of mangroves for traditional purposes changed. In 1965, Dr. Lim moved to Cogtong from Iloilo and developed the first fishpond on the Bay's shore. Fishponds soon became a popular business venture. The Department of Agriculture (DA) awarded Fishpond Lease Agreements (FLAs) to applicants that gave the holders the privilege of engaging in fishpond operations. Eduardo Bajardo, 49 years of age, recalls, "*In the 1970s and early 1980s, large mangrove areas were converted to fishponds. Attractive returns from the culture of fish, prawns and shrimps motivated village residents to engage in aquaculture.*"

In the early-1970s, traditional low intensive cutting methods gave way to large-scale harvesting of the mangrove forest with the arrival of commercial cutters in Cogtong. The wood was sold in larger market centers in Tagbilaran and Cebu.

At present, cutting permits are no longer issued to FLA holders. Occasionally, however, commercial cutters reportedly come to Cogtong Bay to cut mangroves on one of the islands (i.e., Lumislis) protected under Presidential Decree 2151 or 2152. In general, mangrove cutting is reverting to low intensive cutting by local residents.

4.1.2.3 Sources of Information on Fisheries and Mangroves

Fishers in Cogtong tend to be more dependent on internal information sources than on external sources. The primary information sources are other fishers (59%) and parents (22%). About 17 percent of the respondents reported that they learned fishing practices on their own. The role of government technicians in information dissemination appears minimal (2%).

On mangrove technologies, other fishers are also the main source (33%), followed by non-government organizations (7%), government technicians (7%), and information drives (4%). The rest of the respondents did not cite any information source on mangrove technologies.

4.1.3 BIOLOGICAL ATTRIBUTES

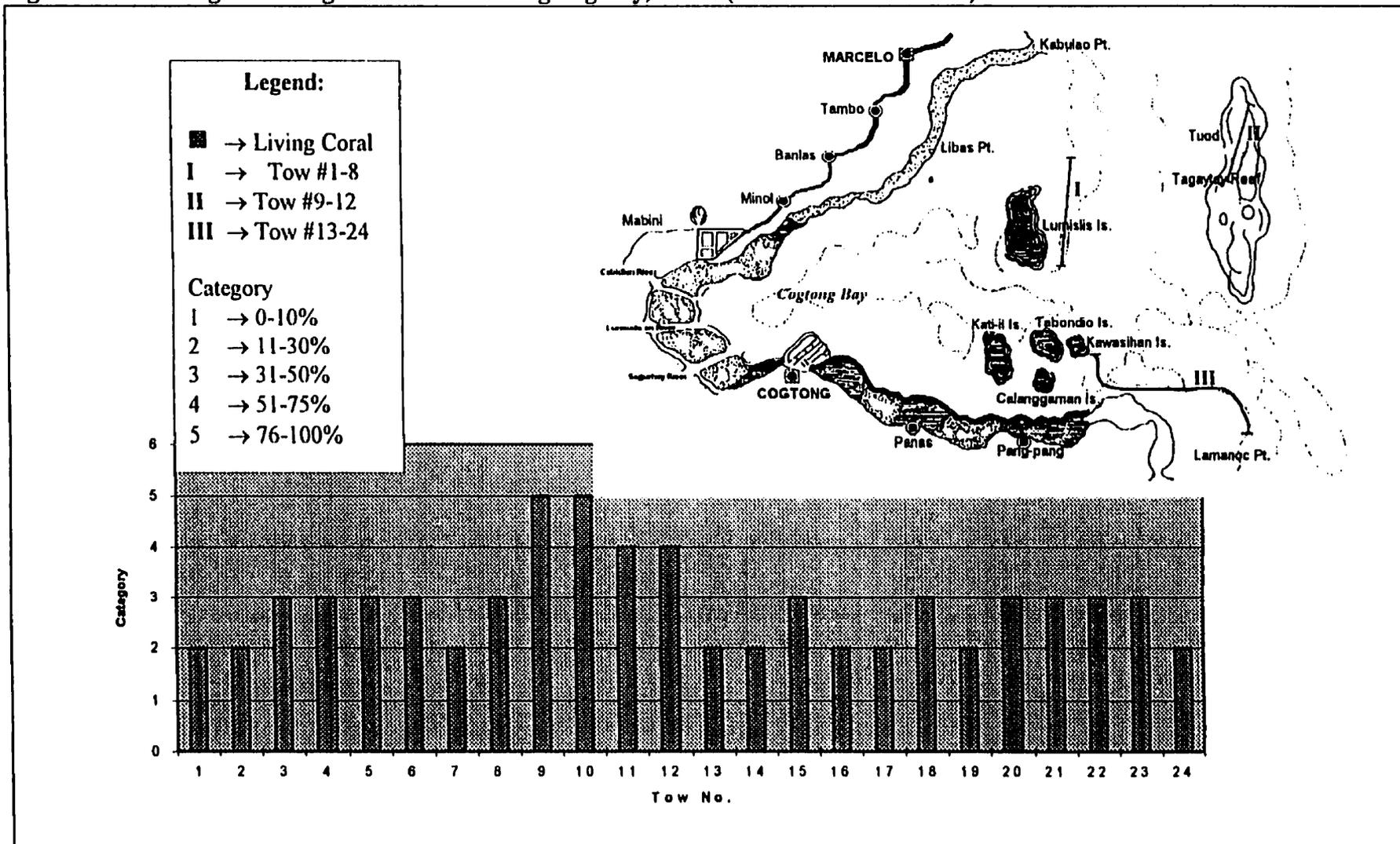
4.1.3.1 Corals and Associated Benthos.

To assess the condition of coral reefs and associated benthic life forms in Cogtong Bay, ICLARM's research team adopted the manta tow reconnaissance technique (English et al. 1994). This technique allows a visual assessment of large reef areas within a short time. The manta tow survey was conducted by towing a snorkeler holding a manta board following the contour of the reef slope. Each tow lasted for two minutes at a speed of 1 to 1.5 knots (0.7 - 1.0 m/s). A semi-quantitative description of the percentage cover, i.e., live, dead and soft corals, was estimated using the following categories: 1 = 0-10%; 2 = 11-30%; 3 = 31-50%; 4 = 51-75%; and 5 = 76-100%.

Twenty-four (24) tows were done during the field survey conducted in July 1997 covering about three-km of coastline. Of these, eight tows (Tow No. 1-8) were conducted at the eastern section of Lumisli Island, four tows (Tow No. 9-12) in Tagaytay reef, and 12 tows (Tow No. 13-24) from Lamanok Point to Kawasihon (near Calangaman Island).

The results of the manta tow survey indicate that living coral condition at the eastern side of Lumisli Island can be classified as poor to fair, with percentage live coral cover ranging from 11 to 50 percent (Figure 5). At Tagaytay Reef, relatively good conditions of corals were observed (i.e., live coral cover of 51-75 percent). The relative higher percentage of live corals in the area must have been influenced by hydrographic characteristics, such as depth of the reefs, water transparency, and circulation. Corals normally grow in well-oxygenated, warm and clear waters that are free from suspended sediments, excessive freshwater run-off and pollutants (Nybakken 1982; White 1990).

Figure 5. Percentage of Living Coral Cover in Cogtong Bay, Bohol (Source: ICLARM 1998)



4.1.3.2 Mangrove Community

Four sampling sites were visited during the July 1997 survey. These include: Lumislis and Kati-il Islands, Panas, and Katungkian (the mangrove reforestation site). In each sampling site, the transect line plot method described in English et al. (1994) was used with some modification. Starting from the seaward extent of the mangrove area, a transect line was extended landwards and perpendicular to the shore.



Picture 4. Reforested Mangrove Island. Cogtong Bay.

At ten-meter intervals along the line, the girth at breast height (GBH) of trees within a 10 x 10-m plot was measured with a fiberglass measuring tape. Those with a circumference of more than 12.5 cm (or 4-cm diameter at breast height, DBH) were recorded as trees. To measure the regenerative capacity of a particular site, mangrove seedling and saplings were counted. Those under 12.5 cm in circumference but over one meter high were recorded as saplings, and the rest (height less than 1-m) were counted as seedlings. The saplings were counted within a 5 x 5-m subplot, and the seedlings, within a 1 x 1-m subplot.

To compare mangrove sites, three ecological parameters were used: 1) relative density (proportional number of species); 2) relative frequency (likelihood of encountering the species); and 3) relative dominance (proportional basal area covered by the species, which is a measure of the stand development). The formulae used were:

Relative density	=	$\frac{\text{individuals of the species}}{\text{sum of all individuals}}$
Relative frequency	=	$\frac{\text{frequency of the species}}{\text{sum of frequencies of all species}}$
Relative dominance	=	$\frac{\text{basal area for the species}}{\text{total of basal areas for all species}}$

Four major mangrove species are found in the survey sites (Table 2). *Rhizophora sp.* is the most common species in Cogtong Bay, based on their relative density, frequency and dominance values. Other species include *Sonneratia sp.*, *Avicennia sp.* and *Brugiera sp.* *Brugiera sp.* is present in Kati-il Island, while *Rhizophora sp.* is found in Panas.

Basal area contribution from the stations was highest at Katungkian, the mangrove reforestation site with total basal area of $6.82 \text{ m}^2\text{ha}^{-1}$. This suggests that the location of the reforestation site is suitable for mangroves. The relatively shallow depth, protection from waves, muddy substrate, and extensive fresh water run-offs, are among the factors that influence the relatively good growth of mangroves at Katungkian. The basal area of the mangroves in Cogtong Bay, however, is relatively low compared to the mangrove stands reported in Honda Bay, Palawan ($16.47 \text{ m}^2\text{ha}^{-1}$) (Garces et al. 1996); Malaysia ($27.02 \text{ m}^2\text{ha}^{-1}$) (Gong et al. 1990) and in Indonesia ($30.50 \text{ m}^2\text{ha}^{-1}$) (Atmadja and Soerojo 1990).

Table 2. Structural Comparison of Mangrove Stands in Cogtong Bay, Bohol

Sampling Site	Genus	Ave. DBH ¹	BA ² (m ² /ha)	RD ³	RF ⁴	RDm ⁵	IV ⁶	DI ⁷
Catiil Island	Sonneratia sp.	28.7	0.06	2.0	60.6	62.6	154.0	
	Avicennia sp.	23.9	2.40	60.6	32.3	34	153.2	
	Rhizophora sp.	10.7	1.31	32.3	7.1	5.5	56.9	
	Brugiera sp.	14.0	0.21	7.1	2.0	1.5	24.8	
	Total		3.98					2.8
Lumislis Island	Sonneratia sp.	20.5	2.16	55.7	65.2	51.2	194.8	
	Avicennia sp.	38.2	0.77	14.0	13.9	18.3	85.2	
	Rhizophora sp.	22.1	1.29	30.4	20.9	30.6	105.2	
	Total		3.98					1.5
Panas Islet	Rhizophora sp.	17.9	4.44	100	100	100	322.3	0.0
Katungkian (Mangrove Reforestation Site)	Sonneratia sp.	23.5	0.04	0.6	0.6	0.56	25.2	
	Avicennia sp.	28	0.57	7.8	7.82	8.35	52.5	
	Rhizophora sp.	23.6	6.21	91.6	91.6	91.1	304.1	
	Total		6.82					2.1

¹ diameter at breast height³ Relative density⁵ Relative dominance⁷ Diversity index² basal area⁴ Relative frequency⁶ Importance value

In other Philippine coastal areas, low basal area values have been reported in several bays: Carigara Bay, 9.84 m²·ha⁻¹ (Bonga et al. 1996); Panguil Bay, 9.08 m²·ha⁻¹ (Lumasag and Openiano 1990); and San Miguel Bay, 6.53 m²·ha⁻¹ (Vega et al. 1994). These are bays where overharvesting and mangrove conversions to aquaculture are major causes of degradation/destruction of mangroves.

4.1.3.3 Fish Catch and Species Composition

A variety of fish species is caught in Cogtong Bay and its adjacent coastal waters. Species caught by gillnets vary from soft-bottom to reef (hard-bottom) dwelling species -- goatfishes, rabbitfishes, sardines, slipmouths, wrasses, and shrimps/crabs. Those caught with handlines (both simple and longlines) are pelagic fishes, such as mackerels, fusiliers, scads, jacks and reef dwelling snappers.

The composition of fish caught has changed over the years. Feliciano Guterez, 48 years of age, recalls, "*During the 1960s, most of our fish catch consisted of more expensive reef fishes, such as groupers, snappers, and Spanish mackerels. Now, we rarely see them anymore. The types of fish we normally catch now are cheaper and less valuable.*"

Based on key informant interviews, the typical catch per fishing trip in 1997 of the majority (about 80%) of Cogtong fishers was two to ten kg, down from about 15-20 kg in the 1960s (Table 3). Catches of gillnets, which were higher at twenty to forty kg in the 1960s, progressively fell to three to ten kg in the 1990s. Catches from fish corrals, along with other types of fishing gear, showed a similar downtrend over time.

Table 3 Trends in Catch Rates (kg/trip) of selected fishing gear in Cogtong Bay: Cogtong

Fishing Gear	1960s	1970s	1980s	1990s
1. Set longline (palangre)	10-15 kg	10 kg	5-7 kg	2 kg
2. Crab/fish pot (bubu)	10-15 kg	10 kg	5 kg	1-2 kg
3. Spear gun (pana)	10 kg	7 kg	5-8 kg	3 kg
4. Squid jigger (tsa-tsa)	10-15 kg	(7-8 kg)	5-8 kg	1-2 kg
5. Simple handline (pasol)	10 kg	Less than 10 kg	5-7 kg	1-2 kg
6. Squid jigger (Ulang-ulang)	10-12 kg	5-10 kg	4-6 kg	2 kg
7. Gillnet (pukot/lambat)	20-40 kg (sometimes 50 kg)	15-20 kg	6-10 kg	3-10 kg
8. Fish Corral (bunsod)	20-30 kg	10-20 kg	10-15 kg	2-9 kg

Feliciano Guterez, a crab catcher at present, notes, *“In the 1960s, we could easily catch 10 kg of crabs or more in just half a day. Now, it is difficult to catch even a kilo. We attribute this to the increase in the number of crab catchers, the uncontrolled cutting of mangrove trees for firewood and for house construction, and the conversion of mangroves into fishponds. We have observed a decline in the volume of bivalves and shrimps as well.”*

At present, Mr. Simplicio Anud, a fish corral owner, harvests two kg of fish per day during the lean season (February to June) and nine kg per day during the peak season (September to January). Mr. Aparici, a gillnet operator, catches ten kg of fish per day during the peak season. An operator of push nets indicated that pollution from fishpond areas may have adversely affected his shrimp catch. He noted relatively smaller shrimps (*sugpo*) in his catch.

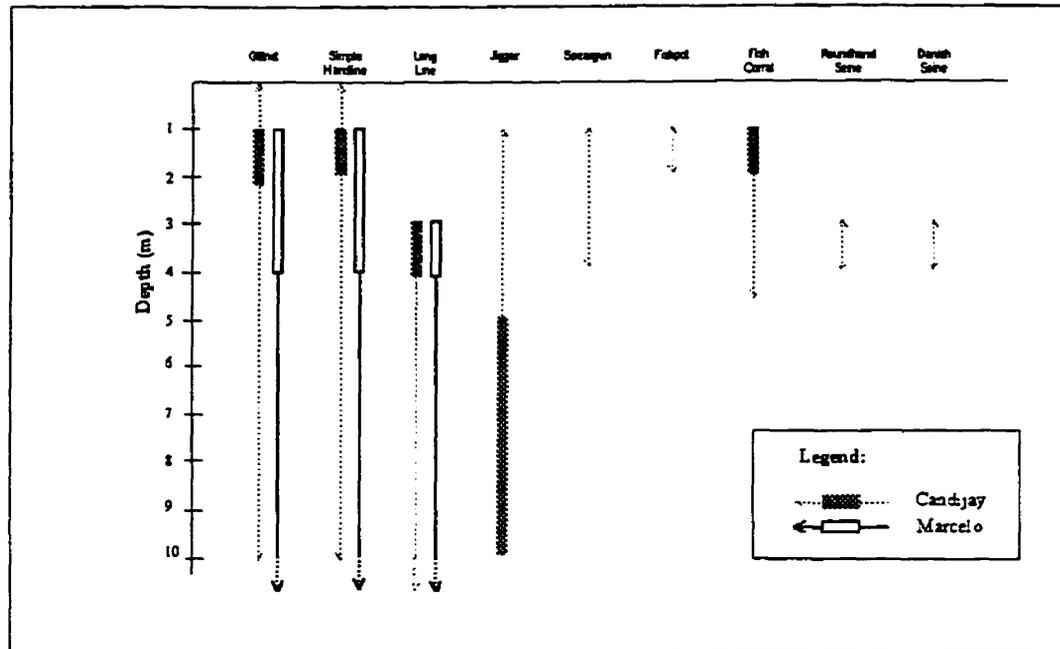
4.1.3.4 Fishing Grounds

Based on the household survey, the majority (78%) of the fishers from Cogtong village operate inside the Bay, while 22% fish outside the Bay. The localized range may be partly attributed to the predominance of non-motorized boats owned/operated by the fishers in the area. These fishers employ gillnets and simple handlines. For fish corrals, about seven units are operating at the inner portion of the Bay.

Key informants mentioned that the encroachment on their traditional fishing areas is a negative effect of the mangrove rehabilitation project. Before 1988, the distance between fish corrals was more than 200 meters, but this was shortened when mangrove rehabilitation started.

Fishing spots frequented by the fishers are the shallow portions of the Bay. About 37 percent of the fishers operate in waters less than five fathoms (15 m), while twenty-percent fish in waters with a depth of six to ten fathoms (18-30 m). Gillnets, simple handlines and longlines are commonly employed within the Bay. Fishing operations outside the Bay are usually in waters exceeding 25 fathoms (75 m). Gillnets are also used outside the Bay to a limited extent. Figure 6 portrays the depth of fishing operations by gear type.

Figure 6. Depth of Fishing Operations by Gear Type



Source: ICLARM 1998

4.1.3.5 Perceived Trends in the Condition of Fishery and Mangrove Resources

To obtain a comparative perception of resource conditions, 54 heads of fishing households in Cogtog were asked to describe the condition of fishery resources 15 years ago and today. A similar question was asked on the condition of mangrove resources.

Fishery Resources. About 65 percent of the fishers expressed that 15 years ago (1982), fishery resources were in a relatively good condition. The underlying reasons were linked to abundant fish catch, fewer resource users, and limited commercial fishing. About 24 percent, on the other hand, felt that the resources were in a bad shape due to illegal fishing activities, mangrove cutting, damaged habitats, and decreasing fish catch. Some 11 percent stated that fishery resources were neither in a bad nor good condition.

In terms of the perceived condition of fishery resources today, fishers perceive resource deterioration. The majority (80%) felt that the resources are now in a bad shape (Table 4) citing a declining fish catch as the predominant reason. Illegal fishing, overfishing, habitat destruction, presence of commercial fishers, use of fine mesh nets, and population growth were also considered contributing factors. Only 15 percent perceived a very good resource condition at present. The rest (5%) perceived no change at all.

Mangrove Resources. On the condition of mangrove resources 15 years ago, the perception is somewhat divided. Almost the same percentage of respondents viewed the resource condition as good (46%) or bad (45%). The rest (9%) were neutral. Those perceiving the resource condition as good attributed it to the presence of thick mangrove stands and to minimal fishpond development in the village. Those who viewed the mangrove resource condition as bad cited the uncontrolled cutting of mangroves, decrease in mangrove stands, fishpond development, and decreasing fish catch.

With regard to the perceived resource condition today, the percentage of respondents who regarded the condition as bad increased to 65 percent, largely due to uncontrolled mangrove cutting, decline in mangrove stands, fishpond development, and declining fish catch. A lower percentage of respondents who perceived the resource situation as good (28%) explained that this could be attributed to mangrove reforestation efforts, improvement in fish catch, and information campaigns.

Comparing resource conditions now versus 15 years ago (1982), a statistically significant increase emerged in the perception of bad resource conditions for fisheries ($p < 0.05$) as well as for mangroves ($p < 0.01$). This implies that overall, the perception of resource conditions has worsened. Though the CMMRCRM introduced coastal resource management interventions from 1989 to 1991 and though fishers have noted an improvement in their fish catch after the mangroves were rehabilitated, the perception is that earlier resource conditions have not been fully restored. Continuing resource rehabilitation and protection efforts remain imperative.

Table 4. Perceived Resource Conditions Based on Household Survey Results: Cogtong

Condition	15 Years Ago (1982)		Today (1997)		T-value	P
	No.	%	No.	%		
Fishery:					-6.153	<0.01
Bad	13	24.0	43	80.0		
Neither bad nor good	6	11.0	3	5.0		
Good	35	65.0	8	15.0		
Total	54	100.0	54	100.0		
Mangroves:					-2.107	<0.05
Bad	24	45.0	35	65.0		
Neither bad nor good	5	9.0	4	7.0		
Good	25	46.0	15	28.0		
Total	54	100.0	54	100.0		

4.1.3.6 Perceived Importance of Mangrove Management

All the respondents were unanimous in expressing that mangrove management is essential to the fishery, regardless of membership in the village-based fishers' association, known as the *Panaghiusa sa Gagmaying Managat sa Cogtong* (PAGAMACO). This indicates an awareness of the interaction of coastal ecosystems that may be attributed, in part, to information campaigns and training sessions carried out by the project. Based on multiple responses, observations since the introduction of mangrove management in Cogtong include: 1) expanded mangrove stands (61%); 2) improved fish habitats (54%); 3) increased fish catch (19%); and 4) less fishpond development (4%).

4.1.3.7 Ecological Knowledge

Based on a random sample survey of 54 fishers in July 1997, the respondents exhibited knowledge of various characteristics of the sea and coast that help the fish to grow and be healthy. Multiple responses include the presence of sea grasses/seaweeds (82%), existence of mangroves (52%), presence of corals (28%), and presence of algae (13%). Members and non-members alike gave similar responses.

No zoning or technical boundaries are present for mangroves in Cogtong Bay. Technical boundaries exist for fishing regarding the species of fish harvested during different periods of the year due to the pelagic characteristics of the fish.

To try to extrapolate more traditional ecological knowledge (TEK) during key informant interviews, respondents were asked if any stories existed that influenced mangrove or fish harvesting behaviours. For example, some key interviews were asked "Do you know of any stories that say one should not fish during the full moon because bad things may happen to you or your family"? Generally, respondents laughed at such an absurd statement. A possible explanation is that cultural practices that encourage sustainability (one of the values of TEK [Berkes 1989]) only perpetuate themselves when validated with positive reinforcement. For example, if one harvesting method reduces the reproduction capacity of a resource by twenty percent, while another does not affect the reproductive capacity, the latter should be culturally preferred. More accurately, one could expect to find the former culturally restricted through social sanctions or even taboos. However, if the resources are so abundant that the community of users can easily sustain their needs with a regeneration rate of only fifty percent, then there would be no incentive to use the more environmentally harvesting method.

Remembering the historical context of Cogtong Bay, resources were always abundant, and most mangrove wood and fish harvesters had similar, low intensity harvesting methods. Resource conflicts and shortages did not arise until the 1970s - only about thirty years ago. A defining element of TEK is an information source that is passed down from generation to generation. If one accepts that resource shortages are a major pre-requisite to positive reinforcement, and positive reinforcement is required to perpetuate culturally preferred harvesting methods, then the short period of resource conflicts would not be sufficient to develop a rich TEK system regulating harvesting methods.

4.2.0 STAKEHOLDER, COMMUNITY, AND FISHER CHARACTERISTICS

This section presents the socio-economic characteristics of stakeholders, fisher community, and fishers, which carry implications for resource use and for incentives to cooperate and coordinate. Among others, it highlights the social homogeneity of Barangay Cogtong, the high dependence of the village on fishery resources, the extent of fisher participation in the project, the motivation of resource users, and the extent of fisher satisfaction with their chosen occupation. The evolution of stakeholder groups as well as the socio-economic characteristics of the community, sample fishers and fisher households is assessed to determine the influence on incentives to cooperate and coordinate such characteristics have.

4.2.1 Stakeholders

Stakeholders are defined as institutions, social groups and individuals that possess a specific, direct and significant interest/stake in the area. The stake may come from institutional mandate, historical association, dependence for livelihood, economic interest, geographic proximity or a variety of other capabilities and concerns. Usually stakeholders are aware of their interests in the management of an area (IUCN 1996).

Not all stakeholders are equally interested in conserving a resource, nor equally entitled to have a role in resource management. Stakeholders therefore must be distinguished. Criteria to distinguish stakeholders are presented in Box 2 (IUCN 1996). Social actors who score high on several accounts may be considered as primary stakeholders and those with lower scores secondary stakeholders. An individual may have representation in several stakeholder groups.

Box 2. Possible Criteria to Distinguish Among Stakeholders

• Existing rights to natural resources
• Continuity of relationship (e.g., residents versus visitors and tourists)
• Unique knowledge and skills for handling resources at stake
• Losses and damage incurred in the management process
• Historical and cultural relations with the resource at stake
• Degree of economic and social reliance on such resources
• Degree of effort and interest in management
• Equity in the access to the resources and distribution of benefits from their use
• Compatibility of the interests and activities of the stakeholder with the national conservation and development policies
• Present or potential impact of the activities of the stakeholder on the resource base

Barangay Cogtong has a variety of stakeholders with an interest in the coastal resources. Some stakeholder groups are directly concerned with the mangrove wood, others the fishery, and still others the ecosystem functions provided by mangroves.

Members of *Panaghiusa Sa Gagmay'ng Mananagat Sa Cogtong (PAGAMACO)* can be identified as primary stakeholders. Original PAGAMACO members participated in either the mangrove rehabilitation, artificial reef construction (AR) or mariculture component of the CMMRCRM. Members of the group, mainly fishers, also attended project activities such as seminars and meetings, and helped enforce fishery and mangrove laws. Moreover, group members worked together with the Barangay and Municipal Councils to strive for a healthy ecosystem. Today, the re-organized group works closely with the United Barangay Federation (UBF) and Municipal Council to protect and manage coastal resources.

The firewood gatherers of Cogtong Barangay are an informal group who directly relies on access to mangrove stands to cut and sell the wood as their primary source of livelihood.

Fishers and shell gatherers (mainly women) who are not part of PAGAMACO are also stakeholders. Both informal groups benefit from healthy mangroves. The fishers usually provide the primary source of income and food for their households while shell gatherers augment family income and food source.

Holders of FLAs comprise another group of stakeholders. There is no formal organization but members of the group are individuals who have a legal claim on the land and have usually invested both time and money into developing or attempting to develop the land into a fishpond.

Fish vendors also rely on the fishery. The livelihoods of fish vendors are dependent on abundant fish. No formal market arrangements exist outside the vendors procuring and selling fish on a competitive basis.

The Cogtong Barangay Council emerged as a stakeholder during the CMMRCRM by offering moral support to project activities and helping with information campaigns and stricter enforcement. Today, the Barangay Council is even more active in managing coastal resources and has joined the UBF to have a stronger voice in influencing decision-making on coastal management.

The Candijay Municipal Council exercises jurisdiction over municipal waters. It has invested efforts in coastal resource management by passing enabling legislation, extending moral support, and helping with enforcement efforts.

The DENR is also a key player. It has jurisdiction over mangrove areas outside communal forests. It was also involved in the CMMRCRM implementation.

4.2.2 COMMUNITY CHARACTERISTICS

Cogtong, a coastal barangay of Candijay was originally settled because of abundant fishery resources. The reliance and deep cultural value fishing holds in the community is evidenced by the name “Cogtong”. The barangay derived its name from the legend of a

large fish named *Kogtong* that helped to ensure abundant fish harvests for the original barangay residents. The residents of Barangay Cogtong have since expanded on the livelihood strategies employed by the original settlers. Cogtong now offers many more employment opportunities. Fish vendors and other business directed jobs offer alternatives, as do various government jobs such as teaching. Although the economy of Cogtong has expanded, fishing is still the economic mainstay and foundation upon which other employment opportunities is built.

When the CMMRCRM was introduced to Cogtong, there were approximately 380 households. In 1997, the households increased to 445, representing an increase of 17 percent from 1988 (the pre-project period). The overall occupational structure has remained fairly stable over time, where fishing households have accounted for 45 percent and fish vendors, 15 percent (Table 5). Laborers and small business operators have increased slightly to 12 percent and 11 percent, respectively.

Individuals using the mangroves as a primary occupation have, however, decreased substantially since the CMMRCRM from 11 percent in 1988 to three percent today. Several factors can be attributed to this trend. First, there are fewer areas to cut wood from now that the majority of mangroves have formal property rights. Second, although mangrove areas have been replanted, the CSC holders are mostly fishers. Further, the stands are not yet mature enough to begin cutting. Fourth, within the barangay, the tradition is for children to follow in the same line of employment as their parents. However, more with mangrove users than fishers and farmers, the children are finding other jobs.

Table 5. Distribution of Households by Primary Occupation: Cogtong

Occupation	1988 (%)	1997 (%)
Fisher	45	45
Fish Vendor	15	15
Laborer	6	12
Small Business Operator	7	11
Government Employee	12	10
Mangrove Gatherer	11	3
Driver	2	2
Farmer	2	2
Total	100	100

Overall, the village residents of Cogtong may be regarded as fairly homogeneous in terms of ethnicity and religion. The present village population is predominantly of native origin, where Boholanos comprise ninety percent. Non-Boholanos, such as Cebuanos, Hiligaynons, and other ethnic groups, account for ten-percent. In terms of religion, the Roman Catholics have continued to be dominant (90%). The rest (10%) are Seventh Day Adventists, Jehovah's Witnesses, and *Iglesia ni Kristo*.

At present, the village facilities are varied. These include: a pre-school, elementary school, high school, and a government-run fisheries college. The village also has a health center, a village hall, food market, restaurant, drug store, television facilities, electric service, radio station, postal service, and public transportation. Water is supplied from a variety of sources: water piped from a submersible pump; one communal artesian well; three privately owned artesian wells; a deep well; and, natural springs. Electricity accounts for 80 percent of light generated, while kerosene only twenty percent. Wood is the primary fuel (90%), followed by electricity (5%) and kerosene (5%). Providing recreational outlets for the village residents are a cemented basketball court, a tennis court, a mini-park, and multiple video houses.

Overall, the integration of Cogtong village into the national economy may be regarded as low to medium. Market links are medium, marked by the daily transport of fish by public transportation to neighbouring villages and municipalities. Transportation links are low due to the presence of unpaved roads to and from the village and of the sole dependence

on motorcycles as a mode of transportation. Communication links are medium. A hand-held radio in the village and a telephone facility are available at the Candijay town center, about seven km away. By contrast, political links are high since the mayor of Candijay visits the village more than once a year.

