

## CHAPTER 1

# INTRODUCTION

### 1.1 Background

Beginning in 1994, the Institute for Fisheries Management (IFM) at the North Sea Center (NSC) in Denmark and the International Center for Living 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. Another goal of the overall research project is 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 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, Republic of South Africa, Thailand, Vietnam, Zambia and Zimbabwe.

The Philippines possesses a number of potential case study sites where there is sufficient experience with co-management arrangements to begin examining performance 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 through the Mangrove Rehabilitation and Coastal Resource Management Project (MRCRMP) in Candijay and Mabini. The United States Agency for International Development (USAID) 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 primary goal of the project was to transform the resource users of eight coastal barangays located in two municipalities along Cogtong Bay into resource managers. The main accomplishments of the MRCRMP relative to its primary goal were the establishment of fishers' associations (FA) capable of managing resources more effectively than individuals, the replanting of mangrove areas 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 MRCRMP. Included in the analysis are the formulation, implementation and management of the project, as well as the 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 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 since the case study setting is unique to Cogtong Bay. Further, co-management agreements can occur anywhere within a spectrum of possibilities, where responsibility for resource management 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 of other co-management arrangements in the Philippines, other Asian countries, and Africa.

## 1.2 Research Framework and Methodology

Co-management refers to the sharing of management responsibility and/or authority over a resource between the government and the local community (Pomeroy and Williams 1994). Co-management arrangements blend 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 equally distributed between the government and the local users. Rather, co-management occurs across a broad range of possibilities, 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 exist where the local resource users design, implement and enforce laws and regulations with mere advice from, or in consultation with, the government (Pomeroy and Berkes 1997). Usually co-management agreements exist somewhere between these two extremes.

The arrangement in Cogtong Bay is an interesting co-management situation. The MRCRMP as a whole is a coastal resource management project, not just a fisheries specific project. Integral to the project goal was the issuance of Certificate of Stewardship Contracts (CSC) to provide tenurial security to mangrove growers. However, the ultimate goal of most project cooperators is linked to a healthy and abundant fishery. The situation provides an excellent opportunity to determine if co-management is a management option suitable only to single resource system management (i.e., fishery) or if co-management can provide ecosystem management.

Since the project addresses coastal resources management, a more holistic perception is called for. Thus, both the mangroves and the fishery are assessed. An analysis of mangroves and mangrove users is necessary because the establishment of a co-management arrangement partly hinged on the issuance of mangrove stewardship contracts. An analysis of the fishers and the fishery is likewise important because a healthy fishery is the goal of local project implementors. The reader should also be aware of the unique relationship between mangrove cooperators and fishers. The relationship is that almost all mangrove cooperators are fishers. However, not all fishers were involved in replanting the mangroves.

Plenty of literature exists on spelling out what is needed for co-management to be successful. However, much less literature exists on assessing the performance and impact 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, resolve 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. The first aspect, institutional arrangement analysis, describes what is occurring in the action situation and specifies relationships between institutional and organizational arrangements. Institutional arrangement analysis links the set of contextual variables -- biological, physical and technological; market; stakeholder and community characteristics; 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 to 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 of co-management arrangements on the systems that operate and affect the resource, inclusive of human and ecological dimensions.

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

**Hypotheses of the Study.** The hypotheses to be tested by this study include: 1) dependence on coastal resources and resource crisis recognition motivate people to support collective action arrangements and 2) the provision of property rights is important to the performance of co-management regimes.

### 1.2.1 Data Collection and Sampling

The data collection process has several steps. At the case study site, researchers investigate the creation of a co-management regime. A historical perspective allows the analysis to take into account data on contextual variables -- such as bio-physical and technical attributes, market, fisher/community attributes, institutional arrangements, and exogenous variables -- and compare them to changes over time. The case study draws information from a random sample of 108 fishing households in two coastal villages, from key informant interviews with village leaders and members of the project beneficiary association, from published articles, and from individuals or organizations that have worked at the site.

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:

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**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
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On site, twelve field enumerators were trained to gather household data. The sample size of 54 for each village was based on power analysis described by Cohen (1988). It included two sample groups of 27 each, drawn randomly 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 implementors, and various personnel of local government units (LGUs) at the municipal level. Secondary data, including local legislation/ordinances, socioeconomic-demographic profiles, project preparation documents, progress reports, and published articles, were collected to support the primary data.

### 1.2.2 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. For the quantitative analysis, several inferential statistical tools were employed in the study: chi-square, t-test (paired and independent sample), principal component analysis, correlation analysis, and regression.