4.2.3 CHARACTERISTICS OF SAMPLE FISHERS

A random sample of 54 fishing households was drawn from the village population. The sample comprised 27 members of the project beneficiary association, known as PAGAMACO, as well as 27 non-members. Table 6 shows no statistically significant difference between members and non-members in terms of mean age, education, household size, and length of residence in the village ($p > 0.05$). On the average, the survey respondents are 48 years of age, have completed an elementary education and have resided in the village for about 37 years. The majority of the respondents were born in Cogtong (54%), while the rest came from neighbouring Visayan areas (44%) and from far-flung Luzon in the Northern Philippines (2%). The average household consists of five members.

Table 6. Characteristics of Sample Fishers: Cogtong

Variable	% Members	% Non-Member	% Total	T-value	p
Age	49.2	46.8	47.9	0.72	>0.05
Education	6.5	6.1	6.3	0.45	>0.05
Household size	5.2	4.2	4.7	1.36	>0.05
Years of residence in the village	39.0	34.2	36.6	1.07	>0.05
N	27.0	27.0	54.0		

In terms of fishing experience, most respondents (76%) reported that they have been fishing for more than 15 years. About 11 percent of the respondents have fished for 11-15 years, and 12 percent, for 10 years or less. In the past, 48 percent were also engaged in non-fishing occupations such as vending, farming and carpentry. Between members and non-members, a statistically significant difference does not exist ($X^2=2.67$, $p > 0.05$).

In terms of participation in the project, Table 7 shows that members differ significantly from non-members in four aspects of project interventions: attendance at project meetings, completion of training, influence over project planning, and knowledge of project objectives. Based on the household survey in Cogtong, attendance at project meetings was higher for members than non-members (52% versus 19%; $X^2=6.58$, $p<0.05$). On the average, most respondents attended five meetings or less. Training completion, likewise, was statistically higher for members than for non-members (30% versus 7%); $X^2=4.42$, $p<0.05$). The training duration lasted for a minimum of three days and a maximum of ten days. Training topics covered mangrove planting and management, establishment of artificial reefs, livelihood, and leadership, among others. The project staff of ACIPHIL and the Department of Trade and Industry (DTI) provided the training.

Table 7. Fisher Participation in the Project: Cogtong

Variable	% Members	% Non-Member	% Total	X^2	p
Attend project meetings	51.9	18.5	35.2	6.58	0.01
Complete training	29.6	7.4	18.5	4.42	0.04
Influence project planning	48.1	5.3	33.3	5.33	0.02
Knowledge of project objectives	100.0	85.2	92.6	4.32	0.04

The survey results, show that more members than non-members indicated that they were able to influence project planning (48% versus 5%; $X^2=5.33$, $p<0.05$) and that members had a greater knowledge of project objectives (100% versus 85%; $X^2=4.32$; $p<0.05$). These responses are consistent with actual project objectives.

4.2.3.1 Fisher Households

Household Size and Out-Migration. About 78 percent of the respondents have six members or less in their households. The rest (22%) have a larger household size of more than six members. More than one-half (57%) of the households also reported that some of their household members have left Cogtong for various reasons. These are to work (80%), to get married (11%), and to study (9%). The usual destinations include

Metro Manila (50%), other provinces (33%), and other municipalities on Bohol (8%). Accounting for the rest of the destinations are other countries (6%) and other villages within Candijay (3%).

Educational and Occupational Profile of Wives. The educational profile indicates that about 55 percent of the wives received an elementary education, while some 26 percent went to high school. A few (19%) pursued a college education. About four percent did not go to school at all. In terms of age, eighty percent of the wives are more than 35 years of age. About 13 percent are in the 25-30-age bracket.

In Cogtong, women's key roles in the village economy and contributions to the support of their households involve the use of local resources. About thirty percent of the wives are engaged in important subsistence and income-generating activities, such as shellfish gleaning, fish vending, oyster gathering, selling cooked food, and nipa shingle-making². Others are store owners (9%), teachers (4%), laundry women (2%), and dressmakers (2%). About 53 percent are housekeepers and caregivers.

During the CMMRCRM implementation, women were actively involved in the fishers' association despite the lack of any deliberate planning on the part of project designers or staff to target women (Mehra, Alcott and Baling 1993). An apparent lack of involvement could be linked to their perception of women's roles as their husband's "helpers". Women were most active in providing voluntary labour for mangrove rehabilitation and for mariculture (oysters and mussels). They also cooked community meals when the men installed the artificial reefs.

When the CMMRCRM introduced oyster culture in Cogtong, the women assisted their husbands in stringing the collectors together, installing stakes, and hanging collectors. They also did much of the harvesting (Mehra, Alcott and Baling 1993).

Household Assets. Unlike paid and fixed employment, income from fishing cannot be adequately quantified due to the absence of record-keeping and to the daily income

² Nipa trees essentially lack a trunk, mature trees are composed almost entirely of large leaves that shoot up from the ground. The leaves are interwoven and form rooftops that last for about five years. In Cogtong Bay, Nipa therefore is analogous to Western "shingles".

variations (Pomeroy et al. 1996). In lieu of actual income, relative wealth was based on house structure, household furnishings/facilities, and ownership of productive assets (i.e., land and boats).



Picture 5. Mid-Range Household. Cogtong Bay.

Table 8. Percent Distribution of Assets: Cogtong

Variable	% Members	% Non-Member	% Total	X ²	p
House Structure				6.78	0.08
Minimal	11.1	14.8	13.0		
Low	33.3	48.1	40.7		
Medium	55.6	25.9	40.7		
High	-	11.2	5.6		
Household Furnishing and Facilities				4.08	0.25
Minimal	11.1	18.5	14.8		
Low	55.6	44.4	50.0		
Medium	33.3	25.9	29.6		
High	-	11.1	5.6		
Land Ownership	29.6	37.0	33.3	0.33	0.56
Ownership motorized boats	89.7	93.3	91.5	0.26	0.61

To evaluate house structure, four categories were used: minimal, low, medium and high. A minimal house structure refers to a house made up entirely of light materials, such as bamboo, cogon and nipa, including the frames. A low quality house structure consists of light materials for the walls and roofs but the frames are made of wood or lumber. A medium quality structure combines lumber and concrete for the walls and frames but uses nipa or cogon for the roof. A high quality house structure, on the other hand, has either a roughly or completely finished external surface and painted or cemented inner walls, along with galvanized iron sheets for the roof. Table 8 shows no statistically significant difference between members and non-members ($X^2=6.78$, $p>0.05$). Non-members, nonetheless, are more likely to have minimal to low house structures than non-members.

The respondents tend to have minimal to low household furnishings and facilities. Minimal refers to the presence of one to two household furnishings, while low refers to the presence of three to five furnishings. Included on the list of furnishings/facilities are such assets as furniture, radio, cassette player, cooking stove, electric fan, water-sealed toilet, sewing machine, motorcycle, and other facilities. Ownership of productive capital such as boats and land may also be regarded as indicators of the respondents' relative wealth. The survey results reveal that there is no statistically significant difference in ownership of land and motorized boats between members and non-members ($p>0.05$).

4.2.3.2 Occupational Multiplicity and Dependence on Coastal Resources

All respondents are dependent on fishing as a primary occupation. Fishing provides more than half of household earnings for 78 percent of the respondents. Occupational multiplicity as a survival strategy among fishing households is fairly evident. Apart from fishing, respondents are engaged in fish trading (19%), carpentry (6%), farming (4%), and gathering of wood, *nipa* palm leaves, and oysters (5%). The rest are engaged in tailoring, masonry, hog raising, and service-related jobs (22%). Forty-four percent of the respondents, however, reported that they do not have a secondary occupation.

The harvest of mangrove products accounts for less than half of household income for 91 percent of the respondents. This indicates that mangrove products supplement household earnings. Some households (35%) also receive remittances from members living outside

the household to augment their income. The difference between members and non-members in dependence on external remittances is not statistically significant (33% versus 37%; $X^2 = 2.08$, $p > 0.05$).

When the respondents were asked if plants and animals that were regarded as few 15 years ago have become more abundant now, they responded that, in general, there is no increase (61%). The same pattern holds true for pest species (76%). Most respondents (72%) also reported that, in general, harvesting areas are dynamic.

4.2.3.3 Job Satisfaction

Given the chance to live their lives over, 52 percent of the sample would no longer choose to become fishers (Table 9). Between members and non-members, the difference is not statistically significant (48% versus 56%; $X^2 = 0.30$, $p > 0.05$). The predominant reason for giving up fishing is linked to the desire to earn a higher income and improve living conditions (82%). Other reasons (multiple response) relate to the difficulty of fishing (25%) and declining fish catch (14%).

For those who chose to remain in fishing (48%), the reasons are: lack of skills in other jobs (39%), being used to fishing (31%), contentment with fishing (12%), absence of a boss (8%), and provision of basic needs (8%). This finding partly suggests that fishers face limited options in terms of job opportunities, given their work experience and limited education, which lead them to choose fishing again if they were to live their lives over.

Table 9. Job Satisfaction of Fishers: Cogtong

Choice	% Member	% Non-Member	% Total	X^2	P
Leave fishing, given the chance to live one's life over	48.1	55.6	51.9	0.30	0.59
Shift from fishing now	70.4	84.5	75.9	0.91	0.33

When the respondents were asked if they would change their occupation **now** from fishing to something else, about 76 percent said yes. Underlying this response are economic reasons, such as the need for higher earnings (56%) and to improve living conditions (39%). Others qualified their response by expressing that they would shift to other occupations **if** the alternative job were light and easy (10%). Non-income related reasons for leaving fishing also emerged. These cover the difficulty of fishing (12%), declining fish catch (7%), and old age/weak body (2%). Thus, the yearning for a better economic status appears stronger in the fishers' desire to shift now from fishing to other jobs.

4.3.0 MARKET RELATIONSHIPS

4.3.1 FISHERY

The fishery of Cogtong is market-driven and oriented toward food fish. About 89 percent of the 54 fishers covered by the random sample survey in July 1997 reported that they sold the bulk of their catch. Only 11 percent indicated that they sold less than half of their catch. The sale of fish primarily takes place at the village (91%). About seven percent goes directly to the Candijay town market (7%). Only two percent of food fish is sold outside Candijay, particularly in Mabini, Guindulman, Jagna, and Tagbilaran. Box 3 highlights the market attributes of Cogtong.

Box 3. Summary of Present Market Characteristics

Indicator	Attributes
Fishing ground Market outlets	Inside Cogtong Bay (78%) Consumer (54%) Primary buyer (28%) Retailers (18%)
Place sold	Village (91%)
Number of traders	30
Existence of <i>suki</i> (favored buyer)	48% with <i>suki</i>
Length of <i>suki</i> relationship	< 5 years – 69% 5-10 years – 23% > 10 years -- 8%
Market orientation	Local/Provincial
Value of product	Low/medium

In relation to market outlets, Cogtong fishers reported that they sell their food fish to consumers (54%), primary buyers/fish dealers (28%), and retailers (18%). The choice of these market outlets is governed by the existence of a *suki* (credit-marketing relationship between a fish buyer and a fisher), proximity, and best price offer. Women (usually spouses and daughters of fishers) dominate the trade of fresh fish.

Key informants recalled that before 1988, there were about 10-15 full-time fish traders from Cogtong. Now, their number has reportedly doubled to thirty. Of this number, twenty traders go offshore to procure their fish. Fish traders have generally observed stability in market outlets, but not in the volume of fish procured from Cogtong fishers. Pedro Odon, 53 years of age, recalls, *"In 1988, we could sell around 50-60 kg daily of fish caught from Cogtong Bay. Now, we are fortunate if we can sell 30-40 kg a day of fish caught from Cogtong Bay. The volume of fish catch from Cogtong Bay has declined."* Bebot Galagar, another fish trader, adds, *"In the 1980s, we bought all our fish directly from village fishers. With the onset of the 1990s, we started buying fish offshore."*

Market channels, at present, include the following: 1) fisher --> fish trader --> consumer; 2) fisher --> primary buyer/fish dealer (village-based and offshore) --> consumer; and 3) fisher --> primary buyer/fish dealer (village-based and offshore)--> fish retailer --> consumer. The first category is the most common marketing channel.

Fish is normally packed in ice to preserve its quality and is stored either in styrofoam containers or plastic-covered buckets. Fish traders obtain their fish directly from village fishers. Most traders load their fish on motorcycles (*habal-habal*) early in the morning and transport them to the Candijay town market. Fish intended for more distant markets outside Candijay is transported on buses. About ten transient fish traders go to Cogtong to procure fish. These transient traders come from other municipalities, such as Jagna, Ubay, Guindulman, and Anda.

Fish is sold by weight or by gallon in Cogtong. The type of fish and size of fish determine prices. Groupers and blue marlin normally command higher market prices. The volume of fresh fish landed also affects fish prices, which, in turn, is dependent on climatic conditions and on the lunar season. During stormy seasons or windy periods when fish supply in the market is low, fish prices tend to increase by at least sixty percent. The main sources of information on fish prices (multiple response) are fish buyers/dealers (41%), other fishers (37%), and market vendors (30%).

In general, the comparative retail prices of marine products in 1988 and 1997 increased. Several types of fish registered double-digit price increases of at least forty percent: herring (*mangsi*), snapper (*katambak*), rabbitfish (*kitong*), trevally (*mamsa*), and grouper (*pugapo*). The traders noted that prices almost tripled for mackerel (*andohao*), anchovy (*bolinao*), and hairtail (*diwit*) over a nine-year period.

The trade of food fish is very competitive. There is no official control over individual fish traders, such as the restriction of fish trading in the area or the imposition of rules on fish landing. Ice plant facilities are virtually non-existent in Cogtong. Based on key informant interviews, fish vendors dry their fish or process them into fish paste

(*guinamos*) when they cannot sell all their fish at the end of the day. The processed fish, however, is normally for home consumption only. At times, fish drying is also done, but traders noted that dried fish commands a lower market price.

The survey results indicate that 48 percent of the fishers have maintained a *suki* relationship. This is largely due to the services that the *suki* provides and the guaranteed market that comes with this arrangement. Multiple responses given by fishers on the advantages of the fisher-*suki* relationship include a guaranteed market for food fish (24%), availability of emergency credit (22%), and provision of fishing assets (2%). The rest (52%) did not have a *suki*. Among the most sought after services from the *suki* are loans for basic needs and provision of capital. In this type of relationship, however, the trader normally dictates the price of fish and limits the fishers' choice of market outlets. Nonetheless, 83 percent of those who have a *suki* expressed that they are happy with their *suki* arrangements. Most *suki* relationships have generally lasted for 1-4 years (69%).

4.3.2 Mangrove Wood

Wood gathering/trading in Cogtong is a part-time livelihood. In 1988, there were about ten full-time wood traders/gatherers. Their number was reduced to seven in 1997 due largely to geographical restrictions in trading mangrove wood, death of earlier wood gatherers, and migration of some wood traders to other areas.

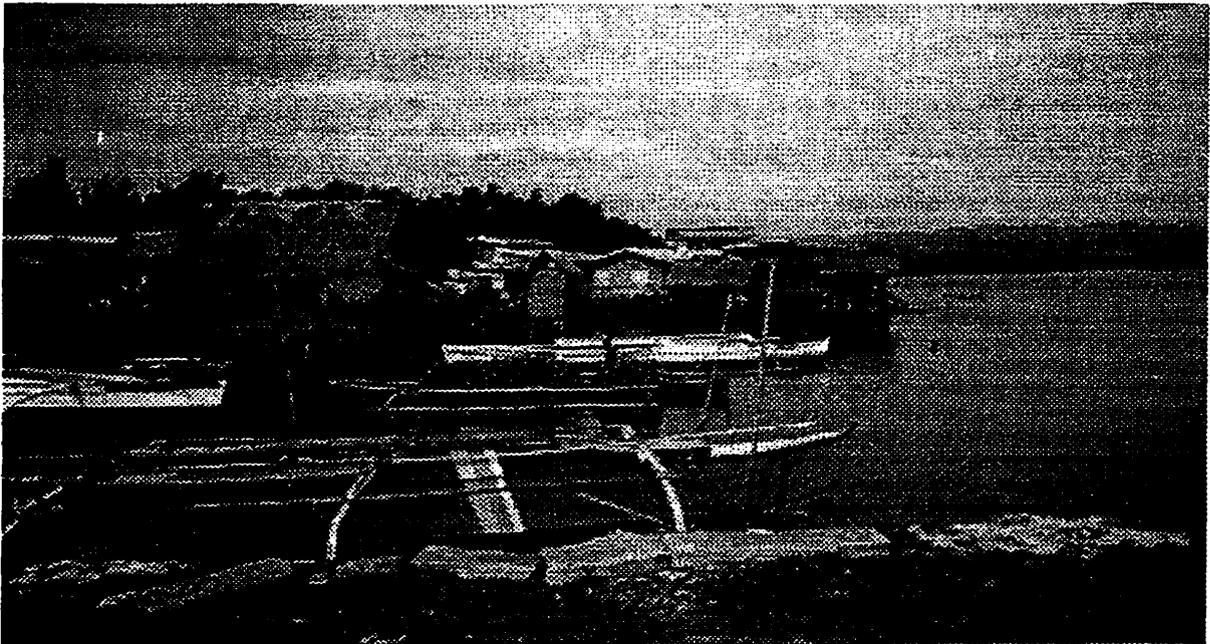
Wood gathering and trading are family-based activities, where family members harvest and gather mangrove branches, chop, remove the bark³, and dry the wood. *Bakhaw* (*Rhizophora* sp.) is normally gathered for firewood due to its relative abundance and ease in cutting the wood. When posts are needed, wood gatherers cut down the tree trunks of *Avicennia* sp. Other uses for *Nipa* are for roof construction and making *Tuba*⁴. The major mangrove harvesting grounds in Candijay are found in Cabidian, Lumislis (Cogtong part), Sagumay, and Pangpang. The dried wood is transported to the market

³ Bark from mangrove trees is often used in the process of tanning leather. However the benefits of stripping the bark in Cogtong was unclear.

⁴ *Tuba* is a mild alcoholic drink that is usually further distilled to a powerful alcoholic drink called *Laubanog*.

and sold to a wholesaler or to a store owner. Demand for firewood rises during stormy seasons, when wood gathering is difficult, and during village festivals (*fiestas*), when large quantities of food are cooked using firewood.

Salome Beltran, a wood trader who is 53 years of age, shares, “*We normally produce 100 bundles of wood in two days. Each bundle comprises 6 pieces of cut wood. We deliver the wood bundles directly to our suki, who then sells the wood to consumers. We get paid in cash upon delivering the wood. However, when our suki has remaining stocks, we are paid in kind, such as rice, canned goods, cigarettes, kerosene, and other basic items, instead of cash. During emergencies, we normally get a loan from our suki.*”



Picture 6. Mangrove Wood Cutter. Barangay Cogtong.

The procurement price of mangrove firewood has increased by fifty percent from 1988 to 1997. In 1988, one bundle of *bakhaw* was sold at P1.00. Now, it costs P1.50. The retail price to consumers is P2.00 per bundle. The sale of mangrove firewood is confined to the municipality of Candijay, in line with a local ordinance that seeks to restrict mangrove harvesting and exploitation.

4.4.0 COMMUNITY INSTITUTIONAL AND ORGANIZATIONAL ARRANGEMENTS

The following section focuses on the tradition of collective action, attitudes towards collective action, and responsibilities for coastal resource management and decision-making in the village of Cogtong. Included in the analysis is the evolution of property rights and rules, and opinions on rule breaking. Additionally, insights into the actual monitoring and enforcement of coastal resource management related rules are presented.

4.4.1 TRADITION OF COLLECTIVE ACTION

Cogtong does not have a very rich tradition of collective action at the village level. The first village level organization in Cogtong was the Parents' and Teachers' Association (PTA). Present since the 1970s, the PTA is directed at improving school-related activities

An organization dedicated to environmental protection was however formed in 1984. The group was called COMAGCO and strove to protect mangroves and rehabilitate the fishery, both of which were subject to intense and destructive harvesting pressures. The catalyst in forming the organization was Mr. Gulle. Originally a resident of Barangay Cogtong, Mr. Gulle moved to General Santos City in Mindanao to work for the Development Bank of the Philippines in the Planning Division. Upon retiring, Mr. Gulle, who had gained much environmental knowledge, returned to Cogtong and witnessed the dismal state the coastal resources were in.

Mr. Gulle was able to rally support and formed COMAGCO. Members consisted mainly of residents from Cogtong, but also included some residents from the neighbouring coastal barangay of Panas. The main actions of COMAGCO were directed towards protecting the mangroves and fishery. In one instance the group discovered that a fishpond was being constructed in one of the mangrove areas protected under Presidential Decree 2151/2. COMAGCO reported the information to the Municipal Council who stopped the construction. The Philippine National Police (PNP) supported COMAGCO by giving members the authority to arrest anyone using illegal harvesting practices.

Barangay officials as well lent support to the group by giving travel allowances for members to attend court hearings. COMAGCO disbanded in 1988 when Mr. Gulle, the president as well as founder, returned to General Santos City without appointing a successor.

The CMMRCRM was implemented in Cogtong Bay in 1989 with community organizing as one of the four main project components of the CMMRCRM. As such, PAGAMACO was formed and officially registered with the Department of Labour and Employment in 1989. As part of the community organizing component of the CMMRCRM, a municipal-wide United Federation was also proposed. Although the idea succeeded in Mabini, the idea never materialized in Candijay. There were only two FAs in Candijay, both of which had internal leadership problems. The original membership of 58 individuals was divided into three groups. The groups, which were not mutually exclusive, included mangrove planters (44 members), artificial reef cooperators (28 members) and mariculture cooperators (22 members). The overall objective of the association was to rehabilitate and protect the coastal resources of Cogtong Bay.

Individuals involved with rehabilitating the mangroves collected and planted propagules on lands assigned to them. Artificial reef adapters helped in the construction and setting of artificial reefs. Members involved with mariculture built structures to facilitate oyster production. Association members also attended seminars, joined in enforcement efforts and helped with information campaigns. PAGAMACO however, did not form a cooperative of any type. Unofficially, the association disbanded a few months after the CMMRCRM staff left. Officially PAGAMACO remained as a registered organization with the Department of Labour and Employment. PAGAMACO became active again at the barangay level 22 February 1997 with the help of the Bohol Resource Management Development Organization (BOREMADEV) and now has 71 registered members. The association has recently applied to the Barangay Fisheries and Aquatic Resources Management Council (BFARMC) for a 50-hectare reforestation contract.

Other village-based organizations were initiated after the CMMRCRM. The St. Joseph Multi-Purpose Cooperative existed from 1993-94 during which time a store was operated. The store was not successful and the cooperative was discontinued.

Another cooperative has recently been formed as a joint effort of residents in Cogtong and Panas called the Candijay Multi-purpose Co-operative. The group has purchased a fishing boat for all members to use and are involved with other livelihood strategies.

A youth group exists to help the youth of the barangay to develop into people of good moral character. Religious organizations also abound to promote the Catholic Way of life.

All of the village-based groups just mentioned were formally organized. No informal groups function in Cogtong.

4.4.1.1 Values of Collective Action

Current Membership in Village Organizations

A survey of 54 respondents in July 1997 indicates that 46 percent belong to a fishers' organization (PAGAMACO) and 26 percent to civic and religious organizations. The rest (28%) are not affiliated with any association at all.

As perceived by the respondents, the purposes of PAGAMACO are varied: 1) improve the condition of coastal resources and prevent resource destruction (17%); 2) provide information on fishing (17%); 3) foster unity among members (13%); 4) stop illegal fishing (9%); 5) increase fish catch/stock (6%); and 6) help develop the community (6%). These are congruent with the declared purposes of the association. Lower frequency responses include: plant mangroves, help the less fortunate, and promote oyster culture. About 39 percent were unable to cite any purpose, none of whom were PAGAMACO members.

Attitudes Toward Association Leadership and Decision-Making. Most PAGAMACO members have a positive regard for their association leader, perceiving the leadership not only as very respectable (74%), but also very credible (89%). The leadership may also be described as legitimate, having been elected by the members themselves. With regard to actual decision-making within the association, the majority (96%) perceived the decision-making process as democratic and participatory, marked by consultation and election to arrive at major agreements.

Attitudes Toward Collective Action. Based on the survey of 54 respondents, inclusive of PAGAMACO members and non-members, the attitudes toward collective action are positive. About 98 percent of the respondents expressed that the people in the village could work together to solve community problems (Table 10). In fishery, around 89 percent felt that village fishers could work together to address fishery problems. Similarly, they felt that mangrove growers could work together to solve mangrove-related problems (94%). These responses are encouraging since mangroves and fishery are part of a mutually supportive ecosystem. Many fishers (80%), moreover, mentioned that both the government and the fishers should work together to solve fishery problems, indicating a positive attitude toward fisheries co-management.

Table 10. Attitudes Toward Collective Action: Cogtong

Attitude	% Member	% Non-Member	% Total	X ²	p
The community can work together to solve village problems	100.0	96.0	98.0	1.01	0.312
Mangrove growers can work together to solve mangrove problems.	88.0	100.0	94.0	3.17	0.074
Fishers can work together to solve fishery problems	89.0	89.0	89.0	0.00	1.000
The government and the community can work together to solve fishery problems	93.0	67.0	80.0	5.97	0.050
N	27	27	54		

Attitudes Toward the Distribution/Sharing of Responsibility for Fisheries Management. When the respondents were asked about the extent of sharing responsibility for resource management, the majority (74%) expressed that the government and the fishers must have equal responsibility (Table 11). The rest (26%) opted for a less equal sharing. Among these respondents, about 17 percent are in favor of giving more responsibility for fisheries management to the government while 9 percent expressed otherwise. Overall, there is a relatively strong support for co-management.

Table 11. Attitudes Toward Responsibility Sharing for Resource Management: Cogtong

Attitude	% Member	% Non-Member	% Total	X ²	P
				0.38	0.53
The government will have most of the responsibility for resource management while the fishers will have relatively less.	11.1	22.2	16.6		
The government and the fishers will have equal responsibility.	77.8	70.4	74.1		
The government will have less responsibility while the fishers will have most of the responsibility.	11.1	7.4	9.3		
N	27.0	27.0	54.0		

Willingness to Support a Similar Project in the Future. A fairly high percentage of the respondents (76%) indicated a willingness to support a similar project in the future. The response of members and non-members is similar in this regard ($X^2=2.53$, $p>0.05$). The finding is encouraging in light of project accomplishments at the site and the painstaking efforts pursued by ACIPHIL and Network Foundation.

When asked about the types of fish and quantity of fish (multiple response) that they are willing to contribute per year to a similar project in the future, 66 percent of the respondents expressed that they are willing to give small and large pelagics. Others would contribute demersals (48%) and crabs (7%). For small pelagics, whose price is relatively cheaper at about 21 pesos per kg, the predominant quantity involved is more than five kg. For the more expensive large demersals costing about 42 pesos per kg, the amount of fish to be donated is around one to five kg per year.

4.4.2 DECISION-MAKING AT THE VILLAGE LEVEL

At the village level, a Barangay Council consisting of ten members conducts formal decision-making. On the council are representatives from each sub-village who are elected by the sub-village constituents for a term of three years. A Barangay Captain, elected by all barangay residents also for a three-year term, heads the Council. The Barangay Council has the authority to pass ordinances on the coastal resources and to enforce laws within barangay boundaries.

Before the CMMRCRM, the Cogtong Barangay Council took preventative measures to discourage illegal fishing such as increased vigilance of the types of fishing practices each boat was using and reporting any wrongdoing to the Municipal Council for formal action. The Municipal Council has the authority to conduct an investigation and refer the case to the Provincial Court if enough evidence was found.

However, the Barangay Council was not very active in managing mangroves. On rare occasions when illegal cutters were caught, laws were not enforced. The Barangay Captain was responsible for conducting an investigation and forwarding the case to the Municipal Council if enough evidence was found. However, perhaps because of the lax enforcement policy of the Municipal Council, the barangay captain seldom conducted preliminary investigations. Once the project began, however, residents were informed an investigation would be conducted, and if the available evidence warranted legal action, the case forwarded to the Municipal Council. In actuality, the situation was that the cutters were apprehended by the foot patrol and warned that they must not cut illegally anymore. If caught again, charges of the first and second offense would be forthcoming. There were no repeat offenders. Stricter enforcement was also accompanied by information campaigns conducted by the Barangay Council on the importance of mangroves.

Barangay involvement in coastal resource management was not limited to more strict enforcement. When the project was proposed, Council members went door to door to encourage people to join PAGAMACO. Barangay ordinances were passed to prohibit

purse netting where mangroves were planted. The council also listened to the concerns of the people and proposed solutions. For example, the recognition of a communal area so the firewood gatherers' livelihood was not extinguished.

The Barangay Council in Cogtong joined with three other Candijay Barangay Councils in 1994 to form the United Barangay Federation (UBF). During the first meeting, the UBF resolved that all of Candijay waters be redefined as a marine reserve area and also called for all fishing within municipal waters to be restricted three days before and three days after the spawning season. However, the Barangay Councils do not have the necessary judicial power to approve such resolutions. The resolutions were rather intended as a message to the Municipal Council. The UBF has also continued to request the national government to convert abandoned FLA areas into timberland. Since PAGAMACO's rebirth, the UBF has also worked together with the FA to lobby Municipal Council for stricter environmental laws.

4.4.3 DECISION-MAKING AT THE MUNICIPAL LEVEL

Before the CMMRCRM, the participation of the Candijay Municipal Council in mangrove management was minimal. With the implementation of the CMMRCRM, the situation changed. Before, there was no monitoring of illegal cutting and no imposition of penalties. Confusion prevailed on who was responsible for enforcing mangrove laws in Candijay. The following account is drawn from excerpts of the minutes of the Candijay Municipal Council meeting on 31 July 1972. The vice-mayor reported that a boat full of firewood was not apprehended by the Philippine National Police (PNP) and that he had requested the Chief of Police to appear at the meeting for an explanation. Both the Chief and a patrolman were present during the Council meeting. The patrolman explained that he apprehended the boat, but the Chief of Police ordered him to release the boat instead. The Chief then explained to the Council that only the Bureau of Forest Development (BFD) could apprehend illegal cutters.

The Municipal Council was more involved with managing the fishery. Beginning in the early-1980s, more and more restrictions were placed on the fishery. Monitoring was lax

however because there was no boat to patrol the municipal waters. Penalties were imposed whenever the Coast Guard caught violators.

Once the project began, the Candijay Municipal Council lent moral and material support. The mayor attended some of the project's early meetings and encouraged people to join. The Council also deployed the municipal agriculturist to lend expertise and help in troubleshooting. The Council helped the CMMRCRM staff build an office and dorm by donating a lot where the former town market had been destroyed by a typhoon, along with lumber and galvanized iron sheets for construction. To support enforcement efforts the Municipal Council provided police officers and for seven months (until the project was able to procure an engine) provided an engine for the CMMRCRM motorboat. Informal agreements, such as the agreement in 1991 permitting cutting in communal areas but restricting sale outside the community were also adopted to facilitate the smooth operation of the project.

After the CMMRCRM contract concluded, the Municipal Council ceased to support the *Bantay Dagat*. During the project, the Municipal Council provided police to aid in the patrol. Once the CMMRCRM ended, there were no more funds to finance the *Bantay Dagat* and the patrol stopped. However, the Municipal Council became more active in passing ordinances directed towards managing coastal resources more sustainably. Operating any form of destructive fishing gear was banned in Candijay waters in 1994. Two years later a closed season was established for *Sauranan Sa Danggit*. A fish sanctuary at the Islet of Tabong Dio Cogtong was also established in 1996.

The Municipal Council, both during and after the CMMRCRM, also promulgated many resolutions. For example, during the projects' life span the council requested President Aquino to cancel three FLAs and asked the authorities of the BFD and Bureau of Fisheries and Aquatic Resources (BFAR) to reject any applications for fishponds within the municipality. An urgent petition was also sent to President Aquino to "...help the residents of Candijay recover a substantial means of livelihood by restoring to them the beneficial use and enjoyment of the mangrove swamp areas..." abandoned by FLA

owners. Further, a request was made to BFAR to detail a fish inspector to Cogtong to identify and confiscate illegally caught fish. The results of these actions were the cancellation of the FLAs held by Jaime Borja, Toradio Tecson and Jose Martier. President Aquino forwarded the request of having abandoned FLA areas converted to timberlands to the DENR, but no action was taken. BFAR deployed a fish inspector which helped to diminish the trade in illegal fish.

Once the CMMRCRM concluded, the Municipal Council continued to request for assistance in managing coastal resources. Requests were made to the Provincial Governor to allocate a motorboat for a seaborne patrol and to the Commandant, Chief Superintendent, and Director of the Philippine Coast Guard to assign a navel attachment to Barangay Cogtong to deter illegal activities. No navel attachment was ever sent.

The Provincial Governor, moreover, was unable to give a new patrol boat. Consequently, the Cogtong Barangay Council took the initiative to repair the boat purchased by the project after it was formally turned over to them by the DENR. At present, the boat is being used to patrol the coastal waters. A memorandum of agreement between the Council and the DENR allows DENR to use the boat when needed.

Outside of requests for help, the Municipal Council also continued to demonstrate support for the ideals the CMMRCRM implemented. PNP members were officially recognized for a job well done when apprehending illegal fishers and cutters, and the Council officially refused a request of fishpond operators to title their land.

4.4.4 PROPERTY RIGHTS AND RULES

Excluding the areas of traditional use in Barangay Cogtong and concession licenses, property rights over the mangroves have been non-existent (open-access). Local residents as well as cutters from abroad in large boats could harvest without limits and not be concerned with government intervention. Cutting areas were determined by first come first served. The first issuance of CSCs in 1984 and the subsequent large-scale implementation of CSCs during the CMMRCRM changed the property rights structure.

Within the boundaries of the CSC, the mangrove stewards can restrict access and withdrawal. CSC holders have “the right to peacefully possess and cultivate the land and enjoy its fruits.” They are entitled to harvest the mangroves, provided they replant the trees. They can also limit the entry of outsiders to their areas. The CSC lasts for 25 years, but is renewable afterwards.

Outside the boundaries of the CSCs, and even within some of the land area held under CSC, the property rights picture is ambiguous and still being contested as FLA operators continue to try and exert their privileges. Where CSCs and FLAs both exist, the area thus far has been legally recognized as private property for the CSC holder. For an example, the reader is directed to the Marcelo case study in chapter five where a discussion is found in section 4.5. The example is germane to Cogtong’s situation because the decisions are above the barangay and municipal levels.

Areas not bounded by CSC but subject to FLA seem to be moving towards a communal property ownership. Dating back to the CMMRCRM, and continuing until present day, village residents have petitioned the national government to recognize the rights of residents versus the FLA operators’ privilege. The petitions ask FLAs be canceled and re-defined as communal swampland. The local residents argued that the 1987 Constitution recognizes “the rights of subsistence fishers, especially of local communities, to the preferential use of communal marine and fishing resources, both inland and offshore.” FLAs only grant the holder the privilege to develop the land into a fishpond. Therefore, residents claim that their rights exceed the privilege of fishpond operators. Some FLAs, such as those granted to Jaime Borja, Toradio Tecson and Jose Martier, have been cancelled based on this argument.

Fishery. Traditional rights and tenure do not exist. Except for the area covered by the recently established fish sanctuary at Tabong Dio Cogtong, open access prevails. Management rights exist for all fishers in the village. The Municipal Council can grant exclusive fishery privileges to operators of fish corrals and mollusk beds in municipal waters outside of the fish sanctuary.

4.4.4.1 Property Rules

Many rules exist that govern the behavior of fishers: operational, collective choice, and constitutional rules. Operational rules, which govern and regulate resource use, directly affect day-to-day decisions made by the fishers on where, when and how to harvest fish (Ostrom 1991). The rules also identify who should monitor the actions of others and how, and what rewards and sanctions are assigned to certain actions. Operational rules may be formal (written/legitimized) or informal (unwritten/traditional). In Cogtong, operational rules may be classified into: 1) boundary rules (who can enter the resource area); 2) allocation rules (actions or procedures for harvesting); 3) scope rules (specification of the characteristics of the resource that can be harvested); 4) aggregation rules (procedures in decision-making that involve multiple individuals); 5) penalty rules (punishment for non-compliance); and 6) input rules (requirements from resource users in terms of time, money and/or materials for management and participation). Examples of these rules are provided in the following section.

Formal Operational Rules. Formal operational rules in Cogtong are largely embodied in local ordinances, national legislation, CSC contracts, and other legal instruments. For instance, the Municipal Council requires fishers to secure fishing permits before they can fish in the municipal waters. This represents a boundary rule. Legal mangrove cutting, likewise, is limited to holders of CSCs and to holders of cutting permits from the DENR. Formal allocation rules ban destructive gear and practices, such as dynamite fishing, use of cyanide or other strong poisons, use of fine mesh gillnets (below 3 cm), deployment of commercial fishing boats in municipal waters, and scaring fish. A local ordinance enacted in 1984 also prohibits any person from operating *Liba-liba* (Danish seine) within seven kilometers from the shoreline.

Scope rules pertain to the ban on catching and selling gravid *siganid* since 1981. A closed season was declared in 1996 within the area of the *Sauranan sa Danggit* (rabbitfish spawning area), as stipulated in Municipal Ordinance 12-87, to ensure rabbitfish reproduce. Aggregation rules require PAGAMACO members to hold dialogues and meetings before endorsing a resolution formally to the *Barangay* Council.

In turn, the Village Council forwards the resolution to the Municipal Council for deliberation and legal action. Village assembly meetings are convened for issue clarification and consensus building, with the active participation of village and municipal officials. Penalty rules also exist in Cogtong. Violations of fishery rules call for a fine or imprisonment of not more than six months, or both. Input rules refer to the mandatory payment of membership fees by PAGAMACO members to support the association's operations, apart from helping report rule violations.

Informal Operational Rules. Informal rules also exist in Cogtong, both for fisheries and mangroves. Entry to the fishing ground is on a first come-first served basis (boundary rule). During fishing operations, fishers are required to deploy their fishnets with care so that they do not get entangled with other nets (allocation rule). When constructing fish corrals, fishers also observe a distance of 200 meters between fish corrals (allocation rule). For mangroves, CSC holders grant other coastal resource users permission to enter their mangrove area (boundary rule). In the communal mangrove area, firewood gatherers are not arrested for cutting trees, provided they plant a propagule for each tree cut.

Collective Choice Rules. Collective choice rules define how rules are made and enforced. This set of rules are used by resource users, officials or external authorities in making decisions about how the resource should be managed. For example, these rules state what proportion of the group must agree before a rule may be adopted or what methods will be used to monitor and enforce compliance with the stated rules (Ostrom 1991). Accordingly, because the CMMRCRM was a co-management project, both the government and local resource users have collective choice rules. Of critical importance are the arrangements for monitoring and enforcing compliance with the operational rules and for settling disputes.

The DENR's Forest Management Bureau (FMB), formerly known as the Bureau of Forest Development, has legal jurisdiction over mangrove areas. Therefore, government collective choice rules relative to the mangroves are vested within the act that established

and described the operation of the FMB. Responsible for reporting violations of fishery laws in Cogtong are members of the government-deployed sea patrol (*Bantay Dagat*) and PAGAMACO members. Assisting them are other law enforcement officers who apprehend illegal fishers. Arrangements for settling disputes involve the conduct of hearings by the barangay captain and the municipal mayor before legal cases are elevated to the court.

The newly re-organized PAGAMACO has yet to pass any association rules governing coastal resources, however the PAGAMACO constitution details the collective choice rules which must be followed. The meeting must be legal, meaning at least fifty percent of the members are present, and for a proposal to be accepted, a majority vote is needed. If however existing PAGAMACO rules are to be changed, a quorum of eighty percent must vote in favour of the change.

Monitoring of PAGAMACO rules are simply done by members. Rule breakers are subject to fines. Persistent rule breakers are expelled from the organization. For example, if an individual fails to attend a meeting, a fine of P25 is imposed. A member is asked to leave the organization if three consecutive meetings are missed. Disputes are settled by vote during the general assembly. As an illustration, if an individual is of the opinion that the fine of P25 is too much or not warranted the issue can be raised and voted on during the general assembly meeting. Due to the short time the reactivated PAGAMACO has functioned (since Feb 1997), not many collective choice rules have been established. Further, no instances of rule-breaking and conflict resolution have occurred.

Constitutional Rules. Constitutional rules determine the types of rules which are permissible and who has collective choice rights (governance and modification) (Ostrom 1991). Therefore, constitutional rules define who is eligible to participate in the process of rule formation, monitoring and enforcement. Again, two sets of constitutional rules exist in Cogtong Bay. The first set is embodied within the Local Government Code,

Fisheries Decree of the Philippines and other related national legislation enacted by the government (for further discussion see section 1.1.1 of this chapter labeled "boundaries").

The second set of constitutional choice rules is associated with PAGAMACO. Although the FAs have not passed any mangrove or fishery-related rules as of yet, the association does have formal rules stipulating the process for passing rules. All members of PAGAMACO can be involved in the association's process of rule formation. To be a member of PAGAMACO, the individual must possess several characteristics. The individual must: be a resident of Barangay Cogtong; a coastal resource user; not be addicted to vices; pay a one time membership due of P5; monthly dues of P5; attend an orientation seminar given by existing members; and, receive seventy percent of the votes by existing members to accept the applicant. Any member may propose a new idea at the general assembly meeting held the first Saturday of every month. A discussion follows if consensus is not immediate. After the discussion, there is a vote (public) and majority rules. For a meeting to be legal, the quorum must be fifty percent.

Although decision-making powers are distributed to all organization members, four committees exist which are responsible for presenting ideas on different facets of the organization. The four committees are: education; project management; finance; and, an audit and inventory committee. These committees make and send reports to the Board of Directors. The Board may either endorse/present the idea for vote to the general assembly, or to reject the idea. The Board of Directors is composed of five officers: secretary; treasurer, auditor, vice-president; and, the president. The officers are elected through secret ballots for a term of one year. Elections are conducted during the general assembly meeting the second week of December. At least eighty percent of the members must be present to have a legal election.

Knowledge of Fishery Rules. A survey of 54 fishers in Cogtong in July 1997 indicated that the fishers are aware of fishery-related rules, particularly those embodied in local ordinances and national laws (e.g., formal rules). Based on multiple responses, the most frequently mentioned formal rules are: 1) prohibition of illegal fishing (85%); 2) ban on

the use of fine mesh nets (6%); and, 3) ban on commercial fishing within 15 kms from the shoreline (2%). About 19 percent expressed that they do not know any fishery laws. Most fishers, likewise, understand the reasons behind these fishery laws. The major reasons cited are to protect marine resources/improve coastal resource conditions (59%), increase fish stocks (18%), allow fish juveniles to mature (13%), and avoid conflicts between municipal and commercial fishers (2%).

For informal rules, some fishers cited the maintenance of a 200-meter distance between fish corrals, first come-first served basis when entering the fishing grounds, avoidance of tangled nets during fishing operations, and imposition of sanctions on violators. The majority (82%) of the respondents were unable to cite any informal fishery rules.

Knowledge of Mangrove Rules. Most respondents expressed that mangrove cutting is formally prohibited in certain areas (67%), while 33 percent are not aware of any rules at all. The reasons cited for such existing rules include the need to preserve/increase mangrove stands (46%) and to increase fish catch (17%). These reflect a basic understanding of the relationship between mangroves and fishery.

Attitudes Toward Rules. The respondents generally felt that rule breaking is not acceptable (67%), inclusive of members and non-members alike. For about 18 percent, rule breaking is sometimes acceptable. About 15 percent neither agreed nor disagreed. For those who find rule-breaking unacceptable, several reasons were given (multiple responses): 1) people must learn to obey rules (39%); 2) rule-breaking will encourage others to violate the law (28%); 3) fear of imprisonment (13%); and 4) rule-breaking will damage the resources (11%). The rest did not cite any reason.

For those who felt that rule breaking is sometimes acceptable, the reasons are basically linked to immediate survival needs. About 15 percent stated that the family's needs are more important. Another seven percent mentioned that rule breaking is sometimes acceptable if it benefits the majority.

When the respondents were asked if the rules on fish harvesting must be changed, 53 percent agreed while 33 percent disagreed. The rest (14%) were neutral. For those who agreed, enforcement is perceived as weak and stricter measures are imperative. They felt that illegal fishing methods are still prevalent, enforcement is lax, and the destruction of coastal ecosystems has continued. For those who disagreed, they felt that the rules are effective and that they help prevent conflicts among resource users.

When asked if the rules on mangrove cutting/harvesting should be changed, most respondents (63%) agreed, twenty percent disagreed, and the rest were neutral (17%). Some respondents are dissatisfied with existing laws on mangrove cutting due to: 1) declining mangrove stands (37%); 2) lack of involvement of the local government (19%); 3) lack of mangrove management (19%); 4) lax enforcement (11%); 5) decreasing fish catch (9%); and 6) political interference/influence (2%). Reforms are needed in these areas.

4.4.5 MONITORING AND ENFORCEMENT

Monitoring and enforcement has a different history for each time period: before the CMMRCRM; during the CMMRCRM; immediately after the CMMRCRM; and now. Before the CMMRCRM, monitoring and enforcement was lax. There was no patrol of mangrove areas as the PNP did not enforce the cutting laws on their own initiative. When the PNP did respond to complaints, violators were just told to stop but no penalties were imposed. Illegal fishing activities were dealt with more severely. If violators were caught, fines, and sometimes penalties (e.g. jail) were enforced. However monitoring fishery rules was rare as the municipality did not own a motorboat.

Once the CMMRCRM started, monitoring efforts were intensified. A *Bantay Dagat* and foot patrol were initiated. For the *Bantay Dagat*, the Municipal Council provided enforcement officers and, for seven months a boat and engine. The CMMRCRM supplied a boat, money for gas, and a boat crew. PAGAMACO members also joined the *Bantay Dagat* that coordinated efforts with the *Bantay Dagat* being operated out of

Mabini. The foot patrol included CMMRCRM staff, DENR staff and PAGAMACO members.

Accompanying a physical presence to discourage illegal fishers and cutters, the policies of the Barangay and Municipal Councils on enforcement became stricter. Offenders were no longer merely told to stop. If illegal cutters were apprehended, the culprits were usually warned and made to sign a promise to stop illegal cutting. If the same culprit was caught again, the offender would be tried for both the first and second offense. Only two illegal cutters were caught by the foot patrol in Cogtong. Neither offender was caught again so no formal action was taken.

Penalties on illegal fishers continued to be imposed in most cases. Some first time offenders, mostly purse net and beach seine fishers because they are relatively poor, were released only with a warning if they promised to stop the illegal activities. Equipment of other illegal fishers such as blast fishers and commercial fishers had their fishing equipment impounded until a fine was paid. Only two formal arrests were made during the CMMRCRM, both for blast fishing. The two arrests did however, prove sufficient to drastically reduce illegal fishing in Cogtong Bay (The Network Foundation 1990).

Information campaigns were also conducted. The Municipal Council, Barangay Council, CMMRCRM staff, and PAGAMACO members were all involved in explaining the importance of mangroves and new enforcement policies.

Immediately after the completion of the CMMRCRM in 1991, the sea patrol also stopped because no one would pay for the gas. Illegal fishing activities soon returned to Cogtong Bay. The foot patrol also disbanded without the CMMRCRM and DENR staff to coordinate the efforts. CSC holders monitored their titled lands on an individual basis. The boat procured by the project was turned over to the DENR.

The present day situation is still different. Since 1995, the sea patrol has again been functioning. The Cogtong Barangay Council repaired the CMMRCRM boat eventually

returned by the DENR. Now the patrol goes out from seven in the morning to four in the afternoon about three times a week and is completely funded by the Municipal Council. Three men, a police officer, driver, and any other municipal employee go on the patrol. The *Bantay Dagat* program was re-started after the Municipal Council funded a *Bantay Dagat* seminar. However, the mayor, for unknown reasons, refused to deputize any graduates as fish wardens for a *Bantay Dagat* program. As a compromise, the mayor instead initiated the sea patrol using municipal employees whom many local residents suspect of being corrupt. However, during the Municipal Council meeting held the final week this research was being conducted, the Municipal Council had again officially requested the mayor to deputize graduates of a fish warden seminar and endorse a *Bantay Dagat* program.

Today, illegal cutting is still a problem to CSC holders in Barangay Cogtong. However, the large boats have almost completely stopped coming to cut mangroves. Local residents today do almost all (90-95%) the illegal cutting.

4.4.5.1 Recorded Violations

No records exist of the warnings issued to illegal cutters and fishers, but records from as far back as 1958 document incidents where the Municipal Council took formal action. No records documented offenses by barangay, therefore violations are reported for all of Candijay. A sample of recorded violations were taken from the years 1958, 1960, 1970, 1975, 1980, 1985, and 1988-1997. A recorded violation does not consider the number of actors. If, for example, five people in one boat were apprehended for illegal fishing, only one violation is recognized. There were 25 instances of official action by the Municipal Council during the sample years. For the years before the CMMRCRM there were six violations. Dynamite fishing accounted for two violations (33%). Illegal possession of dynamited fish, illegal possession of explosives intended for fishing, fishing using a bow and arrow without a bow and arrow license and, cutting without a municipal permit each represent 17 percent of the recorded violations (only one recorded instance each). The illegal cutting charge was from 1960 before the DENR mandated a DENR license instead of a municipal license.

During the project, there were only three recorded violations. Illegal possession of explosives intended for dynamite fishing accounted for two (66%) and illegal possession of dynamited fish the other instance (33%). Only one of the cases charged with possessing explosives was forwarded to the provincial court. The other was not processed due to a lack of evidence.

Seven years after the CMMRCRM, sixteen violations have been recorded. Illegal fishing with methods other than blast fishing represents one half of the violations (eight in total). Four violations (25% of total) of Section 68 of Presidential Decree 705 requiring a license to cut, gather or collect timber were also reported. Blast fishing (19% or three instances) and illegal possession of dynamited fish (6% or one instance) are the remaining violations on record.

4.4.5.2 Current Perceptions of Rule Enforcement and Violations

Based on multiple responses, the most commonly violated rules involve dynamite fishing (98%), sodium cyanide fishing (46%), entry of commercial fishing boats in municipal waters (32%), use of fine mesh nets (13%), and beach quarrying (4%). Multiple responses indicate that the violators came from the village (59%) and from other areas within Candijay (57%). The rest came from other towns (20%).

In terms of rule enforcement, the respondents stated that sanctions are imposed on the violators. Based on multiple responses, violators are arrested (65%), warned (39%), fined (35%), and jailed (32%). Around 19 percent cited that no action was taken on violators. Thus, enforcement is perceived to be wanting in some cases. Only 56 percent of the respondents were satisfied with rule enforcement. About 39 percent were dissatisfied, and the rest were neutral.

On the responsibility for enforcing fishery rules and regulations in Cogtong, 76 percent of the respondents felt that the government and fishers are responsible for actual law enforcement. Thus, a partnership between the government and fishers appears to be felt.

Table 12. Actual Responsibility for Enforcing Fishery Rules and Regulations: Cogtong

Responsible Unit	% Member	% Non-Member	% Total	X ²	P
Government and fishers	70.4	81.5	75.9		
Government only	14.8	18.5	16.7		
Fishers only	14.8	---	7.4		
N	27.0	27.0	100.0	4.23	0.12

4.5.0 EXTERNAL INSTITUTIONAL AND ORGANIZATIONAL ARRANGEMENTS

The following section highlights the delivery of services to Barangay Cogtong by external organizations before, during and after the CMMRCRM. Also discussed are the provincial and national level decision-making arrangements.

4.5.1 SERVICES FROM EXTERNAL ORGANIZATIONS

Before the CMMRCRM, Barangay Cogtong did not receive many benefits from external organizations. The barangay was a recipient of a 1984 reforestation contract as part of the national governments' Integrated Social Forestry (ISF) program, but the community problems of illegal cutting and fishing as well as the FLA-related problems were largely ignored.

During the CMMRCRM, both Candijay and Mabini began to receive services from external organizations. ACIPHIL Inc. and the Network Foundation, under a DENR contract implemented the CMMRCRM. Services the CMMRCRM brought were community organizing, mangrove rehabilitation, artificial reef construction, mariculture and, law enforcement. USAID and the Government of the Philippines funded the project. Associated with the project, new institutional support was provided by the Municipal Council through the passage and enforcement of laws aimed at better coastal resource management.

Services since the CMMRCRM concluded have come from various organizations. The Provincial Agriculture Office, in collaboration with the Department of Interior and Local Government, and the Municipal Government of Candijay conducted a *Bantay Dagat* training seminar July 1995. The Bohol Resource Management Development Organization (BORMADEV) helped re-organize PAGAMACO in February 1997 so the organization could apply for a 50-hectare reforestation contract. BORMADEV also conducted seminars and training on Coastal Resource Leadership as well as providing information on the environmental effects of various fishing techniques.

4.5.1.1 Decision-Making Arrangements

The provincial government of Bohol is not directly involved in managing the coastal resources of Cogtong Bay. As a provincial government, neither the mangroves nor the fish resources lie within their jurisdiction.

The national government has had more of a role in coastal resource management in Cogtong Bay. During the 1970s, centralized government control over coastal resources was reinforced with Presidential Decrees (PD) 704 and 705. Popularly known as the Fisheries Decree of 1975, PD 704 revised and consolidated all fishery related laws and decrees in the Philippines. The decree defined the current boundaries for municipal and commercial fishing. Some of the most consequential sections of PD 704 stipulated the establishment of fish sanctuaries and fishing reservations; declaration of a closed season by area, gear, or species of fish; and, prohibition of illegal fishing such as the use of explosives, obnoxious substances, fine mesh nets, and electro fishing gadgets.

Likewise, PD 705, or the Forestry Reform Code of the Philippines was also issued in 1975 and served to centralize forestry decision-making at the national level. PD 705 merged the Bureau of Forestry, Reforestation Administration, Southern Cebu Reforestation Development Project, and the Parks and Wildlife office into one body called the Bureau of Forest Development (BFD). The BFD recognized that mangroves could not be effectively managed within the broader scope of forestry regulations. As

such, the Coastal Resources Management Committee (CRMC) was formed as a branch of the DENR to manage mangroves.

National level laws that have been passed complementing CMMRCRM activities and goals have stemmed from the CRMC. The most germane example being DENR Administrative Order Number 15 Series of 1990. Section four states the “Conversion of thickly vegetated mangrove areas into fishponds shall no longer be allowed”. The same section later calls for abandoned or undeveloped FLAs to revert to the category of forestland.

Also important in influencing national level decision-making was the new Philippine Constitution enacted in 1987 that further brought coastal resources under state control. The constitution declared that the exploration, development and utilization of natural resources, including aquatic resources are under the “...full control and supervision of the State”. Unlike previous constitutions, the 1987 Constitution articulated a marine resources development policy. The new constitution also limited exclusive use and development of marine wealth to Filipino citizens as the mandate of protection of communal marine and fishing resources extends to offshore fishing grounds of local fishers against foreign intrusion (UP-Local Government Center 1996).

4.5.2 OUTSIDE INFLUENCES ON LOCAL RESOURCES

A significant event affecting the population of Cogtong was the number of people that settled all throughout Cogtong Bay after W.W.II. However, because of the rich resources of Cogtong Bay the increased population alone was not a significant event relative to the history of coastal resources. Three particular events can be identified that had a more direct influence on the coastal resources. The first event was in 1965 when Dr. Lim moved to Barangay Cogtong from Iloilo and developed the first fishpond in the area. The introduction of fishponds has contributed to mangrove destruction even up to today. The second major exogenous event affecting the coastal resources of Cogtong was the arrival of commercial fishers in the late-1960s and commercial cutters in the early-1970s. The CMMRCRM project is identified as the third major exogenous event. PAGAMACO was

organized and illegal activities, due to the increased enforcement efforts, were drastically reduced during the project phase.

Figure 7. Timeline of Contextual Variables: Cogtong, Bohol

Period	1940s	50s	60s	70s	80-87	88	89	90	91	92	93	94	95	96	97
CONTEXTUAL VARIABLES															
• Biological, Physical and Technological Attributes															
Abundant mangrove resources	■	■	■	■											
Abundant fish resources	■	■	■												
Low-intensive, subsistence-based mangrove harvesting	■	■	■	■											
Low-intensive, subsistence-based fish harvesting	■	■	■												
Adoption of fishpond technology			■	■	■	■	■	■	■	■	■	■	■	■	■
Commercial mangrove cutting				■	■	■									
Commercial fishing			■	■	■	■	■	■	■	■	■	■	■	■	■
Widespread illegal fishing				■	■	■				■	■	■	■	■	■
Denuded mangroves				■	■	■									
Declining fish catch				■	■	■	■	■	■	■	■	■	■	■	■
Passage of Presidential Decrees 2151 and 2152 to establish mangrove wilderness and mangrove forest reserve areas					■	■									
Refusal of DENR to issue cutting permits to FLA holders							■	■	■	■	■	■	■	■	■
Replanting of mangroves					■	■	■	■							
Re-appearance of aquatic life around newly planted mangroves										■	■	■	■	■	■
Establishment of a fish sanctuary														■	■

Period	1940s	50s	60s	70s	80-87	88	89	90	91	92	93	94	95	96	97
• External Institutional and Organizational Arrangements															
Limited services from external groups	■	■	■	■	■										
Establishment of mangrove property rights						■	■	■	■	■	■	■	■	■	■
Issuance of FLAs (Fishpond Lease Agreements)			■	■	■	■	■	■	■	■	■	■	■	■	■
Issuance of Certificates of Stewardship Contracts (CSCs)					■	■	■	■	■	■	■	■	■	■	■
Cancellation of some FLAs							■	■	■	■	■	■	■	■	■
• Exogenous Events															
Introduction of fishpond technology from a neighboring province			■												
Arrival of commercial fishers			■												
Arrival of commercial mangrove cutters from other provinces				■											
Introduction and implementation of mangrove rehabilitation and coastal resource management by ACIPHIL, Inc. and Network Foundation							■	■	■						

4.6.0 INCENTIVES TO COOPERATE AND PATTERNS OF INTERACTION

Incentives to cooperate are found at various levels: 1) among resource users; 2) between government organizations (GOs) and non-government organizations (NGOs); and, 3) among resource users, GOs and NGOs. The incentives to cooperate have triggered certain interactions, both positive and negative that have influenced project results over time. Box 4 highlights the incentives and patterns of interactions at various levels.

Box 4. Incentives to Cooperate and Patterns of Interaction: Cogtong

Incentives to Cooperate	Patterns of Interaction
<ul style="list-style-type: none"> • Among Resource Users 	
Common reliance on coastal resources	Illegal fishing, commercial fishing, and illegal mangrove cutting → resource deterioration and conflicts among resource users → community organizing and information campaigns → stricter rule enforcement and recognition of property rights → support for resource management
Increased environmental awareness	Information dissemination on sound environmental management → involvement in resource management projects → recognition by village residents that positive action could be taken
<ul style="list-style-type: none"> • Among Government Organizations (GOs) and Non-Government Organizations (NGOs). 	
Desire for better coastal resource management	Issuance of national legislation in support of coastal resource management → creation by DENR of the Coastal Resource Management Committee
Concern for improving the quality of life of impoverished families who rely on coastal resources for livelihood	Design of a community-based resource management project patterned after the Central Visayas Regional Project (CVRP) → partnership between DENR and NGOs in implementing the CMMRCRM
<ul style="list-style-type: none"> • Among Resource Users, GOs and NGOs 	
Need to fight illegal fishing and illegal mangrove cutting	Joint effort to patrol the sea and land during the project phase → termination of <i>Bantay Dagat's</i> patrol operations after CMMRCRM completion → return of illegal fishing and cutting → recent collaboration between a newly elected municipal councilor and the fishers' federation (UBF) to give priority to environmental concerns → passage of more fishing legislation and reactivation of sea patrol → establishment of a fish sanctuary
Legitimacy of property rights	Monitoring and enforcement of required cutting permits and mangrove stewardship contracts → alienation of firewood gatherers → informal agreement between project staff, fishers' association, Municipal Council, Village Council, and firewood gatherers to designate communal areas for firewood gathering

4.6.1 AMONG RESOURCE USERS

Incentives for the resource users to co-operate originate in a common reliance on coastal resources for their livelihood. Beginning in the 1970s, the residents of Barangay Cogtong began to notice that the fish populations were decreasing. A combination of fewer mangrove stands surrounding the Bay, harmful fishing practices and over fishing reduced the productivity of the Bay's fishery. The decrease in fish catch was intensified by a need to feed a growing population.

Values of the village residents were also changing. COMAGCO's brief existence and the 1984 ISF reforestation project had helped heighten environmental awareness. Residents were now prepared to act to help manage coastal resources so the situation was ripe for community involvement when the CMMRCRM was proposed. Local resource users welcomed and eagerly participated in the CMMRCRM. The results of such cooperation were that most local residents agreed to recognize the establishment of property rights over previously open access mangroves. Resource users also volunteered time and effort to help curtail illegal fishing and cutting activities.

4.6.2 AMONG GOVERNMENT ORGANIZATIONS (GOs) AND NON-GOVERNMENT ORGANIZATIONS (NGOs)

Involvement of the DENR, ACIPHIL Inc., and the Network Foundation in the implementation of the CMMRCRM mangrove rehabilitation project was motivated by three factors. The factors were to: 1) gain experience in the design and implementation of a community-led, NGO-assisted coastal resource management project; 2) validate the Central Visayas Regional Project (CVRP) learning's in coastal resource management, and; 3) develop and test other new approaches to mangrove management.

ACIPHIL's earlier experience with the IBRD-assisted CVRP, where it extended technical assistance to the project, provided the driving force to expand to other areas and promote/refine tested approaches. The Network Foundation (TNF), a development-oriented organization primarily concerned with poverty alleviation and environmental protection, continued the work of ACIPHIL in Cogtong Bay after September 1991. A

stated goal of TNF is to improve the quality of life of impoverished families who rely on communal resources for livelihood (Janiola 1996).

ACIPHIL and TNF, together with the authority-wielding DENR, sought to establish legitimate property rights over the Bay's mangrove areas. The DENR issued CSCs to mangrove growers, providing a legal instrument for assuring tenurial security for mangrove areas under their stewardship.

After the project, new incentives to cooperate continued to influence government level actions. Immediately after the project had ended, and lasting for a few years, the Candijay Municipal Council decreased support for coastal management activities. However, the Municipal Council has again become more involved with coastal resource management. Two main reasons can likely be attributed to the increased involvement. Immediately after the project, there were minimal illegal activities relative to fishing and cutting. However, as time progressed, more and more violators were returning to Cogtong Bay. Today illegal fishing is once more rampant in the Bay and the Municipal Council probably realized that the local government could no longer rely on the decreasing residual enforcement benefits of the CMMRCRM.

Secondly, a new member has been elected as a councilor in the Candijay Town Council. Marcos Delloso Jr., a graduate of the Bohol School of Fisheries was elected as a member of the Municipal Council in June 1992 and brought with him a desire to protect the Bay's coastal resources. Mr. Delloso has forged a strong political relationship with the United Barangay Federation to implement ordinances and activities directed towards sustainable harvesting. The result of the increased involvement has been the reorganization of a sea patrol and perspective implementation of a *Bantay Dagat* program (pending the mayor's approval of the Municipal Council's request). Also, positive steps towards managing coastal resources more sustainably, such as the establishment of a 20-hectare fish sanctuary, have resulted from the increased interest in coastal resources. The procurement of buoys and nylon materials started in 1997. The Council has also

requested the Provincial Commander of Bohol to station a navel detachment in Cogtong to assist in guarding coastal waters.

The Municipal Council additionally sought the services of the Bohol Resource Development (BOREMADEV) Foundation in organizing the Barangay Fisheries and Aquatic Resource Management Council (BFARMC), as well as in conducting coastal resource management training in 1996. As an offshoot of these activities, the BFARMC later came up with a resolution on coastal management and protection. BOREMADEV offered to strengthen PAGAMACO so the group could represent village fishers on issues that directly affect them.

4.6.3 AMONG RESOURCE USERS, GOVERNMENT ORGANIZATIONS (GOs) AND NON-GOVERNMENT ORGANIZATIONS (NGOs)

The traditional system of open-access worked well for the residents of Cogtong until the late-1960s when commercial fishers and cutters began to frequent the Bay to harvest and sell the coastal resources to larger market centers of Tagbilaran and Cebu. Cogtong Bay became a haven for both illegal fishers and illegal mangrove cutters in the 1970s because of the lack of enforcement of existing legislation, inadequate legislation, and open access nature of the coastal resources. Consequently, the traditional users of the Bay's resources became "losers" under the existing situation. The residents witnessed the exploitation of coastal resources by large-scale commercial fishers and cutters for sale to external markets. The commercial cutters and fishers left no benefits but instead contributed to environmental damage.

Local-level resource users wanted to cooperate with GOs and NGOs so that project implementers could receive formal property rights to mangrove areas. Without government recognition, such property rights could not be established. As well, the illegal activities within Cogtong Bay were so rampant that external interventions were needed to assist the under-equipped and under-funded efforts of the Municipal and Barangay Councils.

Though all of the actors wanted to cooperate, there were obstacles to implementing the project. Despite early enthusiasm of local resource users, and moral support from the barangay and municipal levels, village residents maintained a guarded skepticism of the project and were not immediately willing to volunteer their labour. Illegal cutting and illegal fishing were rampant in Cogtong Bay and the DA was continuing to issue FLAs. Many of the individuals involved with mangrove rehabilitation were discouraged from planting because either the trees would be cut down under an FLA; or if the trees survived long enough, illegally cut and sold in Cebu. Therefore the credibility of the project and of the government's political will were main obstacles in initiating project action.

To address the problem of conflicting government policy, the CMMRCRM staff aided the FAs in filing petitions to the DENR to not issue cutting permits for existing FLAs and to convert to communal swamplands, existing land held under FLA agreements that had not been cleared or was abandoned. Success was enjoyed from these actions as some FLA titles were canceled. The DENR assured the residents around Cogtong Bay that cutting permits for areas held under FLA title would no longer be issued. In effect, without a cutting permit, the trees on the FLA land could not be legally cut. This policy created conflicts between the FAs and DENR on one side, and the FLA holders on the other. The conflicts still exist today and have escalated to the point of armed security guards threatening to use deadly force to keep trespassers off FLA lands while workers clear the land. Today, village residents still resent the construction of fishponds, but there are no physical hostilities.

Working together, PAGAMACO members, project staff, and at times staff from government agencies were able to effectively diminish illegal activities within Cogtong Bay. The legitimacy provided by the government alongside enforcement efforts by project staff and project contributed to the prevention of more environmental damage during the project phase.

To deal with the problems of illegal activities CMMRCRM staff also became law enforcement officials organizing a sea patrol and foot patrol. PAGAMACO members joined both. The actions and dedication of the CMMRCRM staff in stopping fishpond construction and illegal fishing and cutting activities eased the members' doubts about the government's commitment to the project.

However, not all of the barangay's coastal resource users were happy with the project. When the CMMRCRM began, *de facto* rules on who could cut the mangroves changed. The law stating any cutting without a DENR permit was illegal, was now being enforced. The firewood gatherers complained that their livelihood had been taken away. An informal agreement was reached in 1991 between PAGAMACO, CMMRCRM, the Municipal Council, Barangay Council and firewood gatherers to leave some mangrove areas as open access. The firewood gatherers could harvest wood from these areas, but in turn, for every tree cut in the common area, a tree would have to be planted. Further, the wood that was cut could not be sold outside of Candijay. The compromise was suitable to all parties and has had fairly good operational success to date.

Figure 8. Summary of Contextual Variables, Major Events and Initiatives by Project Phase: Cogtong

Period	1940s	50s	60s	70s	80-87	88	89	90	91	92	93	94	95	96	97
PRE-PROJECT PHASE															
• Contextual Variables															
Abundant mangrove resources	■	■	■	■											
Abundant fish resources	■	■	■												
Low-intensive, subsistence-based mangrove harvesting	■	■	■	■											
Low-intensive, subsistence-based fish harvesting	■	■	■												
Denuded mangroves					■	■									
Declining fish catch				■	■	■									
Declaration of mangrove wilderness areas and mangrove reserve					■										
Market-oriented fishery				■	■	■									
Dependence on coastal resources	■	■	■	■	■										
Homogenous cultural groups	■	■	■	■	■										
Indifference to illegal cutting	■	■	■	■	■										
Open access to mangrove resources	■	■	■	■											
Open access to fishery resources	■	■	■	■	■	■									
Fragmented/unorganized resource users	■	■	■	■	■										
Issuance of the Fisheries Decree and Forestry Decree				■											
Limited services from external groups	■	■	■	■	■										
Introduction of fishpond technology			■	■	■										

Period	1940s	50s	60s	70s	80-87	88	89	90	91	92	93	94	95	96	97
• Major Events															
Arrival of migrants	■	■	■	■	■	■									
Construction of fishponds			■	■	■	■									
Presence of commercial fishers			■	■	■	■									
Presence of commercial cutters			■	■	■	■									
Issuance of Fishpond Lease Agreements			■	■	■	■									
• Incentives to Cooperate															
Common dependence on coastal resources	■	■	■	■	■	■									
Need to reverse the downward trend in fish yields/rising environmental awareness					■	■									
PROJECT PHASE															
• Contextual Variables															
Decline in illegal cutting							■	■	■						
Limited illegal fishing							■	■	■						
Active participation of PAGAMACO							■	■	■						
Mangroves replanted							■	■	■						
Strictly enforcement of mangrove and fishery rules							■	■	■						
Information campaigns							■	■	■						
Joint patrol of mangroves							■	■	■						
Joint patrol of Municipal waters							■	■	■						
Personal patrolling of mangroves							■	■	■						
Establishment of property rights over mangroves							■	■							
Local Government Code Passed									■						

Period	1940s	50s	60s	70s	80-87	88	89	90	91	92	93	94	95	96	97
• Major Events															
Refusal of DENR to issue cutting permits for fishponds							■	■	■						
Cancellation of some FLAs							■	■							
Alienation of firewood gatherers									■						
Informal agreements restoring firewood gatherers' livelihood															
• Incentives to Cooperate															
Legitimacy and relevance of property rights							■	■	■						
Desire for better coastal resource management and improvement of the condition of coastal residents							■	■	■						
POST-PROJECT PHASE															
• Contextual Variables															
Reduction of Municipal Council's financial and physical support (money and enforcement)										■	■	■	■	■	■
Inactivity of PAGAMACO										■	■	■	■	■	■
Resumption of illegal fishing										■	■	■	■	■	■
<i>Bantay Dagat</i> stops										■	■	■	■	■	■
Revival by the Municipal Council of the sea patrol											■	■	■	■	■
Continued patrolling of mangrove areas by holders of Certificate of Stewardship Contract (CSC)										■	■	■	■	■	■

Period	1940s	50s	60s	70s	80-87	88	89	90	91	92	93	94	95	96	97
• Major Events															
BOREMADEV re-establishes PAGAMACO															
Establishment of a fish sanctuary															
Continuing recognition of communal mangrove areas															
Non-issuance of cutting permits for FLAs															
• Incentives to Cooperate															
Continuing legitimacy of property rights															
Realization of the need for sustained law enforcement															
Continuing dependence on coastal resources															

4.7.0 OUTCOMES/PERFORMANCE INDICATORS OF CO-MANAGEMENT

Ideally, baseline data should be compared with current data to measure changes over time. However, baseline studies on physical, biological and social aspects of Cogtong are not available. A comparison of sites with and without project intervention may also be adopted, but the difficulty of finding a similar site with no project intervention precluded this option. In light of these constraints, the perceptions of project participants and non-participants may be the best alternative in measuring the performance of co-management over time. In a previous evaluation of community-based coastal resource management sites in the Philippines, Pomeroy et al (1996) documented the perceptions of perceived changes over time are useful in the absence of solid baseline data. The technique involved a visual, self-anchoring, ladder-like scale which allowed for making ordinal judgments, placed little demand on informant memory, and could be rapidly administered. The respondents were shown a ladder-like diagram with ten steps, where ten represented the best possible scenario and one the worst possible scenario in terms of the perceived changes in the indicators. The respondents were asked to indicate the appropriate step on the ladder which corresponds to their perceptions of changes in various time periods: before the project (e.g., 1988), today, and five years from now. Box 5 summarizes the performance indicators.

Box 5. Performance Indicators of Co-Management: Cogtong

Equity	Sustainability
<ul style="list-style-type: none"> □ Participation in community affairs <ol style="list-style-type: none"> 1. community affairs in general (PARTICIPATION IN GENERAL) 2. coastal resource management (PARTICIPATION-CRM) □ Influence over community affairs <ol style="list-style-type: none"> 1. community affairs in general (INFLUENCE IN GENERAL) 2. coastal resource management (INFLUENCE-CRM) □ Control over mangrove resources (CONTROL) □ Fair allocation of mangrove harvesting rights (ALLOCATION-HARVEST) □ Satisfaction with mangrove management (SATISFACTION-MANGROVE MGT) □ Benefits from the mangrove area (BENEFITS- MANGROVE AREA) □ Overall well-being of the household (HOUSEHOLD WELL-BEING) □ Household income (INCOME) 	<ul style="list-style-type: none"> □ Overall well-being of coastal resources (COASTAL RESOURCE WELL-BEING) □ Community compliance with rules <ol style="list-style-type: none"> 1. Mangrove rules (COMPLIANCE – MANGROVE) 2. Fishery rules (COMPLIANCE – FISHERY) □ Knowledge of mangroves (KNOWLEDGE - MANGROVES) □ Exchange of information <ol style="list-style-type: none"> 1. Mangroves (INFO EXCHANGE - MANGROVE) 2. Fishery (INFO EXCHANGE – FISHERIES) <p style="text-align: center;">Efficiency</p> <ul style="list-style-type: none"> □ Collective decision-making on rules governing the use of mangrove resources (COLLECTIVE DECISION-MAKING) □ Quickness of resolving community conflicts on mangrove issues (CONFLICT RESOLUTION)

4.7.1 ANALYSIS AND DISCUSSION

The first step in the analysis involved the calculation of mean differences between *today* (T_2) and *before the project* (T_1) for each indicator. A paired comparison t-test was used to determine if the mean differences between these two time periods are statistically significant. For the overall sample, Table 13 shows a statistically significant increase in perceived levels of all performance indicators ($p < 0.01$), except overall well being of coastal resources and household income. Weak law enforcement efforts must have affected the perceived gains in the well-being of coastal resources due to the resumption

of illegal mangrove cutting and illegal fishing after project completion. Increases in the income of fishing households, moreover, have not been statistically significant. Household income can be considered a function of the well being of coastal resources. Larger positive changes, by contrast, were perceived in knowledge of mangrove, participation in coastal resource management, and information exchange on both mangrove and fisheries management. These represent areas where the project had direct intervention.

Table 13. Perceived pre-project to post-project changes in performance indicators for all respondents: before the project and now: Cogtong

Indicator	All		T ₂ -T ₁	P
	Today (T ₂)	Before (T ₁)		
Equity				
a. Participation in general	5.26	3.39	1.87	<0.01
Participation – CRM	5.43	3.30	2.13	<0.01
b. Influence in general	5.37	3.46	1.91	<0.01
Influence-CRM	5.33	3.54	1.80	<0.01
c. Control – mangrove	4.74	3.00	1.74	<0.01
d. Allocation-harvest	5.56	4.15	1.41	<0.01
e. Satisfaction-mangrove management	5.59	3.74	1.85	<0.01
f. Benefits-mangrove area	5.50	4.33	1.17	<0.01
g. Household well-being	4.67	3.93	0.74	<0.01
h. Household income	4.56	4.13	0.43	>0.05
Efficiency				
a. Collective decision-making	5.39	3.70	1.69	<0.01
b. Conflict resolution	5.30	3.39	1.91	<0.01
Sustainability				
a. Coastal resource well-being	4.56	4.43	0.13	>0.05
b. Compliance - mangrove rules	5.02	3.35	1.67	<0.01
Compliance - fishery rules	5.43	3.48	1.94	<0.01
c. Knowledge-mangrove	5.57	3.35	2.22	<0.01
d. Information exchange-mangrove	5.37	3.28	2.09	<0.01
Information exchange-fisheries	5.56	3.48	2.07	<0.01

A paired comparison t-test was also done to determine if the mean differences between perceptions *today* and *five years from now (future)* are statistically significant for each indicator. The results show that all respondents perceived positive and statistically significant changes in **all** performance indicators ($p < 0.01$), indicating optimism on future

co-management indicators in terms of equity, efficiency, and sustainability. Relatively larger positive changes were perceived in overall well being of the household, benefits from the mangrove area, and control over fishery resources.

Table 14 shows the perceived *pre-project changes* to post-project changes (*today*) in the performance indicators based on membership in the village-based fishers association. Members perceived positive and statistically significant changes in the indicators, except in the overall well being of coastal resources and household income. For non-members, the perceived levels of four indicators are positive, but not statistically significant: benefits from the mangrove area, overall household well being, household income, and overall well being of coastal resources. The findings imply that more efforts are required to bring about perceived improvements in material and ecological gains.

Table 14. Perceived pre-project to post-project changes in performance indicators for members and non-members: before the project and now: Cogtong

Performance Indicator	Member				Non-Member			
	Today (T ₂)	Before (T ₁)	T ₂ -T ₁	P	Today (T ₂)	Before (T ₁)	T ₂ - T ₁	P
Equity								
a. Participation in general	5.74	3.41	2.33	<0.01	4.78	3.37	1.41	<0.01
Participation – CRM	5.81	3.22	2.59	<0.01	5.04	3.37	1.67	<0.01
b. Influence in general	5.70	3.59	2.11	<0.01	5.04	3.33	1.70	<0.01
Influence – CRM	5.85	3.81	2.04	<0.01	4.81	3.26	1.56	<0.01
c. Control – mangroves	5.11	3.30	1.81	<0.01	4.37	2.70	1.67	<0.01
d. Allocation – harvest	5.85	4.11	1.74	<0.01	5.26	4.19	1.07	<0.01
e. Satisfaction – mangrove mgt	5.85	3.81	2.04	<0.01	5.33	3.67	1.67	<0.01
f. Benefits – mangrove area	5.96	4.26	1.70	<0.01	5.04	4.41	0.63	>0.05
g. Household well-being	4.89	3.85	1.04	<0.01	4.44	4.00	0.44	>0.05
h. Household income	4.48	4.07	0.41	>0.05	4.63	4.19	0.44	>0.05
Efficiency								
a. Collective decision-making	5.56	3.67	1.89	<0.01	5.22	3.74	1.48	<0.01
b. Conflict resolution	5.59	3.48	2.11	<0.01	5.00	3.30	1.70	<0.01
Sustainability								
a. Coastal resource well-being	4.70	4.37	0.33	>0.05	4.41	4.48	0.07	>0.05
b. Compliance – mangrove	5.00	3.37	1.63	<0.01	5.04	3.33	1.70	<0.01
Compliance – fishery	5.67	3.52	2.15	<0.01	5.19	3.44	1.74	<0.01
c. Knowledge – mangrove	5.93	3.44	2.48	<0.01	5.22	3.26	1.96	<0.01
d. Info exchange – mangrove	5.63	3.30	2.33	<0.01	5.11	3.26	1.85	<0.01
Info exchange – fisheries	5.74	3.56	2.19	<0.01	5.37	3.41	1.96	<0.01

For the perceptions *today* and *five years from now*, members perceived positive and statistically significant changes in all performance indicators of co-management ($p < 0.01$). Non-members, likewise, appeared optimistic on all indicators, except influence over community affairs ($p > 0.05$).

The second step in the analysis was to determine if the members of the fishers association differed from non-members. This was accomplished by subtracting the pre-project perception from the today perception for each indicator (T_2-T_1) and calculating a two-sample t-test for the difference of mean values between the member and non-member samples. As indicated by Table 15, the only statistically significant difference between members and non-members lies in the perceived participation in community affairs ($p<0.05$). Members tended to perceive greater participation in community affairs, which could be partly linked to deliberate project efforts to involve them in collective concerns.

Table 15. Differences between members and non-members with respect to perceived pre-project to post-project changes: before the project and now: Cogtong

Indicator	Members T_2-T_1	Non-Member T_2-T_1	T-Value	Probability
Equity				
a. Participation in general	2.33	1.41	2.24	<0.05
Participation – CRM	2.59	1.67	1.76	>0.10
b. Influence in general	2.11	1.70	1.04	>0.10
Influence – CRM	2.04	1.56	1.28	>0.10
c. Control – mangroves	1.81	1.67	0.35	>0.10
d. Allocation- harvest	1.74	1.07	1.12	>0.10
e. Satisfaction – mangrove mgt	2.04	1.67	0.62	>0.10
f. Benefits – mangrove area	1.70	0.63	1.51	>0.10
g. Household well-being	1.04	0.44	1.15	>0.10
f. Household income	0.41	0.44	-0.08	>0.10
Efficiency				
a. Collective decision-making	1.89	1.48	0.90	>0.10
b. Conflict resolution	2.11	1.70	0.97	>0.10
Sustainability				
a. Coastal resource well-being	0.33	0.07	0.65	>0.10
b. Compliance – mangrove rules	1.63	1.70	-0.24	>0.10
Compliance – fishery rules	2.15	1.74	0.87	>0.10
c. Knowledge – mangrove	2.48	1.96	1.35	>0.10
d. Info exchange – mangrove	2.33	1.85	1.41	>0.10
Info exchange – fisheries	2.19	1.96	0.59	>0.10

Moreover, the *today* perception was compared with the perception *five years from now* for each indicator using a two-sample t-test (e.g., members versus non-members). Positive changes were perceived in all indicators. However, there is no statistically significant difference between members and non-members, except in the perceived quickness of resolving community conflicts ($p < 0.05$). Members tended to perceive higher gains in conflict resolution.

CHAPTER FIVE: *BARANGAY MARCELO*

CONTEXTUAL VARIABLES

Contextual variables refer to the key attributes of the resource, resource user, and management arrangements. There are six variables: 1) physical, technical and biological attributes; 2) stakeholder, community and fisher attributes; 3) market characteristics; 4) fisher and community institutional and organizational arrangements; 5) external institutional and organizational arrangements; and, 6) exogenous (macroeconomic, political, social and natural) attributes.

5.1.0 PHYSICAL, TECHNICAL AND BIOLOGICAL CHARACTERISTICS OF BARANGAY MARCELO

The following section discusses the physical, technical and biological attributes of Barangay Marcelo that have influenced coastal resource institutional arrangements over time.

5.1.1 PHYSICAL CHARACTERISTICS

Barangay Marcelo is part of the municipality of Mabini. Located on the north shore of Cogtong Bay, Marcelo is accessible from Tagbilaran by a 95-kilometer, three and a half-hour bus ride along mostly paved roads. Barangay Marcelo is more than twice the size of Barangay Cogtong but has one-third the population. Located eight kilometers away from *poblacion* (town center), and connected by mud roads difficult to travel in rainy conditions, the 727 residents live on 207 ha of land. The majority of people rely on fishing for their primary source of income.



Picture 7. Road from Barangay Marcelo to *poblacion* (town center).

Although there is more land in Marcelo than Cogtong, there are fewer land-based economic activities. Most houses stretch along the seaward side of the road that connects the barangay to *poblacion*. Across the road are upland areas with a hilly terrain not well suited to agricultural purposes. Barangay land that is brought under agricultural production mainly produces cassava crops.

5.1.1.1 Boundaries

Coastal resources of Cogtong Bay have traditionally been open-access. Outside concession license areas, the mangrove areas in Marcelo have not had any boundaries. With the exception of a marine park in Mabini waters since 1978, very few restrictions existed on fish harvesting methods and none regulating limits. Anyone could fish in the Bay's water or cut trees in the Bay's mangrove areas. Not even residency within the Bay's municipalities was required. The CMMRCRM marked the first time property rights to mangroves within Mabini were introduced. Fishing boundaries have also since been introduced with fish sanctuaries in both Candijay and Mabini.

Customary Boundaries. No traditional boundaries or customary rights of tenure have existed in Marcelo.

Political Boundaries. Historically, jurisdiction over coastal resources was fragmented. BFAR, a national bureau under the Department of Agriculture, was responsible for fisheries until the early-1990s. DENR, on the other hand, exercised jurisdiction over mangroves and forestry. During the CMMRCRM phase (1989-1991), conflicting policies that hampered project implementation partly emanated from the fragmentation of functions among national government agencies.

In 1991, the devolution of many of the functions of BFAR and DENR altered the political boundaries and placed local government units at the forefront of coastal resource management. In particular, local government units now exercise authority over waters within 15 kilometers from the shoreline of their municipality (i.e., municipal waters). Beyond 15 km, BFAR still exercises jurisdiction. For mangroves, local governments are now responsible for community-based forestry projects and communal forest management. Outside communal forests, DENR still retains its authority. For details, see section 1.1.1 in chapter four, which also holds true for Marcelo, Mabini.

Legal Use Boundaries. A marine park in Mabini waters was the first legal boundary established around Cogtong Bay to restrict fishing. Established by the Mabini Municipal Council in 1978 around Lumayag, an island/reef exposed at low tide, the total area of the park was 500 ha and marked by buoys. All fishers were allowed to fish in the area of the marine park but the fishing gear was restricted to longline and the catch to consumption.

Mangroves in Cogtong Bay were also subject to legal use boundaries before the CMMRCRM. Concession licenses, different from a cutting permit, were the first formal boundaries intended to regulate the cutting of mangroves. The most common concession license was an “ordinary license” and lasted for four years. Concession licenses were given to applicants by the Bureau of Forestry (later changed to the Bureau of Forest Development). The applicant paid for the license which gave the holder “...the exclusive

privilege to cut all the allowable harvestable timber in their respective concessions, and the additional rights of occupation possession and control over the same to the exclusion of others...”. Concession licenses were large-scale commercial licenses. Despite a provision of the license stipulating sustainable yield harvesting, holders of the licenses often did not adhere to any limits. Generally, mangrove cutters in Cogtong Bay did not respect private concession areas and the concession license did not impose any *de facto* control on cutting practices. According to key informants, concession licenses have not been issued for Marcelo since the 1970s.

In 1984, portions of the Bay’s mangroves were declared Mangrove Wilderness and Mangrove Swamp Forest Preserve under Presidential Proclamation 2151 and 2152 respectively (Janiola 1996). Four islands (Lumislis, Cat-il, Cabundio and Calanggaman) totaling 275 ha were labeled as wilderness areas. Consequently, “...entry, sale, settlement, exploitation of whatever nature or forms of disposition...” was not permitted. However, without strict enforcement, compliance with the proclamation was low.

In 1989 legal boundaries on mangroves in Cogtong Bay were introduced when the CMMRCRM distributed CSCs. Individual CSC holders were vested with rights of access and withdrawal. The contract states “The grantee shall have the right to peacefully possess and cultivate the land and enjoy fruits thereof...”. The contract lasts for 25 years at which time a renewal can be applied for. The contract also formally imposes limits, albeit ambiguous, on the amount of trees that can be cut. The Grantor of the contract (DENR) sets the limits. According to the legal document, the Grantor “...reserves the right to regulate the cutting or harvesting of the timber crops to insure normal balance of forest cover on the land”. Stewards related that their interpretation of the limits were “sustainable harvesting”.

Legal use boundaries over coastal resources continued to evolve in Cogtong Bay during, and after the CMMRCRM. Mabini Municipal Council redefined the Lumayag Marine Park as a fish sanctuary 1988 in response to encouragement from the Association of Barangay Captains and CMMRCRM staff. No one was allowed access to the waters

inside the sanctuary. The fish sanctuary, however, reverted to a marine park with restricted fishing but not restricted access in 1995 because the sand bars within the sanctuary's boundaries were popular spots to visit.

The end of one sanctuary marked the birth of another. Also in 1995 the Mabini Municipal Council passed a resolution to establish a different fish sanctuary by approving resolution No. 3 series of 1995 of the Board of Directors of Mabini Federation of Small Fishers' Associations (MAFESFA). The Municipal Council recognized the rules and regulations promulgated by MAFESFA and therefore did not pass an ordinance. As such a new fish sanctuary endorsed by the Municipal Council but governed according to MAFESFA guidelines was established at Lumisli Island. Access within the sanctuary was restricted to authorized personnel.

Communal Boundaries. Mabini has formally recognized communal areas at the barangay level. All barangay residents can cut mangroves within the Marcelo communal area, but none of the wood gathered can be sold. A municipal ordinance from 1988 also exists that prohibits the transport of raw forest goods outside municipal boundaries.

Technical Boundaries. No zoning or technical boundaries are present in Cogtong Bay for mangroves. Technical boundaries exist for fishing regarding the species of fish harvested during different periods of the year due to the pelagic characteristics of the fish.

Speargun (Pana)

katambak (pargo), *molmol* (wrasse), *sapayan*, *tigi*, *sapsap* (*slipmouth*), *libgao*, *kitong* (rabbitfish), *danggit* (rabbitfish), *balo* (needlefish), *labayan* (wrasse), *bilason* (fusilier), *tangigue* (frigate mackerel), *talakitok* (trevally), *maya-maya* (snapper), *ulang* (lobster), *pugapo* (grouper), *kugita* (octopus), *torsilyo* (barracuda), *munggit* (surgeonfish), *isdang bato*, *pagi* (ray), *silay* (threadfin bream),

5.1.2 TECHNICAL CHARACTERISTICS

Technical Boundaries. No comprehensive zoning or technical boundary delineation exists in Mabini, except for areas covered by the mangrove wilderness and mangrove forest reserve as well as by the Lumisli Fish Sanctuary. Since Lumisli Island is located in the middle of Cogtong Bay, Mabini and Cogtong share the island.

5.1.2.1 Capture Fisheries and Fishing Gear

The village of Marcelo is characterized by multi-gear and multi-species fisheries. Village fishers use five types of fishing gear, compared to nine in Cogtong, Candijay. About 67 percent of the fishers use gillnets (*pukot*). Others use simple handlines or *pasol* (26%). The rest deploy longlines or *palangre*, jiggers and spearguns. Most fishers (85%) own their fishing gear.

Based on key informant interviews, fishers use gillnets and spearguns throughout the year in Marcelo. Used seasonally are longlines, simple handlines, and jiggers. Longlines are deployed from May to August, and simple handlines, from September to November.

Effective Fishing Time. Fishers report that fishing time has remained the same since the 1970s, but their average fish catch has declined. For 89 percent of the fishers, the number of hours per day spent for fishing ranges from six hours or less. About 11 percent fish for more than ten hours.

Types of Boats Used and Crew Size. Non-motorized boats are dominant in Marcelo (68%). Only 32 percent of the fishers operate with motorized boats. Given the predominance of non-motorized boats and simple gear types, only one or two people assist in fishing operations.

Fish Harvest Sharing System. Sharing arrangements in Marcelo vary by type of fishing gear. Gillnet and longline fishers, after deducting the expenses incurred during the fishing

trip, usually divide the earnings into three parts. One part goes to the crew and two parts to the boat owner. In rare cases involving longline fishing, 4/5 goes to the boat owner and 1/5 to the crew. However, if the fisher owns the boat and fishes with a family member, he normally gets all the fish harvest. For fishers using simple handlines, four parts normally go to the boat owner and one part to the crew. In the absence of a crew, the fisher gets all the harvest.

Across all gear types, the most common sharing is 1/3 to the fisher and 2/3 to the boat owner (70%). About 23 percent of the fishers reported that they do not have to share the fish harvest with anyone.

5.1.2.2 Mangroves

Mangroves have been traditionally used for house construction and firewood. Beginning in the 1940s, mangrove wood was also used for constructing fish corrals. Wood harvesting has been done with a traditional technique that uses *bola*, a cutting instrument resembling a machete.

The low intensive cutting of mangroves for these traditional purposes changed over the years, prompted by the introduction of fishponds in the mid-1960s and the issuance by the DA of Fishpond Lease Agreements (FLAs). An FLA entitled the holder the privilege to operate a fishpond. Records show that in Mabini land was released for fishpond development in 1979 (Janiola 1996). Also changing the traditional, low intensive cutting methods were the entry of large-scale commercial cutters in the early-1970s and the sale of mangrove products to larger market centers, such as the cities of Tagbilaran and Cebu.

At present, commercial cutters seldom come to Cogtong Bay. Those that do usually cut on one of the islands (especially Lumisli) protected under Presidential Decree 2151/2152. Cutting permits are also no longer issued to FLA holders. The cutting of mangroves is reverting to local, small-scale, and more sustainable practices.

5.1.2.3 Information Sources on Fisheries and Mangroves

Based on multiple responses, fishers tend to depend more heavily on other fishers for information on fisheries (70%), covering fishing gear, fish farming/mariculture, and other related areas. Other information sources include: NGOs (13%), fisher himself (11%), government technicians (9%), parents (7%), and radio (4%).

On mangrove management, NGOs (61%) are also the primary provider of information. Other sources are the fisher himself (28%), government technicians (9%), other fishers (6%), information campaigns (4%), radio (2%), and pamphlets (2%). Written materials play a minimal role in information dissemination.

5.1.3 BIOLOGICAL CHARACTERISTICS

5.1.3.1 Live Coral Cover and Mangrove Community

The findings discussed earlier on Cogtong also hold for Marcelo (Section 4.4.1.3).

5.1.3.2 Fish Catch and Species Composition.

Various types of fish per gear type are caught in different months by Marcelo fishers, as shown by Figure 8. For gillnets, the fish species caught range from soft-bottom to reef (hard-bottom) dwelling species, such as goatfishes, rabbitfishes, sardines, slipmouths, wrasses, and shrimps/crabs. For simple handlines and longlines, pelagic fishes are caught, such as mackerels, fusiliers, scads, jacks and some reef dwelling snappers.

Over time, there has been a progressive decline in the average catch per fishing trip. Table 16 shows the downtrend from the 1960s to the 1990s, based on information drawn from key informants.

Table 16. Trends in catch rates (kg/trip) of selected fishing gears in Marcelo.

Fishing Gear	1960s	1970s	1980s	1990s
1. Longline (palangre)	10-15 kg	10 kg	5-7 kg	1-3 k
2. Spear gun (pana)	10 kg	7 kg	5-8 kg	3 kg
3. Squid jigger (tsa-tsa)	10-15 kg	(7-8 kg)	5-8 kg	1-2 kg
4. Simple handline (pasol)	10 kg	Less than 10 kg	5-7 kg	1-2 kg
5. Gillnet (pukot/lambat)	20-40 kg (sometimes 50 kg)	15-20 kg	6-10 kg	3-10 kg

In 1997, eighty percent of the fishers reported an average catch per fishing trip of five kg or less. In 1988, or just before the MRCRMP implementation, only 68 percent caught five-kg or less of fish per fishing trip. Thus, the proportion of fishers who obtained this volume increased. Moreover, those who caught six to ten kg of fish per fishing trip decreased to 18 percent in 1997 from thirty percent in 1988.

5.1.3.3 Fishing Grounds

Based on the household survey in Marcelo, ninety percent of the fishers operate inside the Bay, while ten percent fish outside the Bay. The small range may be attributed to the predominance of non-motorized boats in the area and the use of gillnets and simple handlines, which are usually used in shallower waters.

About 81 percent of the fishers operate in waters less than five fathoms (15 m), while nine percent fish in waters between six to ten fathoms (18-30 m). Fishing operations outside the Bay (10%) are usually in waters more than 25 fathoms (75 m).

5.1.3.4 Perceived Trends in the Condition of Fishery and Mangrove Resources

To obtain a comparative perception of resource conditions, 54 heads of fishing households in Marcelo were asked to describe the condition of fishery resources 15 years ago and today. A similar question was asked on the condition of mangrove resources.

Fishery Resources. About eighty percent of the fishers expressed that 15 years ago (1982), fishery resources were in a relatively good condition. The reasons given were abundant fish catch, limited commercial fishing, and fewer resource users. About 17 percent, on the other hand, felt that the resources were in a bad shape due to illegal fishing activities, mangrove cutting, damaged habitats, and decreasing fish catch. The rest (3%) stated that fishery resources were neither in a bad nor good condition.

In terms of the perceived condition of fishery resources today, fishers perceive resource deterioration. About 68 percent felt that the resources are in a bad shape now (Table 16). Members and non-members of the fishers' association shared this perception. Respondents claimed the resources to be unhealthy today largely due to illegal fishing, lower fish catch, and over-fishing. Other reasons mentioned are commercial fishing, habitat destruction, use of fine mesh nets, and increase in the population. Only 19 percent perceived a very good resource condition at present, based on their observations of increased fish catch, reforested mangrove areas, and reduced illegal fishing. The rest (13%) perceived no change at all.

Mangrove Resources. On the condition of mangrove resources 15 years ago, 48 percent viewed the resource condition as good. About 41 percent perceived it as bad, while the rest (11%) were neutral. Those who perceived the resource condition as good noted the presence of mangrove stands and improved fish catch. Those who viewed the mangrove resource condition as bad cited the illegal cutting of mangroves, fishpond development, and decline in fish catch.

Regarding to the perceived resource condition today, the percentage of respondents who regarded the mangrove condition as good reached 91 percent. Good conditions were linked to the existence of thick and tall mangroves, as well as to higher fish catch. A much lower percentage (6%) perceived the resource situation as bad due to illegal

mangrove cutting. Others (3%) were neutral. Thus, the respondents perceived a statistically significant improvement in the condition of mangroves, but not in fisheries.

Table 17. Perceived Resource Conditions: Marcelo

Resource Condition	15 Years Ago (1982)		Today (1997)		T-value	P
	No.	%	No.	%		
Fishery					-5.985	<0.01
Bad	9	17.0	37	68.0		
Neither bad nor good	2	3.0	7	13.0		
Good	43	80.0	10	19.0		
Total	54	100.0	54	100.0		
Mangrove					-5.884	<0.01
Bad	26	48.0	3	6.0		
Neither bad nor good	6	11.0	2	3.0		
Good	22	41.0	49	91.0		
Total	54	100.0	54	100.0		

5.1.3.5 Perceived Importance of Mangrove Management

Almost all respondents (98%) expressed that mangrove management is essential to the fishery, regardless of membership in the project beneficiary associations. Based on multiple responses, observations since the introduction of mangrove management in Marcelo include: 1) expanded mangrove stands (61%); 2) improved fishing conditions and reduction of commercial fishing (41%); and 3) improved fish habitats (9%). Thus, the project helped rehabilitate the mangroves and improve law enforcement in Marcelo.

5.1.3.6 Ecological Knowledge

Based on a random sample survey of 54 fishers in July 1997, the respondents exhibited knowledge of various characteristics of the sea and coast that help the fish to grow and be healthy. Multiple responses include the presence of sea grasses/seaweeds (89%), presence of corals (65%), existence of mangroves (52%), presence of algae (17%), and clean water (9%). Members and non-members alike gave similar responses. For a further discussion on traditional ecological knowledge the reader is referred to section 1.3.6 of Chapter Four.

5.2.0 STAKEHOLDER, COMMUNITY AND FISHER CHARACTERISTICS

The evolution of stakeholder groups as well as the socio-economic characteristics of the community, sample fishers and fisher households is assessed to determine the influence on incentives to cooperate and coordinate such characteristics have.

5.2.1 STAKEHOLDERS

For an introductory discussion on stakeholders, the reader is directed to Chapter Four, section 2.1 of the Barangay Cogtong case study.

A number of different stakeholder groups can be identified in Marcelo. BOSFA (Bonbon Small Fisher's Association) and MAFA (Mabini Fisher's Association) are the main stakeholders. All members of the FAs are coastal resource users (mainly fishers) and most were involved with the CMMRCRM in rehabilitating the mangroves and fishery as well as enforcement efforts in Marcelo. The groups continued to operate when the CMMRCRM concluded and have since been involved with the DENR through the Coastal Environment Project (CEP) by replanting trees in both the mangrove and uplands areas. In addition, both groups have continued to aid enforcement efforts against illegal cutting and fishing. CSC holders also have property rights over sections of mangroves.



Picture 8. MAFA Clubhouse. Marcelo

Like its member groups BOSFA and MAFA, MAFESFA (Mabini Federation of Small Fishers' Associations) can also be identified as a primary stakeholder. MAFESFA members are composed of individual members serving as representatives of all the various FAs in Marcelo. MAFESFA, or the United Federation (UF) has passed legislation that individual FAs adopt. MAFESFA also has successfully lobbied for municipal ordinances such as establishing a fish sanctuary and is in charge of coordinating efforts for the *Bantay Dagat*.

Fishers and shell gatherers (mainly women) not part of BOSFA or MAFA are also stakeholders. Both informal groups benefit from healthy mangroves. The fishers usually provide the primary source of income and food for their households while shell gatherers augment family income and food source.

Holders of FLAs also form part of the stakeholders. There is no formal organization but members of the group are individuals who have a legal claim on the land and have

usually invested both time and money into developing or attempting to develop the land into a fishpond.

Marcelo Barangay Council is responsible for conducting investigations of illegal activities and forwarding the case to the Municipal Council if enough evidence is found. The Barangay Council also lent moral support to the CMMRCRM, participated in information campaigns and passed legislation to better manage coastal resources.

The Mabini Municipal Council is also a stakeholder. The Municipal Council lent moral and financial support to the project and passed legislation to help with enforcement. The Municipal Council also has jurisdiction over the Mabini waters.

The DENR was involved with project implementation, monitoring and enforcement. The project was also one part of the larger CMMRCRM funded by USAID and implemented by the DENR.

5.2.2 CHARACTERISTICS OF THE FISHER COMMUNITY

Overall, the village population is homogeneous in terms of ethnicity, religion, and occupation. Marcelo's socioeconomic characteristics have remained relatively stable between 1988 and 1997. When the CMMRCRM started in 1989, Boholanos were the most dominant ethnic group. They continue to comprise the biggest ethnic group, accounting for 86 percent of village households in 1997. Cebuanos and other Visayans comprise 12 percent, while Tagalogs account for the minority (2%). The occupational structure has remained stable between 1988 (pre-project) and 1997. At present, households engaged in both farming and fishing are predominant at 84 percent (Table 18). Fish vendors, drivers, and owners of small stores (*sari-sari*) account for three percent each, while office employees and mangrove gatherers comprise the rest. In terms of religion, about 76 percent are Roman Catholics. Sixteen percent belong to Jehovah's Witnesses and eight percent, to Born-Again Christians.

Table 18. Estimated Distribution of Households by Occupation: Marcelo

Occupation	1988 (%)	1997 (%)
Fisher-Farmer	83	84
Fish Vendor	3	3
Driver	3	3
Store Operator	4	3
Employees	3	5
Mangrove Gatherer	4	2
Total	100	100

Village facilities include: an elementary school, a day care center, a food market, piped water supply from a spring, television, electric service, and public transportation (motorcycle). A village stage and a basketball court provide recreational facilities. There is no health center. The nearest doctor and nurse reside at the Mabini town center, some eight kilometers away from the village. The nearest midwife is stationed 4.5 kilometers from Marcelo.

Overall, the level of integration into the national economy may be regarded as low to medium. Transportation links are low, given unimproved and seasonally impassable roads and the sole dependence on motorcycles for transporting people and village products. Likewise, communication links are low due to the absence of telephones. Political links, however, are relatively high because politicians visit the village more than once a year.

5.2.3 CHARACTERISTICS OF SAMPLE FISHERS

A random sample of 54 fishing households was drawn from the village population. The sample was divided into members and non-members of the project beneficiary associations. Table 19 shows that the respondents have no statistically significant difference in terms of mean age, education, household size, and length of residence in the village ($p > 0.05$). On the average, the survey respondents are 48 years of age, have undergone elementary schooling and resided in Marcelo for 41 years. Most of the village residents (61%) were born in the village. The rest trace roots to other Visayan areas

(28%), Mindanao (9%), and Luzon (2%). The average household has about five members.

In terms of fishing experience, the majority (61%) of the respondents indicated they have been fishing for a long time – more than 15 years. About 19 percent have fished for 6-15 years, while 11 percent have done so for one to five years only. The rest of the respondents (9%) have been fishing for 11-15 years. No statistically significant difference exists between members and non-members ($X^2= 1.95$, $p>0.05$).

Table 19. Characteristics of Sample Fishers: Marcelo

Variable	% Members	% Non-Members	% Total	T-value	P
Age	49.7	45.4	47.6	0.97	>0.05
Education	5.6	5.4	5.5	0.33	>0.05
Household size	4.6	5.1	4.9	-0.78	>0.05
Years of residence in the village	45.5	36.7	41.1	1.56	>0.05

In the context of project-related variables, Table 20 shows a statistically significant difference between members and non-members in three aspects: attendance at project meetings, completion of training, and influence on project planning ($p<0.05$). On the average, most respondents joined ten meetings or less. Training activities, which often lasted for one to three days, covered mangrove management, artificial reefs, sanctuary establishment, leadership and pre-membership, among others. The project staff of ACIPHIL provided most of the training (83%), along with the DENR and the Department of Trade and Industry (DTI). In terms of the knowledge of project objectives, members do not differ statistically from non-members. The relatively lower percentage of respondents who are aware of project objectives, however, may be partly attributed to recall problems in Marcelo.

Table 20. Fisher Participation in the Project: Marcelo.

Variable	% Members	% Non-Members	% Total	X ²	P
Attendance at project meetings	88.9	37.0	63.0	15.6	0.00
Completion of training	85.2	29.6	57.4	17.0	0.00
Influence over project planning	88.9	37.0	63.0	15.6	0.00
Knowledge of project objectives	36.4	18.4	25.0	2.39	0.12

5.2.3.1 Fisher Households

Household Size and Out-Migration. Approximately seventy percent of fishing households in Marcelo have a household size of six or less. The rest (30%) have more than six household members. More than half of the respondent households reported that some members have left the village to work (30%) or to look for a job (24%). Others have gone to other areas to study (7%) or to marry (6%). Metro Manila is the most popular destination.

Educational and Occupational Profile of Wives. Most wives (80%) have obtained an elementary education, while some 15 percent went to high school. Only five percent pursued a college education. About 73% of the wives are 36 years of age and older. The rest (27%) are younger, belonging to the 25-35-age bracket.

Women's economic activities in Marcelo represent a mix of subsistence and income-earning endeavors. Women reserve a portion of the fish harvest for household consumption and sell the surplus. Alternatively, if a harvest yields fish of higher value, the fish may be sold. Similar decisions are made with respect to other marine products (Mehra, Alcott and Baling 1993). Aside from trading marine products, women often gather shellfish during low tide for household consumption. They also farm, make *nipa* (palm) shingles, weave mats, and sell food. Day-to-day activities normally involve housekeeping and caring for the children.

Household Assets. The absence of records and daily income variations make fishing income difficult to quantify. In this study, relative wealth was based on house structure, household furnishings/facilities, and ownership of productive assets, such as land and boats. Table 21 shows that non-members are more likely to have minimal to low house structures than members, but the difference is not statistically significant (67% versus 59%; $X^2=1.32$, $p>0.05$). A minimal house structure refers to a house made up entirely of light materials, such as bamboo, cogon and nipa. A low quality structure consists of light materials for the walls and roofs, but the frames are made of wood or lumber.



Picture 9. Mid-Range Household: Barangay Marcelo

For household furnishings and facilities, non-members also tend to have minimal to low facilities (86% versus 82%; $X^2=5.38$, $p>0.05$). Minimal refers to the presence of one or two furnishings/facilities in the household, while low pertains to three or four furnishings. Included in the furnishings are such assets as furniture, radio, cassette player, cooking stove, electric fan, water-sealed toilet, sewing machine, motorcycle, and other facilities. Ownership of productive assets, such as motorized boats and land, shows that a

statistically significant difference does not exist between members and non-members ($p > 0.05$).

Table 21. Percent Distribution of Assets: Marcelo

Variable	% Members	% Non-Members	% Total	X ²	P
House Structure				1.32	0.72
Minimal	20.6	19.0	20.0		
Low	38.2	47.6	41.8		
Medium	20.6	23.8	21.8		
High	20.6	9.5	16.4		
Household Furnishings and Facilities				5.38	0.07
Minimal	41.2	14.3	30.9		
Low	41.2	71.4	52.7		
Medium	17.6	14.3	16.4		
Land Ownership	41.2	38.1	40.0	0.05	0.82
Ownership of motorized boats	88.9	77.8	83.3	0.40	0.53

5.2.3.2 Occupational Multiplicity and Dependence on Coastal Resources

Almost all respondents (91%) reported that fishing is their primary occupation. Fishing provides at least half of the household earnings for 76 percent of the respondents.

Occupational multiplicity is seen in the existence of secondary occupations. In addition to fishing, 49 percent of the households are engaged in farming. Still others work as carpenters (6%), drivers (6%), oyster gatherers (2%), and barbers (2%). About 35 percent of the respondents, however, have no second job.

The harvest of mangrove products accounts for less than half of household income for 91 percent of the households. Dependence on coastal resources primarily covers fishery. Some 41 percent of the households receive external remittances from family members

and relatives outside Marcelo. In terms of dependence on remittances, members do not differ statistically from non-members (44% versus 37%; $X^2=0.31$, $p>0.05$).

When the respondents were asked if plants and animals that were regarded as few 15 years ago have become more abundant now, seventy percent said yes while the rest said no. The same observation was noted in pest species (61%). The respondents (57%) also reported that they have not harvested in the same general area.

Job Satisfaction. Given the chance to live their lives over, 57 percent of the sample fishers in Marcelo expressed that they would not choose to become fishers (Table 21). About 43 percent felt otherwise. For those who would no longer choose fishing if they had their lives to live over, the main reason is the inadequacy of earnings from fishing in meeting household needs. Another reason is declining fish catch.

For those who opted to become fishers again, the predominant reasons are primarily psychological ---- job contentment (32%), easy nature of the job (20%), and being used to fishing (20%). Other reasons include: proximity to the place of work/fishing ground (8%), lack of skills in other jobs (8%), low educational level (4%), absence of a boss (4%), and food provision inherent in fishing (4%). From these responses, the lack of education and experience in other jobs appear to limit the choice of their occupation to fishing.

Table 22. Job Satisfaction of Fishers: Marcelo.

Choice	% Member	% Non-Member	% Total	X^2	P
Give up fishing, given the chance to live one's life over	49	71	57	2.76	0.10
Shift from fishing now	94	95	94	0.35	0.55

When the respondents were asked if they would change their occupation now from fishing to something else, about 94 percent said yes. Only six percent said no due to psychological reasons. Thus, Marcelo fishers expressed willingness to shift to non-fishing occupations, in the context of the present situation and a second lifetime. This willingness appears to be largely driven by economic considerations --- earn more money, improve living conditions, and have a stable job. Non-economic reasons include a declining fish catch. The finding implies that the financial appeal of fishing has diminished relative to other occupations. The perceived resource deterioration, moreover, has been viewed as a negative factor.

5.3.0 MARKET RELATIONSHIPS

5.3.1 FISHERY

The fishery of Marcelo shifted from a subsistence orientation in the 1950s to a market orientation since the 1970s. Food fish is the primary product sold in the market. Approximately eighty percent of the Marcelo respondents covered by the random sample survey in July 1997 indicated that they sold most their catch. Only twenty percent indicated that they sold less than one-half of their catch. Fish transactions are primarily carried out at the village level (93%), implying that fishing households do not have to go to distant areas to sell their fish harvest. Four percent of food fish is sold in the Mabini town market, while three percent goes to nearby municipalities. At present, there are six fish traders in Marcelo who procure fish from village fishers.

Box 6. Summary of Present Market Characteristics: Marcelo

Indicator	Attributes
Fishing ground	Inside Cogtong Bay (90%)
Market outlets	Primary buyer (78%) Retailer (11%) Consumer (11%)
Place sold	Village (93%) Mabini town center (4%) Other municipalities (3%)
Number of traders	6
Existence of <i>suki</i> (credit-trading relationship)	33% with <i>suki</i>
Length of <i>suki</i> relationship	< 5 years (56%) 5-10 years (44%)
Market orientation	Local/provincial
Value of product	Low/medium

Marcelo fishers reported that they usually sell their food fish to primary buyers (78%). Other market outlets include retailers and consumers (11% each). In general, the reasons for selecting a given market outlet are proximity, existence of a credit-trading relationship or *suki*, and best price offer. Two types of market channels exist in Marcelo: 1) fisher → primary buyer/fish trader → consumer; and, 2) fisher → primary buyer/fish trader → fish retailer → consumer.

Fish is normally packed in ice to retain its freshness and is stored either in styrofoam containers or buckets. Fish traders generally transact directly with village fishers for their fish supply. Similar to Cogtong traders, they use motorcycles (*habal-habal*) in transporting their fish to the town market. Fish meant for markets located outside Mabini is loaded on buses and sold in Candijay, Guindulman, Pilar, and Tagbilaran City.

Fish is sold by weight or by bundle (*tuhog*). Normally, the type of fish caught, available supply/fish volume, and fish size determine prices. The price of anchovy is relatively lower than that of snappers and mackerels by about thirty percent. Fish prices are also affected by climatic conditions and by the lunar season. During stormy seasons or windy

periods when fish supply in the market is low, fish prices increase by about fifty-sixty percent. The main sources of information on fish prices are fish buyers/traders (91%), market vendors (7%), and other fishers (2%).

In general, the comparative retail prices of marine products in 1988 and 1997 showed an uptrend. Double-digit price increases of at least thirty-forty percent occurred for snapper (*katambak*), Spanish mackerel (*tanigue*), and rabbitfish (*danggit*).

The trade of fresh fish in Marcelo is competitive. Fish processing at the village level is limited to simple fish drying and preparation of fish paste (*guinamos*), but these products are often meant for home consumption only. Ice plant facilities in the village are absent.

The household survey results indicate that 33 percent of the village fishers have maintained a *suki* (credit-marketing relationship), largely because of credit assistance from the trader and a guaranteed market for the fish caught. Most *suki* relationships have lasted for five to ten years (56%). Others (44%) are relatively more recent (less than five years). All respondents in Marcelo have expressed satisfaction with their *suki* relationships.

The dependence on this credit-marketing relationship, however, is not too pronounced in Marcelo. More fishers (67%) have managed to fish and sell their catch without credit and marketing assistance from the *suki*. In the process, they also have leeway in choosing their market outlets, being free from the obligation to sell their catch to the *suki*.

5.3.2 MANGROVE WOOD

Wood gathering/trading in Marcelo is a part-time livelihood, providing an additional source of household income. It is also a family-oriented activity where household members assist each other in chopping and collecting mangrove branches, removing the

bark⁵, drying the wood, and bundling the dried wood for subsequent sale as firewood. Wood gatherers usually sell the dried wood to a wholesaler or a storeowner who, in turn, caters to the fuel needs of consumers. Prices of mangrove firewood usually increase during the typhoon season, when wood gathering and drying is difficult. Annual village festivals also exert an upward pressure on firewood prices due to the large quantities of food cooked during the celebration.

5.4.0 COMMUNITY AND INSTITUTIONAL ORGANIZATIONAL ARRANGEMENTS

The following section focuses on the tradition of collective action, attitudes towards collective action and responsibilities for coastal resource management and decision-making in Marcelo. Included in the analysis is the evolution of property rights and rules, and opinions on rule breaking. Additionally, insights into the actual monitoring and attitudes toward enforcement of coastal resource management related rules are presented.

5.4.1 TRADITION OF COLLECTIVE ACTION

Marcelo does not have a long tradition of village-level collective action although an informal tradition of *dayjong* has deep roots. *Dayjong* is akin to a social organization. Whenever a member of the community dies, community members donate money to the grieving household. Local residents were unsure of when the practice started, but were certain that *dayjong* has always existed.

Regarding formal groups, the Parents' and Teachers' Association (PTA) has aimed to improve school-related activities in Marcelo since the 1950s. Also, the Farmers' Organization (especially for coconut farmers) was established in 1972. The objectives of the Farmer's Organization were to obtain hybrid coconut seedlings for its members. If a member has vacant land ready to plant, the Philippine Coconut Authority (National

⁵ Although mangrove bark is used in the process of tanning leather, the use of the bark in Cogtong Bay was unclear.

government) would give P2,000 and seedlings for each hectare that a farmer is planting. A formal youth organization dedicated to ensuring the village youth develop a good moral conscience has also existed in Marcelo since 1988. The Barangay Health Workers group was formed around the same time, and is dedicated to helping the sick and old as well as helping with childcare and immunizations.

The CMMRCRM project, as part of its community organizing goals, established two FAs in Marcelo. Two groups formed because of the geographical distance between the two sitios (sub-villages). The Bonbon Small Fishermen's Association (BOSFA) was formed in *sitio* Bonbon, and the Marcelo Fishermen's Association (MAFA) in *sitio* Popog. Both FAs were registered with the Department of Labour and Employment in 1990. Community organizing evolved beyond the barangay level in Mabini. One month after the last coastal barangay FA in Mabini officially registered, an organization uniting all of the individual FAs in Mabini was also duly registered. The name of this organization was Mabini Federation of Small Fishers' Associations (MAFESFA). Individual MAFESFA membership was composed of the president and secretary from each barangay level FA in Mabini. As an umbrella organization, the United Federation (UF) as MAFESFA is also called, gives cohesiveness to all the individual FAs of Mabini.

BOSFA and MAFA are both formal groups whose objectives are to rehabilitate and manage the coastal resources. BOSFA and MAFA members attended seminars conducted by the CMMRCRM and were involved in collecting and planting propagules as well as forming artificial reefs. Both organizations also helped enforcement efforts by joining the *Bantay Dagat*. No foot patrol was established for the barangay but members of both groups were active in information campaigns explaining to individuals the importance of mangroves. Members also watched over, pruned and re-planted their own CSC area as well as monitored the barangay communal forest area. After the CMMRCRM project concluded, both groups continued to function and have engaged in other reforestation activities in the uplands and on Lumisli Island. Both groups are also

still involved with the *Bantay Dagat*. Membership in BOSFA has increased from 15 to 34 while MAFA membership has remained constant at 21 members.

BOSFA and MAFA also established credit cooperatives whereby members can loan from the associations' capital. Both groups charge an interest of seven percent. Half of the year-end profits of the lending institution are retained to augment the capital. The other half is split evenly and paid out to members as year-end dividends.

Many new organizations in Marcelo have been established subsequent to BOSFA and MAFA. The Small Coconut Farmers was formed in 1990. The objectives of the Small Coconut Farmers are to unite the farmers at a municipal level, much like MAFESFA unites the fishers. The Rural Improvement Club also came into existence in 1990 in Marcelo. Established by the DA, the group has formal members, all of whom are women. The objective of the organization is to teach skills such as mat weaving and gardening that will help improve the lifestyle of rural residents. A Senior Citizen's Group was formed in 1994 to help improve the lives of seniors. Social activities and political cohesiveness are some of the activities conducted by the group.

5.4.1.1 VALUES OF COLLECTIVE ACTION

Current Membership in Village Organizations. A survey of 54 respondents in July 1997 indicates that 39 percent belong to BOSFA and 28 percent to MAFA. Others (13%) are affiliated with civic and religious organizations. About twenty percent are not members of any association at all.

As expressed by the respondents, the main purposes of BOSFA and MAFA are to improve the condition of coastal resources (39%) and promote unity among the members (30%). In addition, these fishers' associations provide fishing information (4%) and assist in community development (4%). Other respondents (23%), all of whom are non-members of BOSFA and MAFA, were unable to cite any purpose.

Attitudes Toward Association Leadership and Decision-Making. Based on the survey, members have a very high regard for their association leader, perceiving the leadership as very respectable (85%) and very credible (93%). The leadership, moreover, is legitimate since the officers were elected by the members themselves. Decision-making within the associations is described as democratic and consultative, marked by consensus to arrive at major policies and agreements.

Attitudes Toward Collective Action. The attitudes of the respondents toward collective action are positive. About 98 percent expressed that village residents could work together to solve community problems (Table 23). In fishery, around 89 percent felt that village fishers could work together to address fishery problems. Similarly, they felt that mangrove growers could work together to solve mangrove-related problems (93%). These responses are very encouraging. Many fishers (72%), also expressed that both the government and the fishers could work together to solve fishery problems, indicating a positive attitude toward fisheries management.

Table 23. Attitudes Toward Collective Action: Marcelo

Attitude	% Member	% Non-Member	% Total	X ²	P
The community can work together to solve village problems.	100.0	96.3	98.1	1.01	0.31
Mangrove growers can work together to solve mangrove problems.	96.3	88.9	92.6	1.08	0.30
Fishers can work together to solve fishery problems.	88.9	88.9	88.9	0.00	1.00
The government and the fishers can work together to solve fishery problems.	72.7	71.4	72.2	5.06	0.08

Attitudes Toward the Distribution/Sharing of Responsibility for Fisheries Management. When the respondents were asked about the extent of responsibility sharing for resource management, 54 percent indicated equal responsibility for the government and the fishers. The rest preferred a less equal sharing (46%). Overall, there is a fairly strong support for co-management.

Table 24. Attitudes Toward the Sharing of Responsibility for Resource Management: Marcelo

Attitude	% Member	% Non-Member	% Total	X ²	P
				0.51	0.47
The government and the fishers will have unequal responsibility for resource management..	42.4	52.4	46.3		
The government and the fishers will have equal responsibility.	57.6	47.6	53.7		

Willingness to Support a Similar Project in the Future. A fairly high proportion of respondents (72%) signified willingness to support a project similar to the CMMRCRM in the future, regardless of membership in the FAs (70% versus 72%; X²=0.09, p>0.05). This finding is encouraging, in light of arduous tasks carried out by ACIPHIL, Inc. and Network Foundation in Cogtong Bay.

When asked about the types of fish and quantity of fish (multiple response) that they would like to contribute to a similar project in the future, 63 percent of the respondents mentioned that they are willing to give small pelagics. Others would share demersals (15%) and crabs (9%). The predominant value offered was one to two kg per year.

5.4.2 DECISION-MAKING AT THE VILLAGE LEVEL

At the village level, a Barangay Council consisting of ten members conducts formal decision-making. On the council are representatives from each sub-village who are elected by the sub-village constituents for a term of three years. A Barangay Captain, also elected for a three-year term by all barangay residents, heads the council. The Barangay Council has the authority to pass ordinances on the coastal resources and to enforce laws within the barangay boundaries.

Before the CMMRCRM, the Marcelo Barangay Council was not very active in enforcing fishing regulations as the coastal waters are vested within municipal jurisdiction. On rare occasions when illegal cutters were caught, the Barangay Council did not enforce laws. The Barangay Captain was responsible for conducting an investigation into illegal cutting and forwarding the case to the Municipal Council if enough evidence was found. However, perhaps because of the lax enforcement policy of the Municipal Council, such preliminary investigations were seldom conducted.

Once the CMMRCRM began however, the situation changed. Residents were informed investigations would be conducted, and if the evidence warranted, cases filed. No one in Marcelo has been apprehended for illegally cutting mangroves since the CMMRCRM began.

Marcelo Barangay Council also lent support to the project outside of stricter enforcement. The Council provided verbal endorsements and moral support to project activities. The Barangay Council was involved with information campaigns telling people why mangroves are important. Some Council members even joined the *Bantay Dagat*. The Council also passed an ordinance imposing a fine of P25 per illegally cut log and agreed to a communal area. Today, the Council still supports the activities of BOSFA and MAFA.

5.4.3 DECISION-MAKING AT THE MUNICIPAL LEVEL

The Mabini Municipal Council was slightly more involved than the Candijay Municipal Council before the CMMRCRM began. Concerned with a declining fish catch, in 1978 the Council formally established a marine park at Lumayag Islet. Within the 500-hectare park, all types of fishing gear except longline were restricted. Also, the amount of fish that could be caught was restricted to household consumption. However, there were no concerted efforts to monitor the area as the municipality did not own a motorboat. Instead, the council rented a boat from time to time. When illegal fishers were apprehended in Mabini waters, the Municipal Council usually forwarded the case to the Provincial Court. Seldom were penalties imposed on violators of illegal cutting.

Once the CMMRCRM began, the municipal government lent moral and financial support. The mayor attended some of the original meetings and helped explain the purpose and benefits of the project. A *Bantay Dagat* was officially established in 1989. The Municipal Council provided a motorboat (given to Mabini after the Municipal Council requested a boat from the Provincial Governor), a driver, and police officers as well as a weekly allotment for gas. Laws against illegal cutters were also enforced more strictly and illegal fishing fines were earmarked to fund the *Bantay Dagat*.

The Municipal Council also extended aid beyond physical support. New legislation were passed to discourage illegal fishers and cutters. One legislation passed during the CMMRCRM's existence was that all crewmembers on boats caught illegally fishing were subject to a P500 fine. Also, a law was adopted from Barangay Marcelo and applied to all Mabini that illegal cutters were subject to a P25 fine per log. An ordinance also restricted transport of forest products in raw form outside of the municipality. The Council was involved with information campaigns at the barangay level, and at the federal level officially requested the director of the Bureau of Forest Development (BFD) in Quezon City not to approve any applications for FLAs in Mabini.

After the completion of the CMMRCRM, the Municipal Council maintained a high level of involvement. The sea patrol continued, albeit only three times a week as opposed to nightly. Information campaigns were still conducted explaining the importance of mangroves. The Council also remained receptive to new ideas from MAFESFA and its various components. For example, in Marcelo the Municipal Council formally agreed to the communal mangrove areas and informally agreed to allow harvesters to use dead trees from the communal area for firewood. A motion to establish a fish sanctuary around Lumislis proposed by MAFESFA was also approved in 1995 using the rules and regulations the UF set forth. Further, to encourage the UF *Bantay Dagat* program, fifty percent of any fine imposed on illegal fishers apprehended by MAFESFA members went to the UF.

A more significant event than the CMMRCRM's conclusion influencing the involvement of the Mabini Municipal Council in managing the coastal resources was the incumbent mayor's failure to get re-elected. Illegal fishers (*baling*), resentful that their preferred way of fishing was outlawed and being enforced, apparently encouraged family and friends not to re-elect the mayor. When the new mayor's term began, the UF was suddenly no longer involved with the Municipal Council in enforcement efforts as the police refused to coordinate their efforts.

Nonetheless, the UF *Bantay Dagat* continued using a boat provided by the DENR through the new Coastal Environment Program (CEP). However the patrol, because of limited gas funds from the Municipal Council, was reduced to two times a week and restricted to the fish sanctuary. By January of 1997, the UF *Bantay Dagat* stopped because no funds have been released for gas despite the fact that P36,000 was allocated for the *Bantay Dagat* in the budget. Further, rumors persist that when the Municipal Council sends out a sea patrol corruption is rampant.

5.4.4 PROPERTY RIGHTS AND RULES

5.4.4.1 Property Rights

Customary rights and tenure for both mangroves and fishery in Marcelo have been non-existent. Until the 1980s, local residents as well as cutters from other areas freely entered the area and harvested resources without limits. Harvesting was on a first-come, first-served basis.

Mangroves. During the CMMRCRM phase, the issuance of CSCs changed the property rights structure for most of the Bay's mangroves. Within the boundaries of the CSC, the stewards can restrict both the rights of access and of withdrawal.

Outside the boundaries of the CSCs; and even within some of the land area held under CSC, the property rights picture is ambiguous and still being contested as FLA operators continue to try and exert their privileges. For example in Popog, a landowner of an upland area complained that the CSC encroached on his land. Representatives from the DENR came to the area in question and conducted an ocular survey. The survey confirmed the boundaries to be accurate and the land in question resolved to be CSC land. The ruling was made in favour of the CSC holder because mangroves must be considered as Forestlands and cannot be titled as Alienable and Disposable Lands. Therefore, mangroves are excluded from private title.

No land conflicts with FLA owners have been reported in Marcelo, but in Barangay Tambo, Municipality of Mabini, an example can be found where CSC title has superseded FLA title. During the CMMRCRM, land of one FLA that was not yet developed was subdivided into CSC land. The fishpond operator complained to the DENR that CMMRCRM members were saying that cutting trees and developing the fishpond was no longer legal. The DENR recognized that both parties had legal interest on the land but supported fully the rights of the CSC holders. Further, the DENR stated that no cutting permit would be given for the land in question. The FLA holder,

dissatisfied with the DENR's response, began making a dike around the FLA area. Making a dike is the first stage of developing a fishpond. Workers from Cebu were hired, as was an armed security guard with instructions to shoot trespassers. DENR received complaints from MAFESFA that the FLA holder was building a dike. The local DENR office sent a forest guard to execute a DENR order restricting the cutting of trees on the land. The security guard threatened the DENR-sent forest officer to get off the land or be shot. The security guard also said that without a court order, the workers would not stop.

Many representatives from the DENR Regional Office later went back to the contested area and asked for the FLA. The security guard could not produce the FLA license and the owner was not present. DENR officials told the security guard that the owner had to produce the agreement to the Central Talibon Office the following day. The FLA owner did not. The DENR has since forwarded the case to the regional trial court hoping for a court order to restrict the development of a fishpond on the FLA land. The incident is very recent relative to this research. The second visit by DENR officials from the Regional Office and subsequent filing of court case occurred during the same time period that this research was being conducted in Cogtong Bay. As such the courts were still processing the case at the conclusion of the research period. However, because of the DENR involvement and previous recognition of CSC rights, the probability of the courts restricting the development of the land into a fishpond is extremely high.

Areas not bounded by CSC but subject to FLA seem to be moving towards a communal property ownership. Since the CMMRCRM started, and continuing until present day, village residents have petitioned the national government to recognize the rights of residents versus the FLA operators' privilege. The petitions ask for FLAs to be canceled and re-defined as communal swamp land. The legal argument local residents are using is the 1987 Constitution that states residents of localities with marginal fishing and marine resources have the right to the preferential use of these resources. FLAs only grant the

holder the privilege to develop the land into a fishpond. Residents claim their rights exceed the fishpond operators' privilege. Some FLAs in Candijay have been canceled according to this argument. Therefore, the property rights seem to be moving to communal property.

Fishery. Traditional fishing rights and tenure do not exist in Marcelo. Open-access has prevailed for several decades, except in the area covered by the Lumayag fish sanctuary (1988-1995) and then by the new Lumislis fish sanctuary (1995 to date). Management rights exist for all village fishers. The Mabini Municipal Council grants exclusive fishery privileges to operators of fish corrals and mollusk beds in municipal waters outside of the fish sanctuary.

5.4.4.2 Property Rules.

Like Cogtong village, three types of rules govern the behavior of fishers in Marcelo. These include: 1) operational rules; 2) collective choice rules; and, 3) constitutional rules. Rules may be formal (written/legitimized) or informal (unwritten/traditional). Operational rules are further classified into boundary rules, allocation rules, scope rules, aggregation rules, penalty rules, and input rules (See Section 4.4.5 for details).

Formal operational rules. Formal operational rules in Marcelo are set forth in local ordinances, national legislation, and CSCs. Only fishers with authorized permits from the Municipal Council can legally fish in Mabini's municipal waters. This represents a boundary rule (i.e., who has access to resources). A 1988 ordinance prohibits bagnet (*basnig*) fishers from fishing within fifty meters of the rabbitfish concession or *Sauranan sa Danguit*.

Legal mangrove cutting is limited to CSC holders and to those who have secured cutting permits from the DENR. Based on CSC provisions, CSC holders are allowed to cut their trees, contingent upon sustainable resource use. At the level of FAs, formal operational

rules require each member to prune his CSC area, replant dead trees, and guard against illegal cutters. Violations are subject to a fine of P25. CSC holders must also permit other people access, provided no damage is done to the trees.

Formal allocation rules (i.e., harvesting actions or procedures) ban destructive fishing operations, such as blast fishing, use of cyanide and other strong poisons, use of fine mesh gillnets (below 3 cm), and deployment of commercial boats in municipal waters, among others. A 1990 municipal ordinance prohibits any person from casting fishnets within 200 meters from fish traps. Since 1993, electric shiners were no longer permitted to operate in Mabini waters. Trawl fishing was outlawed in 1996. For mangroves, municipal rules include the establishment of communal areas, but restrict the sale of raw forest products to Mabini boundaries only.

Scope rules (characteristics of product to be harvested) prohibit catching fry during the rabbit fish-spawning period. The Municipal Council has designated rabbit fish concession areas in this regard.

Penalty rules refer to the imposition of fines on rule violators. The failure of FA members to replant dead mangrove trees entails a fine of P25.

Informal operational rules. Marcelo has few informal operational rules, both for fishery and for mangroves. For instance, fishers constructing fish corrals must observe a distance of 200 meters between fish corrals (allocation rule). Fishers must also avoid getting their fishing nets entangled with other nets during fishing operations (allocation rule). On mangroves, one recognized informal rule initiated by MAFESFA is that users of the communal mangrove area can use dead trees as firewood (scope rule).

Collective Choice Rules. Collective choice rules define how rules are made and enforced. Resource users, officials or external authorities use these rules in making

decisions about how the resource should be managed. For example these rules state what proportion of the group must agree before a rule may be adopted or what methods will be used to monitor and enforce compliance with the stated rules (Ostrom 1991). Accordingly, because the CMMRCRM was a co-management project, both the government and local resource users have collective choice rules.

The Forest Management Bureau (FMB) has legislative jurisdiction over the areas bounded by CSCs. Therefore, government collective choice rules relative to the mangroves are vested within the act that established and described the operation of the FMB. The Fisheries Decree of the Philippines contains the collective choice rules for fisheries.

The constitutions of BOSFA and MAFA state that for rules to be introduced, the quorum must be eighty percent to have a legally recognized meeting. Once a meeting is recognized as legal, rules can be passed with simple majority.

As mentioned, rules, both formal and informal exist, regarding mangroves. Monitoring of these rules are just casually done by members. For example, if one member noticed another member was not replanting trees that had died, then the issue would be raised. Financial penalties are the main punitive measures taken against rule breakers. For example, failing to replant areas that have many dead trees is subject to a P25 fine. No one has ever had such penalties imposed. When posed a hypothetical question of "What would happen if the person refused to pay the fine?", respondents said the associations' action would be voted on. However, the question seemed quite silly to members. One individual belonging to MAFA seemed to summarize the sentiments of all members in responding that "*Everyone follows the rules because they feel the rules are to the land's best interest*".

The other punitive measure is revoking a person's membership to the group. To be expelled from the association, a significant rule would have to be broken. For example, when asked what would happen to a member caught fishing illegally, respondents said that the incident would be reported to the association president who would conduct an investigation. If the investigation produced enough evidence, the president would forward the case to the Municipal Council for formal action and the violator would no longer be a member of the FA.

Members of BOSFA only recall one instance of discontentment among some BOSFA members. During the early stages of the CMMRCRM, some members were reportedly unclear of the project's goals and talked badly about BOSFA at times other than at association meetings. During the next BOSFA meeting, the purpose of the project was again explained. The discontent members were then satisfied with BOSFA and no problems have been encountered since.

Similarly, MAFA members also only report one instance where a member has been unhappy. The original president of the organization knew he would be unable to attend the regular monthly meeting and informed a number of MAFA members of such. He also left behind the regular monthly dues. However, the group still voted to impose a fine on the president for not attending the meeting. The fine furthermore was increased to three times the amount the regular fine for missing a meeting because the individual was the president. Informed of the fine, the then president claimed the amount unjust, paid the fine, and then resigned from MAFA.

Constitutional Rules. Constitutional rules determine the types of rules which are permissible and who has collective choice rights (governance and modification) (Ostrom 1991). Therefore, constitutional rules define who is eligible to participate in the process of rule formation, monitoring and enforcement. Accordingly, two sets of constitutional rules exist in Cogtong Bay. The first set are embodied within the Local Government

Code, Forest Management Bureau, and the Fisheries Decree of the Philippines, and other related national legislation enacted by the government (for further discussion see section 1.1.1 in chapter four).

The second set of constitutional choice rules found in Cogtong Bay is associated with the FAs (PAGAMACO, BOSFA, MAFA and MAFESFA). All have formal rules stipulating the process for passing rules.

The situation with BOSFA and MAFA are similar. All members are involved in the process of rule formation. Prospective members must have good community standing; be of good moral character; live in the barangay; and, be truly interested in the organization and willing to live according to the responsibilities associated with being a member. An applicant must apply to the organization. The Board of Directors assesses the individual according to the required criteria. If the individual possesses the necessary characteristics, then the Board of Directors endorses the individual to the general assembly. The general assembly then votes on accepting the person or not. A stipulation that does not exist with Cogtong-based PAGAMACO however, is that now a successful candidate must pay a substantial membership fee. When BOSFA and MAFA were originally organized, both formed financial co-operatives for lending money. Both financial institutions have been successful and both groups' capital has increased substantially. Membership to BOSFA is currently P1 000 and MAFA P800.

All members of BOSFA and MAFA can present ideas for discussion. For the idea to be accepted, simple majority is required. Similar to PAGAMACO, various committees also exist to facilitate policy-making. BOSFA and MAFA have an election committee, finance committee and education committee which presents ideas to the Board of Directors. The Board can then endorse the proposal and send it to the general assembly for vote where simple majority rules.

Officers of the Board of Directors are elected every year. First, the person must be nominated. BOSFA elects officers by secret ballot while MAFA has a public vote. The individual receiving the most votes wins the position. All members can be nominated for all positions.

MAFESFA also has constitutional rules. Original membership in MAFESFA was two representatives (president and secretary) from each of the member FAs. MAFESFA officers were then elected from the group by nomination and secret ballot. Membership to MAFESFA is done by an organization basis. The UF welcomes any coastal organization from Mabini who then sends two representatives to join MAFESFA as individuals. All members can present ideas that are voted on by simple majority.

Knowledge of Fishery Rules. A survey of 54 fishers in Marcelo in July 1997 showed that not all fishers are aware of formal fishery rules (59%). Only 41 percent of the respondents were able to cite rules, particularly those related to the prohibition of illegal fishing activities (i.e., blast fishing, use of fine mesh nets, and commercial fishing within municipal waters). They explained that these rules are meant to improve the condition of coastal resources (59%) and increase fish stock (11%). The rest (30%), however, could not offer any reason for these rules. For informal fishery rules, the level of knowledge is apparently higher (89%). Most commonly cited rules are the maintenance of a 200-meter distance between fish corrals, avoidance of net entangling during fishing operations, and punishment of violators. Underlying these informal rules are such reasons as avoiding conflicts with other fishers and improving coastal resource conditions.

Knowledge of Mangrove Rules. Most respondents (78%) are aware of mangrove-related rules, particularly the prohibition of mangrove cutting without authorization. They also show an understanding of the reasons behind the rules, which are primarily linked to the need to protect mangrove resources (37%), increase mangrove stands (28%),

and improve fish catch (13%). This understanding is consistent with the messages imparted by the CMMRCRM during the project phase.

Attitude Toward Rules. More than half (56%) of the respondents felt that rule-breaking is unacceptable. About thirty percent expressed that rule-breaking is acceptable at times, while 14 percent is neutral. Members did not differ significantly from non-members in this regard. For those who consider rule-breaking as unacceptable, the main reasons given are: 1) it is not right to violate the law (43%); 2) other fishers will be negatively affected (13%); and, 3) rule-breaking will damage resources (9%). Other reasons mentioned are that rule breaking will encourage more people to violate the rule and will confuse law enforcement. Still others are afraid of imprisonment. For those who felt that rule breaking is sometimes acceptable, the justification lies in meeting the needs of the majority and the survival needs of the family.

When the respondents were asked on whether or not the rules on fish harvesting must be changed, 55 percent agreed. About 33 percent disagreed, while the rest were neutral (12%). For those who agreed, they basically felt the need for stricter laws and law enforcement as well as for the crackdown on commercial fishing. For those who disagreed, the perception is that the rules are effective and that they help deter the occurrence of conflicts among fishers.

When asked if the rules on mangrove cutting/harvesting should be changed, 59 percent of the respondents agreed, while 33 percent disagreed. The rest neither agreed nor disagreed. Members did not differ significantly from non-members in their response. The dissatisfaction with present rules is apparently rooted in the need to intensify efforts to prevent resource depletion and protect the mangroves (39%), improve the condition of mangrove stands (22%), and set in place stricter rules (20%). Others perceive an excessive cutting of mangroves. For those who are not inclined to change the rules on mangrove harvesting, they expressed that their dependence on mangroves might be

adversely affected if a change takes place (20%). Others perceive the rules as effective (19%).

5.4.5 MONITORING AND ENFORCEMENT

Monitoring and enforcement has a different history for each time period: before the CMMRCRM, during the CMMRCRM, immediately after the CMMRCRM and present day. Before the CMMRCRM, a sea patrol existed in Mabini funded by the Municipal Council. The municipality did not have a boat so one was rented. The sea patrol sporadically patrolled the area around the marine park. Fines were usually imposed on apprehended illegal fishers. No real efforts were directed to deter illegal cutters. Key informants relayed once a month, a representative from the DENR visited Marcelo for a few hours to look for illegal logs cut from the uplands being shipped into the municipality. Apparently, no concern was demonstrated for illegal cutting of mangroves in the barangay.

When the CMMRCRM project began, the Municipal Council requested the Provincial Governor to provide the municipality a motorboat for a *Bantay Dagat*. The request was granted. A full-time *Bantay Dagat* coordinated efforts with the CMMRCRM boat based in Barangay Cogtong. The Municipal Council paid for the boat's gas from a weekly budget. When costs exceeded the budget, CMMRCRM covered the difference. Police, deputized members of the various FAs, and sometimes even the mayor all staffed the boat. *Bantay Dagat* members had the authority to stop and confiscate equipment used for illegal fishing. The violations were reported to the Municipal Council who forwarded the cases to the Provincial Court. Four official violations were recorded during the CMMRCRM life span. One apprehension resulted in a five-month prison sentence. Confiscated equipment was returned after violators paid a fine.

A physical presence was not the only incentive used to discourage illegal activities. DENR started an information campaign asserting existing laws regarding illegal cutting

would be enforced and penalties implemented. DENR also explained the importance of mangroves and why people should not cut the trees. As part of the information campaign, a large billboard was erected in Marcelo reinforcing DENR's statements. Members of BOSFA and MAFA informed people in personal conversation of the new policies. Aside from enforcing existing legislation, the Mabini Municipal Council and Marcelo Barangay Council also passed new ordinances to aid in the campaign against illegal cutting and fishing.

After the CMMRCRM concluded, the *Bantay Dagat* program that had used the Municipal boat became a sea patrol as members of the UF no longer joined the boat's patrol. The sea patrol continued but only three times a week. Members of the UF started a *Bantay Dagat* with the CMMRCRM motorboat used in Cogtong during the project. The Municipal Council provided gas money for the operation of the *Bantay Dagat* and the UF made a schedule for each FA to go on patrol. Originally, the *Bantay Dagat* and sea patrol coordinated efforts. Coordination stopped when the new mayor was elected. By January 1997 the UF *Bantay Dagat* program had halted completely as no funds were released for gas despite the budget allocating P36,000 for such purposes. The municipal sea patrol still continues, but at a reduced effort. Residents are not confident as to the credibility of the sea patrol.

Recorded Violations. Recorded violations do not account for the number of actors. Rather, if many individuals acting in concert with each other are apprehended, than the instance counts as just one violation. The earliest recorded violations on record for the Municipality of Mabini are from 1961. No records existed that provided a breakdown on violations for each barangay. Therefore, the violations for the town of Mabini are presented for discussion. Since 1961 there have been 22 recorded violations. During the years 1961 to 1987 (before the CMMRCRM was initiated), there were nine recorded violations. Dynamite fishing was the most common with seven violations (78%) while

possession of dynamited fish and illegal fishing but not with dynamite are both represented once (11%).

During the CMMRCRM, there were five violations. Illegal fishing methods (not including dynamite fishing) were recorded three times (60%), while dynamite fishing once (20%). Section 68 of Presidential Decree 705 which requires individuals who gather, cut and/or collect timber to have a license was also violated once (20%). The violation was however not in Marcelo.

After the CMMRCRM officially ended, there have been eight recorded violations. Baby trawl fishing accounts for six instances (75%) and dynamite fishing for two (25%). All illegal fishing cases are forwarded to the Provincial Court for punitive action.

5.4.5.1 Current Perceptions of Rule Enforcement and Violations

Based on multiple responses, the most commonly perceived violations are: dynamite fishing (94%), cyanide fishing (76%), and intrusion of commercial fishing boats in Mabini waters (33%). Lower frequency responses of two percent each were noted on the use of fine mesh nets, mangrove cutting, and beach quarrying. The respondents indicated that the violators came from the village (54%), within Mabini (30%), and from other areas outside of Mabini (22%).

Violators have been punished for wrongdoing. However, rule violators are mainly warned (43%). Others are fined (39%) or arrested (20%). Some seven percent mentioned that no action has been taken on violators. Overall, only 48 percent expressed satisfaction with rule enforcement. About 44 percent of the respondents were dissatisfied, while the rest were neutral (8%).

On the responsibility for enforcing fishery rules in Marcelo, 76 percent of the respondents felt that the government and fishers are responsible for actual enforcement of fishery

rules (Table 25). About 13 percent indicated that only the fishers are responsible. The rest (11%) expressed that only the government is responsible. Thus, a joint effort between the government and the fishers for rule enforcement is felt.

Table 25. Actual Responsibility for Enforcing Fishery Rules and Regulations: Marcelo

Responsible Unit	% Member	% Non-Member	% Total	X ²	p
				2.353	0.308
Government only	06.1	19.0	11.1		
Fishers only	15.2	09.5	13.0		
Government and fishers	78.8	71.4	75.9		

5.5.0 EXTERNAL INSTITUTIONAL AND ORGANIZATIONAL ARRANGEMENTS

The following section highlights the delivery of services to Marcelo by external organizations before, during and after the CMMRCRM. Also discussed are the decision-making arrangements at provincial and national levels.

5.5.1 SERVICES FROM EXTERNAL ORGANIZATIONS

Before the project, Marcelo was largely outside the mainstream of external assistance. During the CMMRCRM, both Candijay and Mabini began to receive services from external organizations. ACIPHIL Inc. and the Network Foundation under a DENR contract implemented the CMMRCRM. Services the CMMRCRM brought were community organizing, mangrove rehabilitation, artificial reef construction, mariculture and, law enforcement. USAID and the Government of the Philippines provided the funding for the project.

The DENR has been an active agency of the national government. It joined project meetings and helped establish project credibility. Even after project completion, it

continued to be active in Marcelo through the new Coastal Environment Program (CEP) initiated in 1994. Since that time, the DENR has continued to re-visit the FAs in Marcelo and encourage replanting in upland and mangrove areas. BOSFA and MAFA have also received P5,500, two female goats and one pig from the DENR.

In addition to the DENR, other government departments have assisted Marcelo. The Department of Agriculture (DA) gave the necessary materials to Marcelo fishers who wanted to make fish pots (*bobos*). The Bohol Provincial Government donated a motorboat to the *Bantay Dagat* program of Marcelo. The Department of Trade and Industry (DTI) provided “soft loans” to both BOSFA and MAFA. Both groups have established excellent credit records. Recently, BOSFA received its third loan, amounting to P300,000.

5.5.1.1 Decision-Making Arrangements

The provincial government of Bohol is not directly involved in managing the coastal resources of Cogtong Bay. However, the Provincial Governor did respond to a request by the Mabini Municipal Council for a motorboat to be used in law enforcement. As a provincial government, neither the mangroves nor the fish resources lie within their jurisdiction.

The national government has had more of a role in coastal resource management in Cogtong Bay. Readers are encouraged to refer back to Chapter Four section 5.1.1 for a review of the national government’s role.

5.5.2 OUTSIDE INFLUENCES ON LOCAL RESOURCES

Three particular exogenous events can be identified that had a direct influence on the coastal resources used by Marcelo residents. The first event was in the late-1960s when commercial fishers first started to come to the Bay. Commercial cutters soon followed and arrived in the early-1970s. The second major exogenous event affecting the coastal

resources in Marcelo was in 1979. Records indicate that 1979 was the first year land in Marcelo was subject to FLAs. The CMMRCRM is also identified as a major exogenous event. BOSFA and MAFA were organized and illegal activities all but stopped due to the increased enforcement efforts. Both FAs continue to operate and as organized units have continued coastal management projects.

5.6.0 INCENTIVES TO COOPERATE AND PATTERNS OF INTERACTION

Incentives to cooperate are found at various levels: 1) among resource users; 2) between government organizations (GOs) and non-government organizations (NGOs); and, 3) among resource users, GOs and NGOs. The incentives to cooperate have triggered certain interactions, both positive and negative that have influenced project results over time.

Box 7 highlights the incentives to cooperate among resource users, between government organizations (GOs) and non-government organizations (NGOs), and among resource users, GOs and NGOs. These incentives have helped shape the course of events and interactions in Marcelo at various levels.

Box 7. Incentives to Cooperate and Patterns of Interaction: Marcelo

Incentives to Cooperate	Patterns of Interaction
• Among Resource Users	
Dependence on coastal resources	Illegal fishing and illegal mangrove cutting → worsening resource conditions and conflicts among resource users → stricter rule enforcement → support for resource management
Need for fishers' associations (FAs) to generate earnings	Formation of BOSFA and MAFA → creation of credit cooperatives since mariculture was not part of CMMRCRM activities in Marcelo → growth of equity due to expanded membership in credit cooperatives
Tangible evidence of growth of aquatic life around newly planted mangroves	Protection of newly planted areas from damage by FA members → observed increase in shrimps, crabs, shells and fingerlings around newly planted mangroves → reduction of illegal mangrove cutting in Marcelo
• Among Government Organizations (Gos) and Non-Government Organizations (NGOs).	
Desire for better coastal resource management	Issuance of national legislation to support coastal resource management → creation by DENR of the Coastal Resource Management Committee
Concern for improving the quality of life of poor families who rely on coastal resources for livelihood	Design of a new project inspired by the Central Visayas Regional Project → partnership between DENR and NGOs in implementing the new project as a component of the USAID-funded RRDP (Rainfed Resources Development Project)
• Among Resource Users, GOs and NGOs	
Legitimacy of property rights	Enforcement of required cutting permits and of mangrove stewardship contracts → reduction of illegal cutting activities in Marcelo → alienation of firewood gatherers → designation of communal mangrove areas for firewood gathering
Need to fight illegal fishing and illegal mangrove cutting	Deployment of patrol teams → alienation of illegal fishers and users of destructive fishing gear → change in political leadership → weakened support for law enforcement from the newly elected mayor → stoppage of joint patrol operations → FA members now limit their patrolling activities to the new fish sanctuary
Introduction of a new coastal resource management project to the village	Continuing FA operations even after project termination → involvement in the new Coastal Environment Project (CEP) in 1994 → replanting of more mangrove areas → receipt of livestock and financial assistance by FAs

5.6.1 AMONG RESOURCE USERS

Incentives for the resource users to co-operate originate in a common reliance on coastal resources for their livelihood. Beginning in the 1970s, the residents of Barangay Marcelo began to notice that the fish catches were decreasing. A combination of fewer mangrove stands surrounding the Bay, harmful fishing practices and over fishing reduced the productivity of the Bay's fishery. The decrease in fish catch was intensified by a need to feed a growing population.

Residents, concerned with a declining fish catch, were now prepared to act to help manage coastal resources. The situation was therefore ripe for community involvement when the CMMRCRM was proposed. The result was local resource users welcoming and eagerly participating in the CMMRCRM. Most local residents agreed to recognize the establishment of property rights over previously open-access mangroves and volunteered time and effort to help curtail illegal fishing and cutting activities.

Association members also decided to form credit cooperatives as an additional livelihood strategy. Mariculture was expected to be an income generating activity but mariculture was not part of project activities in Marcelo. BOSFA and MAFA elected to form credit cooperatives to generate capital instead of mariculture.

A few years after the CMMRCRM, benefits of rehabilitating the mangroves in Marcelo were realized. Barangay residents began to notice shrimps, crabs, shells and fingerlings in the replanted areas. In addition, village residents perceived that fish populations were increasing. Lending credence to the residents' perceptions was an increase of transient fishers, and the beginning of an aquarium fishing industry. The recognition of the increasing aquatic life marked a turning point for rule compliance. The few illegal cutters still existing stopped and all barangay residents were now conscious to use the mangroves sustainably.

However, there were also problems in Mabini. Illegal fishers resented being pushed out of their fishing practice and in the following municipal election encouraged family and

friends to vote against the incumbent mayor. Rumors also abound that the illegal fishers even bought votes. The incumbent mayor was not re-elected and the new mayor reduced the FA *Bantay Dagat* program to twice a week.

5.6.2 AMONG GOVERNMENT ORGANIZATIONS (GOs) AND NON-GOVERNMENT ORGANIZATIONS (NGOs)

Three reasons motivated the government, ACIPHIL, and Network Foundation in implementing the CMMRCRM. These are to: 1) gain experience in the design and implementation of a community-led, NGO-assisted coastal resource management project; 2) validate the learnings of the Central Visayas Regional Project (CVRP) in coastal resource management, and; 3) develop and test new approaches to mangrove management.

The involvement of ACIPHIL was prompted by its earlier experience with the CVRP and its desire to replicate and refine current approaches to resource management. The Network Foundation was involved because of its commitment to poverty alleviation and environmental protection.

5.6.3 AMONG RESOURCE USERS, GOVERNMENT ORGANIZATIONS (GOs) AND NON-GOVERNMENT ORGANIZATIONS (NGOs)

The traditional system of open-access worked well for the residents of Marcelo until the late-1960s when commercial fishers and cutters began to frequent the Bay to harvest and sell the coastal resources to larger market centers of Tagbilaran and Cebu. Cogtong Bay became a haven for both illegal fishers and illegal mangrove cutters in the 1970s because of the lack of enforcement of existing legislation, inadequate legislation, and open-access nature of the coastal resources. Consequently, the traditional users of the Bay's resources became "losers" under the existing situation. The residents witnessed the coastal resources they relied on being exploited by large-scale commercial fishers and cutters for sale to external markets. The commercial cutters and fishers left no benefits but instead contributed to environmental damage.

Local-level resource users wanted to cooperate with GOs and NGOs so that project implementers could receive formal property rights to mangrove areas. Without government recognition, such property rights could not be established. As well, the illegal activities within Cogtong Bay were so rampant that external interventions were needed to assist the under-equipped and under-funded efforts of the Municipal and Barangay Councils. However, despite early enthusiasm by Marcelo residents and moral support from the barangay and municipal levels, local residents maintained a guarded skepticism of the project and were not immediately willing to volunteer their labour. Illegal cutting and illegal fishing were prevalent in Cogtong Bay and the DA was continuing to issue Fishpond License Agreements (FLAs). Many of the individuals involved with mangrove rehabilitation were discouraged from planting because either the trees would be cut down under an FLA; or if the trees survived long enough, illegally cut and sold in Cebu. Therefore, the credibility of the project and of the government's political will were main obstacles in initiating project action.

To address the problem of conflicting government policy, the CMMRCRM staff aided the individual FAs in filing petitions to the DENR asking them not to issue anymore FLAs and to revert existing land held under FLA agreements that had not been cleared or was abandoned back to communal swamp lands. Success was enjoyed from these actions as some FLA titles were canceled and the DENR assured the residents around Cogtong Bay that the DENR would no longer issue cutting permits for areas held under FLA title. In effect, without a cutting permit, the trees on the FLA land could not be legally cut. This policy created conflicts between the FAs and DENR on one side, and the FLA holders on the other. The conflicts still exist today and have escalated to the point of armed security guards threatening to use deadly force to keep trespassers off of FLA lands while workers clear the land.

To deal with the problems of illegal activities, CMMRCRM staff also became law enforcement officials organizing a *Bantay Dagat* that BOSFA and MAFA members (as part of the UF) joined. The sea patrol from Mabini worked in conjunction with the sea patrol based in Cogtong. The enforcement effectively discouraged illegal fishers and

cutters from plying their trade. Testament to this fact was the frustration exhibited by the illegal fishers while members of the *Bantay Dagat* from Mabini were on duty. The president of MAFESFA and some other members who regularly joined the *Bantay Dagat* had their fish corrals destroyed as a form of retribution. The actions and dedication of the CMMRCRM staff in stopping fishpond construction and illegal fishing and cutting activities eased the members' doubts about the government's commitment to the project. Working together, MAFESFA members, project staff, and at times staff from government agencies were able to effectively diminish illegal activities within Cogtong Bay. The legitimization provided by the government and enforcement efforts by project staff and project adopters enabled a *Bantay Dagat* program to operate and penalties to be imposed.

Unexpected benefits that encourage the local users to continue working in cooperation with the government have been rewards from the DENR for sustaining the FAs. During the post-project phase, the launching of the DENR's Coastal Environment Project (CEP) provided a new incentive for the fishers to cooperate with the government. New mangrove areas were planted. Each FA also received livelihood assistance from the CEP covering P5,500, two female goats, and a pig for breeding purposes.

The GOs and NGOs recognized that the coastal residents make the day to day decisions on how coastal resources will be managed. Therefore, to effectively manage the resources, local level users must be a part of the process. As such long-term stewardship contracts were distributed.

A recent incentive is the government's plan to use Cogtong Bay as a prototype site for the DENR's forthcoming US \$53 million Mangrove Development Project (MDP). The MDP, financed by the Asian Development Bank, intends to place 153,000 ha of mangrove forest under rehabilitation and management by local communities at sixty sites nationwide. Cogtong Bay is envisioned to be a primary training area for NGO staff and DENR counterparts. The GOs and NGOs recognize that the coastal residents make the day-to-day decisions on how coastal resources will be managed. Therefore, to effectively

manage the resources, local level users must be a part of the process. As such the CSCs were issued.

Figure 11. Summary of Contextual Variables, Major Events and Initiatives by Project Phase: Marcelo, Bohol.

Period	1940s	50s	60s	70s	80-87	88	89	90	91	92	93	94	95	96	97
PRE-PROJECT PHASE															
• Contextual Variables															
Abundant mangrove resources	■	■	■	■											
Abundant fish resources	■	■	■												
Establishment of a marine park at Lumayag				■	■										
Redefinition of the marine park as a fish sanctuary						■									
Low-intensive, subsistence-based mangrove harvesting	■	■	■												
Low-intensive, subsistence-based fish harvesting	■	■													
Denuded mangroves					■	■									
Declining fish catch				■	■	■									
Passage of PD 2151 and 2152 to declare mangrove wilderness and mangrove reserve areas					■	■									
Market-oriented fishery			■	■	■	■									
Commercial sale of mangrove products				■	■	■									
Homogenous cultural groups	■	■	■	■	■	■									
Indifference to illegal cutting and fishing	■	■	■	■	■	■									
Open-access to coastal resources	■	■	■	■	■	■									
Fragmented/unorganized resource users	■	■	■	■	■	■									

	1940s	50s	60s	70s	80-87	88	89	90	91	92	93	94	95	96	97
Passage of legislation restricting Harmful fishing practices															
Limited services by external groups															
Construction of fishponds															
Period	1940s	50s	60s	70s	80-87	88	89	90	91	92	93	94	95	96	97
• Major Events															
Arrival of migrants from other provinces															
Presence of commercial fishers															
Presence of commercial cutters															
Issuance of FLAs															
• Incentives to Cooperate															
Common dependence on coastal resources															
PROJECT PHASE															
• Contextual Variables															
Limited illegal mangrove cutting															
Very limited illegal fishing															
Organization and active operation of fishers' associations (BOSFA and MAFA)															
Replanting of mangroves															
Strict enforcement of existing laws															
Information campaigns															
Joint patrol of municipal waters															
Establishment of property rights over mangroves															
Passage of new laws to protect coastal resources															

Period	1940s	50s	60s	70s	80-87	88	89	90	91	92	93	94	95	96	97
• Major Events															
Refusal of DENR to issue cutting permits to FLA holders							■	■	■						
Cancellation of some FLAs							■	■	■						
Alienation of firewood gatherers								■							
Informal recognition of communal mangrove areas									■						
• Incentives to Cooperate															
Legitimacy of property rights							■	■	■						
Desire for better coastal resource management							■	■	■						
Need to fight illegal coastal activities							■	■	■						
POST-PROJECT PHASE															
• Contextual Variables															
Reduction of the Municipal Council's financial and physical support for law enforcement										■	■	■	■	■	■
Resumption of illegal fishing										■	■	■	■	■	■
Stoppage of joint sea patrol operations (fishers' federation and municipal government)														■	■
Patrolling of the fish sanctuary by the fishers' association										■	■	■	■	■	■
Personal patrolling of mangrove areas by CSC holders															

Period	1940s	50s	60s	70s	80-87	88	89	90	91	92	93	94	95	96	97
• Major Events															
New municipal administration															
Establishment of a new fish sanctuary at Lumisli Island (Mabini side)															
Non-issuance of cutting permits to FLA holders															
Conversion of the Lumayag fish sanctuary into a marine park															
• Incentives to Cooperate															
Continuing dependence on coastal resources															
Continuing legitimacy of mangrove property rights															

5.7.0 OUTCOMES/PERFORMANCE INDICATORS OF CO-MANAGEMENT

For this section, the methodology used resembles that of Cogtong (see section 6.0). The technique involved a visual, self-anchoring, ladder-like scale conducive to making ordinal judgments, placed little demand on informant memory, and could be rapidly administered. The respondents were shown a ladder-like diagram with ten steps, where ten represented the best possible scenario and one the worst possible scenario in terms of the perceived changes in the indicators. The respondents were asked to indicate the appropriate step on the ladder which corresponds to their perceptions of changes in various time periods: before the project (e.g., 1988), today, and five years from now. Box 4 from the Cogtong case study summarizes the performance indicators.

5.7.1 Analysis and Discussion

The first step in the analysis involved the calculation of mean differences between *today* (T_2) and *before the project* (T_1) for each indicator. A paired comparison t-test was used to determine if the mean differences between these two time periods are statistically significant. For the overall sample, Table 26 shows a statistically significant increase in perceived levels of **all** performance indicators ($p < 0.01$). Larger and statistically significant changes were perceived in knowledge of mangrove, control over resources, benefits from the mangrove area, and information exchange on mangrove management. Smaller, yet positive changes, were noted in other indicators.

Table 26. Perceived pre-project to post-project changes in performance indicators for all respondents: before the project and now: Marcelo

Indicator	All			P
	Today (T ₂)	Before (T ₁)	T ₂ -T ₁	
Equity				
a. Participation in general	4.70	2.19	2.52	<0.01
Participation – CRM	4.76	2.17	2.59	<0.01
b. Influence in general	5.22	2.28	2.94	<0.01
Influence-CRM	5.11	2.48	2.63	<0.01
c. Control – mangrove	5.48	2.20	3.28	<0.01
d. Allocation-harvest	5.39	2.43	2.96	<0.01
e. Satisfaction-mangrove management	7.00	4.39	2.61	<0.01
f. Benefits-mangrove area	5.69	2.56	3.13	<0.01
g. Household well-being	4.70	3.28	1.43	<0.01
h. Household income	4.94	3.24	1.70	<0.01
Efficiency				
a. Collective decision-making	5.52	2.57	2.94	<0.01
b. Conflict resolution	5.87	2.91	2.96	<0.01
Sustainability				
a. Coastal resource well-being	4.89	3.70	1.19	<0.01
b. Compliance - mangrove rules	5.50	2.35	3.15	<0.01
Compliance - fishery rules	5.28	3.04	2.24	<0.01
c. Knowledge-mangrove	6.06	2.39	3.67	<0.01
d. Information exchange-mangrove	5.78	2.56	3.31	<0.01
Information exchange-fisheries	5.78	2.85	2.93	<0.01

A paired comparison t-test was also done to determine if the mean differences between perceptions *today* and *five years from now (future)* are statistically significant for each indicator. The results show that all respondents perceived positive and statistically significant changes in all performance indicators ($p < 0.01$), indicating optimism on future co-management indicators in terms of equity, efficiency, and sustainability. Relatively larger positive changes were perceived in control over mangrove resources, participation in coastal resource management, benefits from the mangrove area, compliance with mangrove rules, and information exchange on mangrove management.

Table 27 shows the perceived *pre-project changes* to post-project changes (*today*) in the

performance indicators based on membership in the fishers' association. Members perceived positive and statistically significant increases in all indicators, except in the overall well being of coastal resources ($p>0.05$). Non-members, on the other hand, perceived statistically significant changes in all indicators ($p<0.01$). Most likely, members were more conservative than non-members in their assessment of the overall well being of coastal resources, having been made aware of the implications of destructive resource uses on the resource.

Table 27. Perceived pre-project to post-project changes in performance indicators for members and non-members: before the project and now: Marcelo

	Member				Non-Member			
	Today (T ₂)	Before (T ₁)	T ₂ - T ₁	P	Today (T ₂)	Before (T ₁)	T ₂ - T ₁	P
Equity								
a. Participation in general	4.81	2.11	2.70	<0.01	4.59	2.26	2.33	<0.01
Participation in CRM	5.11	2.44	2.67	<0.01	4.41	1.89	2.52	<0.01
b. Influence in general	5.48	2.48	3.00	<0.01	4.96	2.07	2.89	<0.01
Influence over CRM	5.41	2.81	2.59	<0.01	4.81	2.15	2.67	<0.01
c. Control over fisheries	5.52	2.15	3.37	<0.01	5.44	2.26	3.19	<0.01
d. Allocation – harvest	5.48	2.11	3.37	<0.01	5.30	2.74	2.56	<0.01
e. Satisfaction – mangrove mgt	5.22	2.19	3.04	<0.01	8.78	6.59	2.19	<0.01
f. Benefits – mangrove	5.56	2.30	3.26	<0.01	5.81	2.81	3.00	<0.01
g. Well being – household	4.81	3.70	1.11	>0.05	4.59	2.85	1.74	<0.01
h. Household income	4.96	3.26	1.70	<0.01	4.93	3.22	1.70	<0.01
Efficiency								
a. Collective decision-making	5.63	2.33	3.30	<0.01	5.41	2.81	2.59	<0.01
b. Conflict resolution	6.11	3.00	3.11	<0.01	5.63	2.81	2.81	<0.01
Sustainability								
a. Coastal resource well-being	4.67	3.93	0.74	>0.05	5.11	3.48	1.63	<0.01
b. Compliance – mangrove rules	5.59	2.15	3.44	<0.01	5.41	2.56	2.85	<0.01
Compliance – fishery rules	5.63	3.00	2.63	<0.01	4.93	3.07	1.85	<0.01
c. Knowledge of mangrove	6.37	2.26	4.11	<0.01	5.74	2.52	3.22	<0.01
d. Info exchange – mangroves.	6.15	2.56	3.59	<0.01	5.59	2.56	3.04	<0.01
Info exchange – fisheries.	6.33	2.78	3.56	<0.01	5.22	2.93	2.30	<0.01

For perceptions *today* and *five years from now*, both members and non-members perceived positive and statistically significant changes in all performance indicators ($p < 0.01$). Both groups expressed positive perceptions of future changes, which augur well for sustaining co-management arrangements in Marcelo.

The second step in the analysis was to determine if the FA members differed from non-members. This was accomplished by subtracting the pre-project perception from the today perception for each indicator ($T_2 - T_1$) and calculating a two-sample t-test for the difference of mean values between the member and non-member samples. Table 28 shows that the only statistically significant difference between these two groups lies in the fair allocation of mangrove harvesting rights ($p < 0.05$), where members perceived a larger change. This is understandable because the FA members are the direct recipients of CSCs, having actively participated in mangrove rehabilitation efforts.

Moreover, the *today* perception was compared with the perception *five years from now* for each indicator using a two-sample t-test (i.e., members versus non-members). Members and non-members did not differ statistically in their perceptions of positive changes. Both groups are optimistic of the future situation.

Table 28. Differences between Members and Non-Members with Respect to Perceived pre-project to post-project changes: before the project and now: Marcelo

Indicators	Members T2-T1	Non- Member T2-T1	T-Value	Probability
Equity				
a. Participation in general	2.76	2.14	1.38	>0.05
Participation – CRM	2.82	2.24	1.38	>0.05
b. Influence in general	3.12	2.67	0.78	>0.05
Influence – CRM	2.64	2.62	-0.04	>0.05
c. Control – mangroves	3.36	3.14	1.99	<0.05
d. Allocation – mangrove harvesting rights	3.36	2.33	2.43	>0.05
e. Satisfaction – mangrove management	3.21	1.67	0.76	>0.05
f. Benefits -- mangrove area	3.27	2.90	-0.20	>0.05
g. Household well-being	1.36	1.52	-0.19	>0.05
h. Household income	1.67	1.76	0.00	>0.05
Efficiency				
a. Collective decision making	3.15	2.62	0.98	>0.05
b. Conflict resolution	3.03	2.86	0.41	>0.05
Sustainability				
a. Coastal resource well-being	1.00	1.48	-0.60	>0.05
b. Compliance – mangrove rules	3.21	3.05	2.29	>0.05
Compliance – fishery rules	2.58	1.71	1.62	>0.05
c. Knowledge – mangrove	3.79	3.48	0.59	>0.05
d. Info exchange -- mangrove	3.52	3.00	1.05	>0.05
Info exchange – fisheries.	3.30	2.33	1.95	>0.05

CHAPTER SIX: SYNTHESIS OF THE COGTONG BAY EXPERIENCE

This section summarizes the experience of the two coastal villages along Cogtong Bay in Bohol, Philippines. The section also provides a historical perspective of the contextual variables that have shaped incentives and collective action situations.

6.1.0 CONTEXTUAL VARIABLES

Cogtong Bay is located in the Central Visayas region of the Philippines. The Bay's 10,000 ha are shared by the municipalities of Mabini on the north, and Candijay on the south. 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 lands. Out of 2,000 ha of mangrove forest, 1,400 ha are still intact. Of these, about 275 ha in the islands of Lumisli, Kati-il, Tabondio and Calanggaman were declared as mangrove wilderness by the national government. The areas 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.

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 (Box 7). The Bay has no customary rights of tenure to the fishery. For the mangrove areas, however, some form of informal management and tenurial rights existed in Cogtong, Candijay from the 1940s to the mid-1980s. Some 25 families informally designated under their care mangrove areas of one hectare or less per family. Informal tenurial rights were passed on to succeeding generations. Eventually, these rights became formal when the younger generations applied for mangrove stewardship contracts in the latter half of the 1980s.

The coastal villages of Cogtong, Candijay and Marcelo, Mabini have been inhabited largely by native Boholanos and other Visayans from neighboring provinces. They are relatively homogeneous in terms of ethnicity, religion, and occupation. About 3/4 of the village population relies on coastal resources for survival and livelihood (Box 9), indicating a high degree of dependence on coastal resources. Aside from fish, most families gather crabs, shellfish, algae and other marine products for consumption and sale.

The Cogtong Bay fishery may be described as multi-species, multi-gear, and mainly artisanal. Most of the fishing has been done by small-scale fishers who own small boats and fish with traditional gear, such as fish corrals, handlines, spears, and fish traps. In the 1970s and 1980s, fishers started using non-traditional types of fishing gear, such as gillnets and Danish seine. Demersal and pelagic species have been caught in dispersed fishing grounds, both within and outside the Bay.

Box 8. Physical, technical and biological attributes: Cogtong, Candijay and Marcelo, Mabini

Indicator	Cogtong, Candijay	Marcelo, Mabini
Boundaries	<ul style="list-style-type: none"> • Open-access fishery, except the area covered by the newly-established fish sanctuary (1997) • Open-access mangrove areas until the late 1980s when DENR issued Certificates of Stewardship Contracts to mangrove planters; ban on cutting mangrove trees in mangrove wilderness reserve found in Lumislis, Kati-il, Tabondio and Calanggaman • Municipal waters delineated (inner portion of the Bay has been equidistantly divided) since 1992, but not strictly enforced • Unclear political boundaries (1970s to early 1990s) 	<ul style="list-style-type: none"> • Open-access fishery, except the area covered by the new fish sanctuary (1995) • Municipal waters delineated since 1992. Non-Mabini fishers are required to secure permits before they can fish in Mabini waters, but this is not strictly enforced • Open-access mangrove areas until the second half of the 1980s when DENR first issued CSCs to mangrove planters; ban on cutting mangrove trees in Lumislis (Mabini side of the island) • Unclear political boundaries (1970s to early 1990s)
Single or multiple fishery	<ul style="list-style-type: none"> • Multi-gear fisheries: 9 distinct gear types (i.e., gillnets, simple handlines, longlines, squid jiggers, fish corrals, fish pots, spearguns, bagnets, and Danish seine) 	<ul style="list-style-type: none"> • Multi-gear fisheries: 5 distinct gear types (i.e., gillnets, simple handlines, longlines, squid jiggers, and spearguns)
Artisanal or industrial fishery	<ul style="list-style-type: none"> • Mainly artisanal • Fishing vessels are generally less than 3 GT and mostly non-motorized 	<ul style="list-style-type: none"> • Similar to Cogtong
Level and mix of technology	<ul style="list-style-type: none"> • Mix of technology: traditional/non-destructive (fish corrals, gillnets, handlines) and destructive (e.g., use of dynamite) • Minimal fish processing at the village level (fish drying and fish paste making for household consumption) 	<ul style="list-style-type: none"> • Non-destructive (i.e., gillnets, handlines, longlines) and destructive (i.e., blast fishing) • Minimal fish drying at the village level

<p>Dispersed or localized fishing patterns</p>	<ul style="list-style-type: none"> • Year-round fishing, particularly for gillnet fishing operations and fish corrals. Seasonal fishing for simple handlines, longlines and squid jiggers. • Dispersed fishing grounds: inside Cogtong Bay (78%) and outside the Bay (22%) • Multi-species fishery : demersal (goatfish, mullet, hairtail, parrotfish, breams, snappers, groupers, slipmouth, rabbitfish, shrimps, crabs and lobsters) and pelagic (sardines, anchovies, mackerels, fusiliers and squids) 	<ul style="list-style-type: none"> • Year-round fishing, particularly for gillnet fishing operations and speargun. Seasonal fishing for simple handlines, longlines and squid jiggers • Dispersed fishing grounds: inside Cogtong Bay (90%) and outside the Bay (10%) • Multi-species fishery: similar to Cogtong
<p>Multi-species or single species fishery</p>	<ul style="list-style-type: none"> • Both sedentary and migratory species 	<ul style="list-style-type: none"> • Both sedentary and migratory species
<p>Migratory or sedentary fishery resources</p> <p>Level of stock exploitation</p>	<ul style="list-style-type: none"> • Declining catch rates, particularly for gillnets, simple handlines, squid jigger and fish corrals. • Catch rates of the majority is 2-10 kg per trip/day in 1997, down from 10-20 kg in the 1960s • Introduction of non-traditional gear types in the 1970s and 1980s (i.e., nylon nets, filter nets); increased competition among gear types • Relative decline in sizes of catch (e.g., prawns or <i>sugpo</i>) • Scarcity of high-value fish, such as groupers and snappers 	<ul style="list-style-type: none"> • Declining catch rates, particularly for gillnets and handlines • Catch rates of the majority is 2-10 kg per trip/day in 1997, down from 10-20 kg in the 1960s • Introduction of non-traditional gear types in the 1970s and 1980s (i.e., nylon nets) • Relative decline in sizes of catch (i.e., prawns)
<p>Status of habitat</p>	<ul style="list-style-type: none"> • Relatively poor water transparency at the inner portion of the Bay. • Relatively poor to fair coral condition (11-50% live coral cover); Tagaytay reef has a relatively good (50-75%) coral condition • Relatively low basal area (3.98-6.82 m²/ha); mangrove reforestation site in Katungkian has the highest basal area • Some mangrove areas were converted to fishponds, particularly near river systems 	<ul style="list-style-type: none"> • Similar to Cogtong

Box 9. Attributes of fishers and fisher community: Cogtong, Candijay and Marcelo, Mabini

Indicator	Cogtong, Candijay	Marcelo, Mabini
Homogeneity/heterogeneity of resource users	<ul style="list-style-type: none"> • Relatively homogeneous in terms of ethnicity and religion 	<ul style="list-style-type: none"> • Relatively homogeneous in terms of occupation, ethnicity and religion
Dependence on coastal resources for livelihood	<ul style="list-style-type: none"> • Relatively high dependence on coastal resources (63% of village households rely on coastal resources) • Fishing provides more than half of total household earnings for 78% of fishing households 	<ul style="list-style-type: none"> • High reliance on coastal resources (87% of village households depend on coastal resources) • Fishing provides more than half of total household earnings for 76% of fishing households
Motivation of users	<ul style="list-style-type: none"> • Subsistence-driven for fisheries until the 1960s and for mangroves, until the 1970s • Market-driven afterwards 	<ul style="list-style-type: none"> • Similar to Cogtong
Attitudes of fishers	<ul style="list-style-type: none"> • Positive attitudes toward collective action and toward co-management 	<ul style="list-style-type: none"> • Similar to Cogtong
Level of information and knowledge of coastal resource management	<ul style="list-style-type: none"> • High indigenous knowledge of fishing gear • Low knowledge of mangrove management before the CMMRCRM • Improved information exchange on fisheries management and mangrove management after the implementation of the CMMRCRM 	<ul style="list-style-type: none"> • Similar to Cogtong

Until the early-1960s, fishers recalled abundant fishery resources and thick mangrove stands. Resource abundance, along with the use of traditional and non-destructive harvesting practices and the predominance of subsistence village economies, enabled the coastal residents to enjoy marine resources without major conflicts in resource use. The mid-1960s and the onset of the 1970s, however, saw a drastic change in the situation due to three major events. These include: 1) the introduction of fishpond technology from Iloilo, a province in the Western Visayas region; 2) the arrival of commercial fishers and entry of commercial mangrove cutters from neighboring provinces; and, 3) the integration of Cogtong Bay into the heavily market-driven economies of nearby provinces and urban centers, such as Cebu and Tagbilaran. Together, these events hastened the degradation of the Bay's resources and gave rise to conflicts among resource users. The open-access nature of resource use, together with the pronounced market orientation of food fish and mangrove products since the 1970s and 1980s, led to uncontrolled mangrove cutting for firewood and for fishpond development as well as to the use of destructive fishing gear. The shift from subsistence village economies to market-driven economies opened new linkages to provincial and regional markets in the Visayas (Box 10).

The devastation of mangroves and fisheries has posed an important problem and source of discontent among coastal residents whose very survival is intertwined with the Bay's resources. Over time, village fishers increasingly became aware of the decline in their average fish catch. Their average catch dwindled from about twenty kg in the 1960s, to ten kg in the 1970s, to approximately five kg or less in the 1980s.

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., a 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) to pursue mangrove rehabilitation and coastal resource management as a component of the USAID-funded Rainfed Resources Development Project (RRDP).

Patterned after the nearshore fisheries component of the IBRD-assisted Central Visayas Regional Project (1984-1992), 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. The project adopted a community-based approach to address the problem of resource degradation and poverty in coastal villages along Cogtong Bay from 1989 to 1991. A key strategy of the project was the provision of secure tenure over areas to be managed. The Network Foundation, a non-government organization, assisted ACIPHIL in implementing the Candijay-Mabini Mangrove Rehabilitation and Coastal Resource Management Project (CMMRCRM). At the end of the project, 110 ha were replanted with mangroves (Janiola 1996). For the entire project area of eight coastal villages, 265 beneficiaries received Certificates of Stewardship Contracts (CSCs).

The CMMRCRM phase (1989-1991) 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, conditional on sustainable use. 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 then 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.

Box 10. Market Attributes: Cogtong, Candijay and Marcelo, Mabini

Indicator	Cogtong, Candijay	Marcelo, Mabini
Subsistence or market oriented	<ul style="list-style-type: none"> Market-oriented for food fish since the 1970s and for mangroves since the 1980s 	<ul style="list-style-type: none"> Similar to Cogtong
Market structure	<ul style="list-style-type: none"> Many sellers and buyers Existence of <i>sukis</i> (credit-marketing relationships) between fishers and buyers 	<ul style="list-style-type: none"> Similar to Cogtong
Market orientation	<ul style="list-style-type: none"> Oriented toward local, provincial and regional markets in the Visayas 	<ul style="list-style-type: none"> Similar to Cogtong
Value of coastal products	<ul style="list-style-type: none"> Low to medium for fish products and mangrove products 	<ul style="list-style-type: none"> Similar to Cogtong

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 (Janiola 1996). The struggle between FLA holders and village fishers eventually diminished when the DENR insisted that cutting trees in mangrove forests for fishpond development is 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, project staff and local resource users acted together and prevented the construction of illegal fishponds and the illegal harvesting of mangroves for commercial sale. The alliance also played an active role in controlling blast fishing in the Bay.

During the post-CMMRCRM phase, however, fishers observed a lower level of rule compliance (Box 11). 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 kilometers 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 of 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 Lumisli 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 incentives. These include: 1) a common dependence on coastal resources on the part of resource users; 2) heightened environmental awareness as a result of information campaigns and

community organizing efforts of the CMMRCRM; 3) desire for better coastal resource management on the part of government organizations and non-government 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.

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

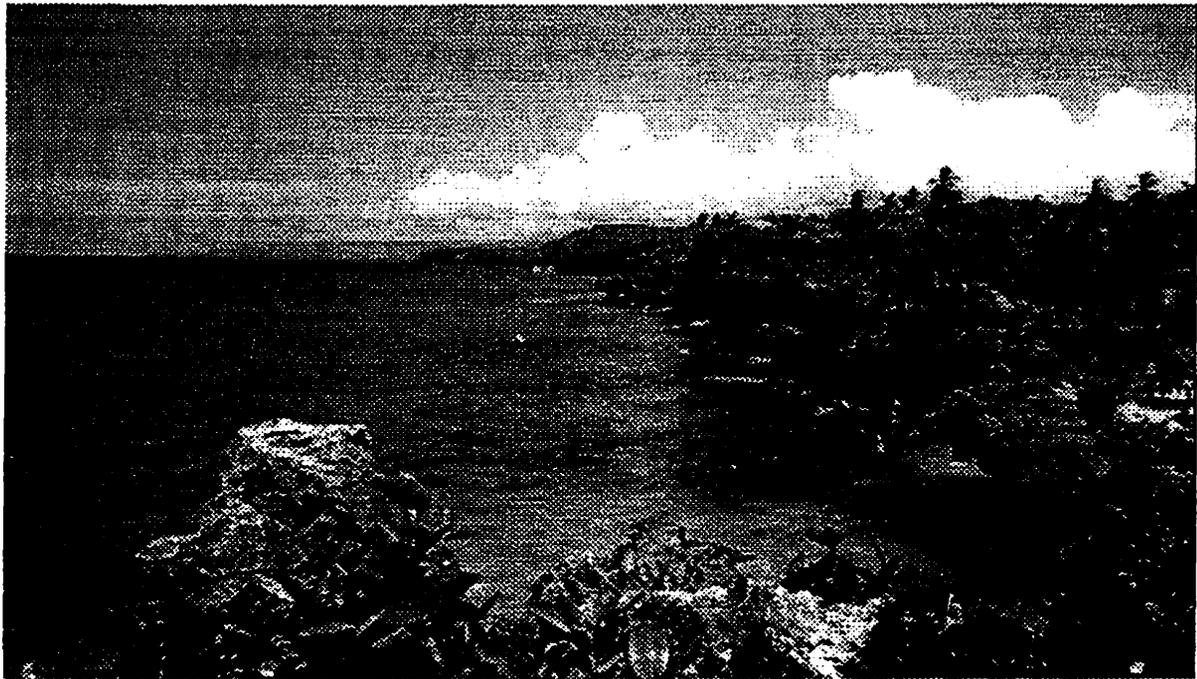
Box 11. Decision-Making Arrangements: Cogtong and Marcelo

Indicator	Cogtong, Candijay	Marcelo, Mabini
Leadership/power structure of user groups	<ul style="list-style-type: none"> • Legitimate, democratic, credible and respectable leaders • Participatory decision-making; majority vote 	<ul style="list-style-type: none"> • Similar to Cogtong
Main types of rules	<ul style="list-style-type: none"> • Informal operational rules: 1) entry to fishing grounds on a first come-first served basis; 2) distance of 200 meters between fish corrals; 3) distance between nets during fishing operations to avoid entangling of nets • Formal operational rules: 1) mandatory fishing permits; 2) ban on destructive fishing operations, such as blast fishing, use of cyanide or other strong poisons, fine mesh nets (below 3 cm), and Danish seine, among others; 4) ban on commercial fishing boats within 15 km from the shoreline • Collective choice rules: provisions on monitoring and enforcement and on settling disputes as embodied in local legislation, rules of the fishers' association, and DENR regulations • Constitutional rules: 1) Local Government Code, Fisheries Decree of the Philippines, Forest Decree of the Philippines, Presidential Proclamations and other legislation; rules of the fishers' association on the process of rule formation and approval 	<ul style="list-style-type: none"> • Similar to Cogtong
Decision-making process for operational and collective choice rules	<ul style="list-style-type: none"> • Democratic: marked by public hearings and general assemblies • Majority vote 	<ul style="list-style-type: none"> • Similar to Cogtong

<p>Level of representation of resource users and stakeholders in the decision-making processes at different levels (municipal, provincial, regional, national)</p>	<ul style="list-style-type: none"> • Village and municipal: high during project phase; low to medium during post-project phase • Provincial: low • Regional: low • National: low 	<ul style="list-style-type: none"> • Similar to Cogtong
<p>Relevance of rules</p>	<ul style="list-style-type: none"> • Medium • Relatively favorable attitude toward rules (i.e., rule-breaking is not acceptable) • Preference for shifting to stricter rules now that are supportive of sound coastal resource management 	<ul style="list-style-type: none"> • Similar to Cogtong
<p>Enforcement of rules and regulations/sanctions</p>	<ul style="list-style-type: none"> • Medium enforcement during the project phase; low enforcement during the pre-project and post-project phases • Monitoring and enforcement done by sea patrol and foot patrol during the project phase; lax enforcement after project completion; inactivity of the association of fishers after project completion; reactivation of the sea patrol in 1995 • Violators of fishery and mangrove laws are generally warned and fined • Resources available for monitoring and enforcement: motorized boat, enforcement personnel, and funds for gasoline and other operating expenses • Level of compliance: medium to high during the project phase; low during the pre-project and post-project phases 	<ul style="list-style-type: none"> • Similar to Cogtong • Deployment of patrol teams in monitoring and enforcement; active involvement of the federation of fishers in patrolling activities during the project phase and after project completion • Violators of fishery and mangrove laws are warned and fined • Resources available for enforcement: similar to Cogtong • Level of rule compliance: similar to Cogtong

CHAPTER SEVEN: CONCLUSIONS

The following section answers the objectives that were presented in chapter one. There were three specific objectives: to identify the existing property rights system to determine rights of access and withdrawal, as well as obligations associated with resource use; to identify the scale and degree of user group involvement to determine ways in which user groups can, or do participate in co-management; and to identify if co-management increases the resilience of the local social-ecological system. The following sections first address the specific objectives, followed by the overall objective. A discussion on the shortcomings of the CMMRCRM concludes the chapter.



Picture 10. What's at Stake?

7.1.0 SPECIFIC OBJECTIVES

7.1.1 EXISTING PROPERTY RIGHTS REGIME

Fishery

Rights of Access. Traditionally, and presently, fishery resources are open-access to everyone excluding the designated conservation areas such as marine parks and fish sanctuaries identified in the case study chapters. Restrictions for the designated conservation areas are vested in formal rules.

Rights of Withdrawal. Restrictions on withdrawal were present in both municipalities. Formal rules passed by the municipal councils made some methods of fishing illegal. Most restrictions have been passed within the last 15 years. As outlined in the case studies, the history of rule enforcement and rule compliance for the fishery fluctuated from very low to very high the past thirty years. Outside of restrictions on the type of method used, there were no rules regulating fish catch.

Mangroves

Rights of Access. Property rights for the mangroves are a combination of communal areas and private ownership (CSC areas). On private property, operational rules restricted rights of withdrawal only. Any individual has rights of access to CSC areas providing no damage was done to the mangroves. In Barangay Cogtong the operational rules governing the mangroves were informal and casually agreed to by CSC holders. In Marcelo, both BOSFA and MAFA had more formalized agreements for CSC holders to not restrict rights of access.

Rights of Withdrawal. No restrictions were in place to restrict methods of withdrawal until the CMMRCRM. Associated with the project, formal operational rules were passed requiring users of common area mangroves to replant a propagule (seedling) for every tree that was cut. On private area mangrove stands the CSC holder was vested with managing his plot in a "sustainable manner" (essentially replant one tree for every one cut).

Comparing the action situation of different property rights across different time periods in Cogtong Bay, a progression to the "Tragedy of the Commons" was evidenced when the resource-using community changed. The property rights regime of the resources moved to an open-access system. Local institutional management arrangements were compromised with the arrival of commercial fishers and mangrove wood cutters who did not respect local-level harvesting traditions of low-intensity, subsistence-based methods. Once the informal rules were violated by outsiders, the traditional local system collapsed and a "Tragedy of the Commons" situation, complete with resource degradation, ensued.

Researching the CMMRCRM illustrated that for any combination of change to the resources, or resource users, management techniques will have to adapt to the new arrangements. In the case of Cogtong Bay, a shift to co-management proved beneficial. Co-management was a well-suited solution to remedy the open-access property rights system. Private property rights were established to encourage mangrove conservation as opposed to mangrove degradation. Large positive benefits resulted for the mangroves.

In an attempt to manage the fishery more sustainably, FAs were organized. Although the establishment of FAs accompanied no formal change in fishery property rights, characteristics of the resource did shift from complete open-access towards communal property, a preferred property rights regime for enhancing equity, efficiency and sustainability. Marginal benefits resulted.

7.1.2 LEVEL OF PARTICIPATION

Resource user groups in Cogtong Bay had a wide scale and level of participation in co-management. "Scale" refers to the various levels of government local resource users could interact with. "Degree" is the influence local resource users had at the various levels. Although the federal level was accessible, there was very little interaction with local resource users. The degree of influence was also very low. For example, in Candijay, the town council wrote numerous letters to then-president Aquino asking for FLA areas to be converted to communal swamp. The letters were never answered. The

national government did however transfer property rights for mangroves to local CSC holders.

The degree of influence was much higher at the provincial level. For example, in Candijay, a boat was given by the provincial government to help with enforcement efforts, while in Mabini DENR officers assisted in stopping fishpond construction after a request by MAFA. Both instances occurred at the request of the local FAs. The Provincial Government did not actively pursue giving assistance without being asked first.

At the local level there was a very high degree of influence. Both town councils started *Bantay Dagat* programs with local resource users help. Today PAGAMACO and MAFA exert powerful influences in shaping municipal ordinances. For a more thorough discussion on the interactions between the various levels the reader is directed to section 4.2, 4.3 and 5.1 of Chapters Four and Five.

The range of scales and level of influence by local groups in the co-management process is not surprising. Referring back to Chapter One where a co-management scale was illustrated, the theory was presented that co-management can occur across a wide range. Similarly, because more than one government level was involved, the co-management arrangement had various degrees of power sharing between different government levels. The important aspect to understand however is that each level of government needs an adequate power sharing level with local institutions (Pomeroy and Berkes 19997). For example, has too much resource management responsibility been devolved past the point of the local institutions' capabilities to manage, or has not enough responsibility been distributed that local efforts to manage are stifled? In Cogtong Bay, although the power sharing distributions at various levels were adequate, there was not a perfect fit. The result was weak monitoring and enforcement efforts as all the government levels off-loaded costs of monitoring and enforcement to the FAs.

7.1.3 MANAGEMENT SYSTEMS AND RESILIENCE

A very important element of resiliency is a system's ability to absorb shocks and perturbations and continue to function. As was mentioned in the discussion chapters (four and five) most residents of Marcelo and Cogtong are poor, living a day-to-day subsistence lifestyle. Emergency credit is available (*suki*) and BOSFA and MAFA formed credit cooperatives, but a hand-to-mouth reality still exists. For the social system to be resilient therefore, residents cannot rely on just one livelihood strategy - e.g. fishing. Especially when one considers that most of the fishers sell the harvest. If the market price for fish suddenly decreased sharply, fishers would need another livelihood strategy to fall back on.

With co-management, and the accompanying shifting of property rights over mangroves, local CSC holders now have another option. For example, the harvest of mangrove products accounted for less than one half of household incomes for 91 percent of the respondents indicating that harvesting mangrove products augments primary occupations. However, now seven years after reforestation, the potential exists to expand this alternative livelihood. Eutiquio Petalcorin, a CSC holder and PAGAMACO member explains "*I have not yet started harvesting because the trees are only seven years, and not yet mature*". What can be derived from the statement is that fishers have planted mangroves but have not yet begun to harvest mangrove wood from their CSC lots because of the growth period needed. Therefore, once the mangrove areas are mature, additional sources of income will become available.

Theoretically, an essential element to further increase the social-ecological resiliency beyond alternative livelihood strategies is the devolution of day-to-day management responsibility to local-level resource users. One resiliency related benefits associated with local-level management is that local residents goals and needs are intimately known by those making the daily rules and choices. Also, decision-makers have a vested interest in the effectiveness of the management decisions. Further, with a shift in property rights (open-access to private property), resource users' strategies change from exploitation to conservation as the owners reap the benefits of sustainable use. Another theoretical

advantage local-level management brings to resiliency is that managers can be very responsive to any changes, no matter how slight as opposed to a more centralized "top up" system.

To determine if the co-management arrangement helped increase the resilience of the local social-ecological system (as theory suggests), residents' perceptions on efficiency, equity and sustainability may be examined. Such an examination is the focus of the next section.

7.2.0 OVERALL OBJECTIVES

The Candijay-Mabini Mangrove Rehabilitation and Coastal Resource Management project (CMMRCRM) was a project funded by USAID and the Government of the Philippines. The DENR contracted the project's implementation to ACIPHIL, a Philippine NGO. ACIPHIL implemented the project from January 1989 to September 1991. ACIPHIL and The Network Foundation jointly operated the project between September and December 1991. No outside organization oversaw the project until the DENR officially took over in March 1995 as part of the Coastal Environment Program. The CMMRCRM can provide many lessons. Despite organizational problems and at times lack of support from the Municipal Councils, the mangroves were replanted and have been sustained. The success in rehabilitating the mangroves in the face of so many obstacles such as illegal cutting, and fishpond development in the early parts of the project to the faltering of PAGAMACO and return of illegal fishers after the project stands testament to co-management's resiliency as a management option. To better understand the most important factors associated with deciding when a co-management strategy should be employed, and what (in a generic sense) conditions should be present, the following conclusions have been drawn. A limitation to the conclusions however is that co-management can occur across a range of power sharing distributions and within any environmental setting. Conclusions drawn from the CMMRCRM are based on the power sharing distributions and environmental setting associated with the project. There were many components to answering the overall objective of the project - what were the key factors in making the CMMRCRM a successful co-management arrangement. Prior

to discussing the characteristics that contributed to making the CMMRCR successful, the criteria for success must be presented.

As mentioned, equity, efficiency and sustainability were the measures of success. Section 7.0 of both Chapters Four and Five presented the findings regarding the three performance indicators. Comparisons were made of the performance indicators across three time periods. The first comparison done for both villages was values of today (1997) compared to before the project (1989). The second temporal comparison was done for the results of the today (1998) values to five years from today to determine respondents' attitudes on changes the project initiated.

In Barangay Cogtong, there were statistically significant increases in the perceived levels of all co-management performance indicators except overall well being of coastal resources and household incomes. In Marcelo, all co-management performance indicators increased. Further, respondents were optimistic about the future. All respondents from both barangays perceived positive and statistically significant changes in all performance indicators. Powerful numbers such as these are indicative of a successful project based on the criteria of equity, efficiency and sustainability. The most important criteria for success can be summarized under four main headings:

1. Resource Characteristics

There must be a **common reliance on a set of resources** and the boundaries must be clear. Further, the stock of resources must be in decline to trigger management intervention. For example, if an individual perceives resources will be abundantly available in perpetuity, what would invoke a person to sacrifice leisure time and put forth efforts and perhaps real income to conserve the resource? If however, the community members recognize that in ten years the traditional and main livelihood of community residents will disappear, individual and collective action will be much more likely. There are three examples from the Cogtong Bay experience that support this observation. First, when Mr. Gulle returned to Barangay Cogtong in 1984 and witnessed the dismal state of

the local environment, the returning resident organized COMAGCO to improve environmental problems.

The second example stems from the six main "incentives to cooperate" summarized in Chapter Six. The first two incentives identified were: 1) a common dependence on coastal resources by the resource users, and 2) heightened environmental awareness.

Key informant interviews provide the third example. Larger benefits were realized in Marcelo. Even during the community organization stage attendance at meetings (as a percentage) in Marcelo was consistently higher than in Cogtong. Project implementers opined the FAs in Marcelo were more successful than Cogtong in part, because of the higher dependence on coastal resources. The less diverse structure of the village economy in Marcelo coupled with the lower education levels (on average) limited alternative livelihood strategies.

Results from a thorough statistical analysis conducted by ICLARM on data generated from the household surveys verify the importance of a resource crisis in initiating management interventions. A change in the total perceived performance of co-management in Cogtong village was strongly influenced by the perception of a resource crisis prior to project implementation. This independent variable accounts for 14 percent of the variance in the component (adjusted $R^2=0.138$). The regression equation is statistically significant ($p<0.01$). The finding suggests that the recognition of a worsening resource condition is a driving force that motivates resource users to take joint action on the situation (ICLARM 1998).

2. Institutions

Local-level institutions capable of assuming an increased role in management responsibility must be present. As part of the contract, ACIPHIL staff had to establish FAs before any other project-related activities could start. For local-level resource users to share power and decision-making, community organization must be strong enough to handle such responsibilities. For example, in Cogtong Bay, the local resource users had, for their entire existence, been in a resource use situation of open-access to fugitive

resources. Social institutions capable of handling management responsibilities are not often found in such situations, just as 16 lane freeways are not often found in poor rural settings. To devolve property rights and management responsibility over resources without preparing the resource users through seminars educating the people on management techniques would not be effective. The first activity of project staff reflected the importance of building local-level institutional capabilities as village members were organized into local FAs. Additional research further supports the need for capable local institutions in successful co-management arrangements (Berkes 1997)

3. Process Features

The **process** of implementing co-management arrangements **requires flexibility** to permit the project to grow into the community. A general implementation plan was developed for the CMMRCRM based on learnings from other coastal resource projects, and from an understanding of project goals and local needs. However, unexpected reactions occurred when the project was implemented. For example, in Barangay Cogtong the project originally alienated the firewood gatherers by annexing common property mangrove stands. Firewood gatherers therefore opposed the project that threatened their livelihood. Other coastal resource users supported the marginalized group based on humanitarian reasons. Such reactions were not expected in the project planning stage. If the project's implementation process was rigid, and incapable of adapting to change, a large section of the population would have been at odds with the project. Instead, by maintaining some mangrove areas as accessible communal property, the firewood gatherers were able to maintain their livelihood and community concerns were addressed.

Trust between the actors must be established. The Cogtong Bay experience illustrated the importance of establishing trust between local-level cooperators and the government and project implementers. For example, when the government's commitment to the project goals of reforestation was questioned in the early stages of the project, participants in both barangays were skeptical about becoming involved. However, when the project's implementers began enforcing laws against illegal fishing and cutting and

protesting against fishpond development, local-level resource users were more anxious to participate. Trust is also recognized as a major requisite in other co-management arrangements by Berkes (1997) in his synthesis on defining characteristics of successful co-management arrangements.

Effective participation is required. The process facilitated a high level of public involvement. When dealing with community-based resource management and co-management, an essential component is the participation of local resource users. The CMMRCRM encouraged public involvement by bringing the project to the people instead of having the people come to the project. For example, in the early stages of institution building, project staff went door to door explaining the project's intended goals and expected benefits. The local residents were then invited to attend a meeting (scheduled to take place at the end of the monthly general village meeting) to become involved with the project. The CMMRCRM generated high public involvement because of the culturally appropriate methods used in recruiting participants. Had the staff stormed into the village and demanded all residents attend a meeting during the lunch hour, the degree of participation would have been much lower.

Local resource users must be involved in monitoring and enforcement efforts. For example, a *Bantay Dagat* as opposed to a sea patrol. Police officers do not directly rely on fish for their livelihood. Rather the local government pays a police officer. Therefore if a police officer is bribed or "on the take", the individual is not directly hurting their livelihood. Residents of both Cogtong and Marcelo suspect police corruption. One senior Municipal Council member from Mabini even reported that the local police take bribes and do not enforce the laws properly. If however, members of the FA were present during monitoring, then the probability of corruption decreases. To be a member of a FA in Cogtong Bay, an individual must be dependent on coastal resources. Therefore if a FA member chooses to be corrupt, than the livelihood of that person is directly negatively affected.

Further, monitoring and enforcement must be effective. Positive results from the CMMRCRM were weakened according to local respondents because of poor monitoring and enforcement. In Cogtong village, the majority (80%) of respondents stated the fishery resources are currently degraded. Numerous causes were given, 66 percent were directly related to illegal fishing. A total of 45 percent of the Cogtong respondents cited mangrove resources as being degraded. The main explanation according to respondents was illegal mangrove cutting.

Similar results were found in Marcelo where 68 percent of respondents stated fishery resources are currently degraded because of illegal fishing and over-fishing. Regarding mangroves, only six percent of Marcelo respondents identified mangroves as degraded but, all claimed illegal cutting as the sole reason. Policy implications for other co-management arrangements are to ensure a change in property rights is accompanied with monitoring and enforcement efforts so intended benefits are maximized.

4. Livelihood Benefits

The CMMRCRM illustrated the positive results when **tangible benefits accrue to local resource users**. Most management plans of over-exploited resources call for conservation and more sustainable use. Often local resource users are asked to place trust in project implementers that the lives of local residents will improve if the project's plans are followed. However it is unreasonable to expect that people who live hand to mouth, day-to-day will be capable of waiting five years before any benefits are expected. A very important aspect of the CMMRCRM in Marcelo that encouraged rule compliance was the recognition of tangible benefits. For example, when aquatic life around newly planted mangroves were seen in Marcelo, the few remaining illegal cutters stopped. Although seeing aquatic life around newly planted mangroves did not give immediate tangible benefits, local users were identified as being able to make the connection between healthy mangroves and a healthy fishery (100% in Cogtong, 98% in Marcelo).

A situation reflective of the role tangible benefits have can be illustrated in a comparison between the fishery and the mangroves. Almost all reported illegal resource related

activities in Cogtong Bay since the project's conclusion were illegal fishing. There were no official reports of illegal woodcutting. A possible explanation is that unlike CSC lots, the fishery has no boundaries. Fish remain a transient and fugative resource without property rights so one individual's efforts to conserve is not directly recognized. The level of positive re-enforcement is not exhibited to the same degree as with mangrove stands where a CSC owner can physically see improving resource conditions and encouraged to continue more sustainable resource use.

Future co-management arrangements may want to consider the importance of tangible benefits to local cooperators. Alternative revenue sources (even payments) to aid families during the transition period could reduce the need to break rules during poor times. Payments may lessen the need for monitoring and enforcement as resource users would not be made "worse-off" during transition periods. Methods to illustrate to local participant's project successes (e.g. water quality measurements or some other indicator of environmental quality that responds quickly to ecosystem changes) could encourage further compliance as positive re-enforcement. Berkes (1997) agrees with the importance of generating economic (livelihood) benefits for successful co-management arrangements.

Another key element of the project was that the project's clear geographic boundaries enabled individuals to **directly observe positive results**. Individuals could directly identify positive results, and receive benefits from a healthy section of mangrove forest. Benefits were not spread out thinly along a vast area, but were obvious and close to home. This links closely with tangible benefits. Participants in the CMMRCRM were able to recognize tangible benefits such as replanted mangroves which was linked to increased rule compliance in Marcelo. Future projects should consider the important role recognizing benefits has in sustaining project goals with local-level cooperators and implement project parameters that reflect the importance of recognizable benefits.

People's organizations should **enable institutional development and empowerment that improves a community's means to generate its own livelihood activities**. The

CMMRCRM did establish the institutional development in both case study villages but Cogtong village did not extend the new social institutions to activities beyond the project. As a result, the FA was not sustained once the project benefits stopped. For example, PAGAMACO members widely report that the organization disbanded once the CMMRCRM staff left because of poor leadership. However, if poor leadership was the main reason PAGAMACO disbanded, the new question becomes “Why did someone else not fill the leadership void”? Once the project had ended and each individual had received title to the CSC, had witnessed the last AR put in place or built their mariculture structures, there were no more project benefits, and therefore no incentives to sustain the FA. Direct and tangible benefits were no longer going to be provided.

By contrast, in Barangay Marcelo, members of both MAFA and BOSFA extended the benefits of the social institution building beyond project activities. Credit cooperatives were initiated. Benefits to members from the credit cooperatives were twofold. First, members had access to loans. Second, because interest was charged on the loans, members (shareholders) received economic gain. For example, the capital of MAFA has increased so much that membership (membership is equal to owning one share in the association) currently costs P800. Original membership fees were P20. If today in Marcelo MAFA’s leadership became disinterested and stopped calling meetings, individual members who in essence have over P800 each in stock in the organization will likely not permit MAFA to disband. Therefore, developing social institutions that empower local residents and improves the community's means to generate livelihood activities is an essential component to perpetuating local people organizations. Perpetuating local people organizations in turn is essential to implementing successful co-management arrangements.

7.3.0 CHALLENGES FOR CO-MANAGEMENT

The concluding discussion has so far presented a positive picture of co-management and the benefits the CMMRCRM brought to Cogtong Bay. However, a major obstacle to the success of the project was rule breaking. Two main explanations illustrate why rule

breaking was so common. The first explanation is based on property rights. The second deals with socio-economic conditions.

A total of eighty percent of Cogtong respondents, reported that the fishery resources were degraded. Rule breaking was the main reason. In Marcelo, the percentage reporting a degraded fishery was 68. Again, rule breaking was the primary cause. However, only 45 percent of the respondents in Cogtong reported today's mangroves to be degraded and only six percent made the claim of degraded mangroves in Marcelo. Analogous to the explanations for poor fishery resources, illegal activities were the primary cause of degraded mangroves.

There is a large discrepancy between the number of respondents who claim the fishery to be degraded when compared to the percentage who report the mangroves to be degraded (80% vs. 45% in Cogtong; 68% vs. 6% in Marcelo). A plausible explanation for the discrepancy is that the CMMRCRM changed the property rights situation for the mangroves, but not for the fishery. Therefore rules of resource use subject to community social pressure were formed for mangroves (sustainable use) while the fishery only had restrictions on types of harvesting (excluding the fish sanctuaries). The fishery in effect remained open-access as communal property controls with the formation of FAs were incomplete. Although rules did detail illegal fishing methods, because there was no local ownership of the resource as is the case with the mangroves, social pressures to comply are less. Effective property rights could have included communal fishing territories used under community accepted and enforced rules. Many examples exist around the world that document communal property rights can be associated with common property fishing systems (Dyer and McGoodwin 1994; Wilson et al 1994).

Another factor affecting rule compliance is socio-economic conditions. Two groups of rule-breakers can be identified within the local community. The first group lives a day-to-day hand-to-mouth existence. Given the choice of starving today or going to jail tomorrow, the latter will almost always prevail. This survival mentality accounts for the

first group of rule-breakers. Recommendations in the preceding section suggested solutions on how to reduce the need for people to break rules to obtain food.

Violators in the second group are not starving, but rather hungry for profits and luxury items. Rule breaking by this second group of culprits poses a serious threat to what the CMMRCRM tried to, and mostly did accomplish. As the benefits of healthy mangroves continue to augment the fishery, the amount of harvestable resources will increase. The richer the resource base becomes, the more resources and profits illegal fishers and mangrove wood cutters will gain. Greater rewards will not only lead to increased difficulty in discouraging existing illegal practices, but also enhance the temptation for current rule cooperators to break the rules. For example, if a rule-complying individual sees his rule breaking neighbour with a colour television, the desire to also obtain a colour television may overcome the individual's moral commitment to rule-compliance. If more resource users are enticed to break the rules, the action situation may reflect what happened when commercial cutters and fishers first arrived in Cogtong Bay. A result may be a return to open-access resources as formal management rules (as opposed to informal traditions as the case was in the 1970s) are ignored. Vigilant monitoring and stern enforcement, combined with information campaigns may be the only solution to discourage the actions of this second group of rule-breakers, but at what point do the costs exceed the benefits?

As a concluding comment, co-management arrangements do provide positive benefits, but at the current level of implementation do not provide a panacea for all that ails natural resources management. A very daunting problem of rule breaking was evidenced in the analysis of all the contextual variables in both villages. Until solutions to such grassroots problems can be implemented, benefits of the CMMRCRM will continue to be skimmed by unscrupulous actors concerned not with community sustainability, but personal economic rewards.

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DEFINITIONS

Alienable or Disposable Land: Any portion of the public domain certified by the Director of Forestry as better suited for agricultural than forestry purposes and therefore not required by the public interest to be retained as forest land (Forestry Administrative Order Number 11 1970).

Communal Forest: a tract of public forest set aside for the exclusive use of the residents of a municipality from which said residents may cut, collect and remove forest products for their personal use in accordance with all existing law and regulations (Forestry Administrative Order Number 11 1970).

Co-management: Refers to the sharing of management responsibility and/or authority of a resource between the government as owners of the resource, and the local community as users of the resource (Pomeroy and Williams 1994). Co-management is further defined as blending the two "pure" management alternatives of state-level management with local-level management (Berkes, George and Preston 1991).

Common-property (common-pool) resources: A class of resources for which exclusion is difficult and joint use involves subtractibility (Feeny et al. 1990; Berkes 1989).

Community Based Resource Management (CBRM): A management system whereby the local community of resource users has the responsibility for managing resources including planning, implementation, monitoring and enforcement (Pomeroy 1994).

Forest Land: those lands of the public domain determined and classified as needed for forest purposes (Forestry Administrative Order Number 11 1970).

Institutional Arrangements: The set of rights and rules by which a community of resource users organize resource governance, management and use in collective action situations (ICLARM and NSC 1996).

Open-Access Regime: The absence of well defined property rights. Access to the resource is unregulated and free and open to anyone (ICLARM and NSC 1996).

Local-Level Management: Decentralized management which may use customary authority. Based on traditional ecological knowledge, and rule-making and enforcement at the local level. Relies on self-regulation and social sanctions (Berkes 1994).

Mangrove Forest: A type of forest occurring on tidal flats along the sea coast, extending along streams where the water is brackish (Presidential Decree Number 705 1975).

Mariculture: The accepted definition is "Maritime Aquaculture". However within the report the phrase is used according to the local meaning – oyster growing. Mariculture was one of three project activities (along with artificial reef deployment and mangrove reforestation) initiated in Barangay Cogtong by the CMMRCRM.

Resiliency: The magnitude of disturbance that can be absorbed before a system changes its structure by changing the variables and processes that control behaviour and the ability of a system to absorb perturbations (Berkes and Folke 1994).

State-Level Management: Management conducted by a centralized authority such as a federal agency; based on scientific data and analysis; and uses the authority of government laws and regulations for enforcement (Berkes 1994).

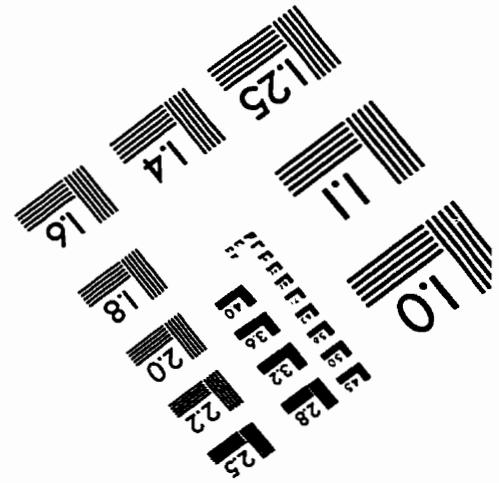
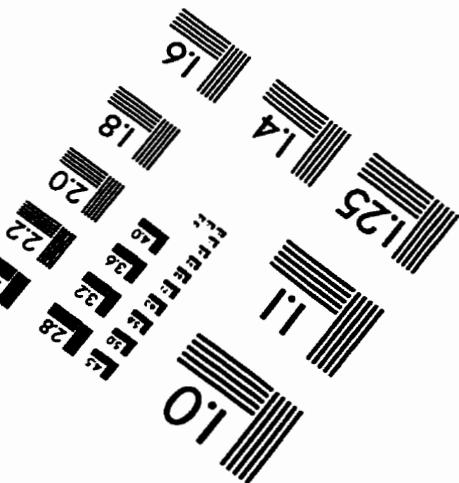
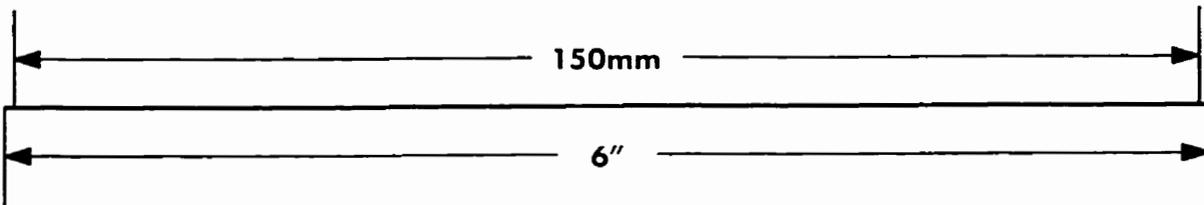
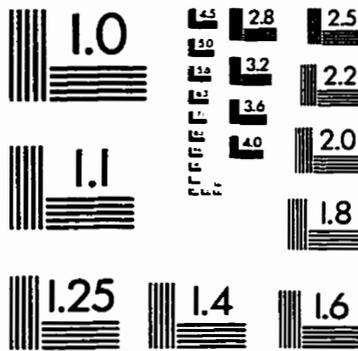
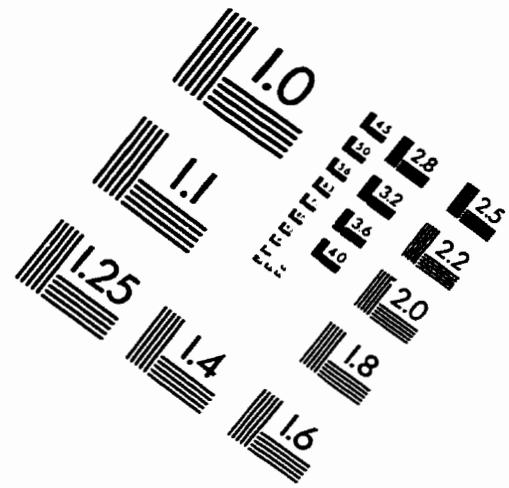
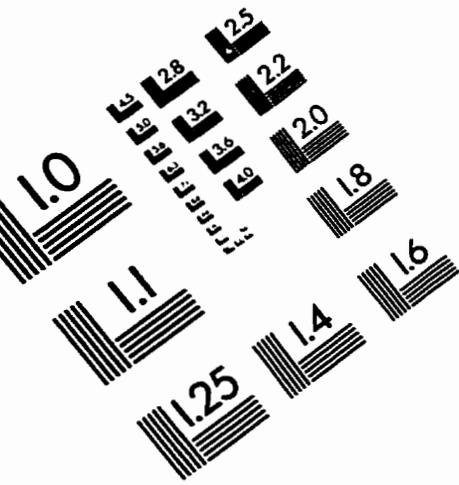
Stewardship: The tendency for resource users to maintain productivity and ecological characteristics of the resource (Berkes 1989).

Sustainability: Can be divided into stewardship and resilience. Sustainability implies not challenging ecological thresholds on temporal and spatial scales that will negatively affect ecological services and human welfare. Sustainability is a process including ecological, social and economic dimensions (Berkes and Folke 1994).

Traditional Ecological Knowledge (TEK): A cumulative body of knowledge and beliefs, handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment (Berkes and Folke 1994).

Western Resource Management Systems: Resource management based on Newtonian science and expertise of government resource managers; used herein interchangeably with scientific resource management systems (Berkes and Folke 1994).

IMAGE EVALUATION TEST TARGET (QA-3)



APPLIED IMAGE, Inc
1653 East Main Street
Rochester, NY 14609 USA
Phone: 716/482-0300
Fax: 716/288-5989

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