For nominal/categorical variables, chi-square tested the hypothesis of independence between samples of respondents, e.g., members and non-members. The paired t-test tested for significance of difference between two time periods while the independent sample t-test tested for significance of differences between two independent samples, e.g., members versus non-members. Correlation and regression analyses were used to determine the relationship between dependent and independent variables. Principal component analysis, a variable reduction procedure, was instrumental in assessing whether relationships can be reduced to a smaller number of components or composite variables and thus account for most of the variance in the observed variables.<sup>1</sup>

### 1.3 Overview of Case Study Sites

To achieve an understanding of the factors that are associated with successful co-management arrangements, two villages were selected as case study sites: Cogtong in Candijay municipality and Marcelo in Mabini. Both villages satisfied five site selection criteria: 1) actual sharing of responsibility and authority for coastal resource management between the government and the village; 2) dependence of village residents on fishing; 3) establishment of a resource management

<sup>1</sup> The discussion of the methodology comes from Pomeroy, R. S., Pollnac, R. B., Predo, C. D., and Katon, B. M., "Impact Evaluation of Community-Based Coastal Resource Management Projects in the Philippines," ICLARM Research Report No. 3, June 1996.

technology; 4) existence of property rights and rules; and 5) sustainability of coastal resource management interventions after project completion and demonstration of tangible outcomes.

Cogtong is a village that depends heavily on coastal resources to provide food and income to village residents. Of the 561 households in 1997 (or approximately 3,361 persons), about 65 percent are dependent on fishing and fish trading.

Despite active involvement of the FA in Cogtong during the MRCRMP, it 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-MRCRMP period since individual CSC holders continued to patrol their areas.

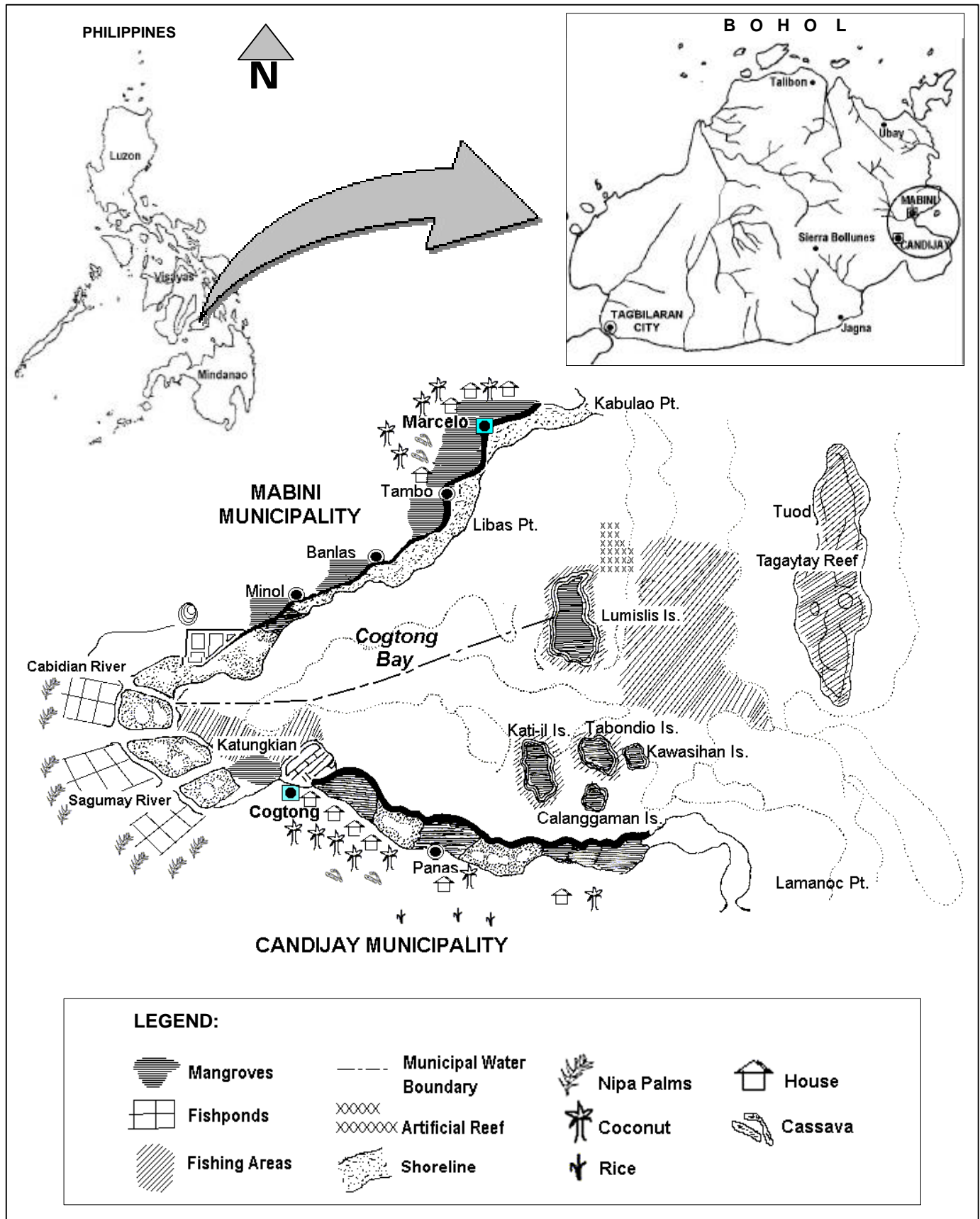
Marcelo in the municipality of Mabini resembles Cogtong in many ways. It is a coastal village with a long history of fishing. The 777 residents live in 144 households. For the majority of village residents, fishing is the primary source of income. Both FAs in Barangay Marcelo, as well as the United Federation of all the FAs established by the project in Mabini, have continued to operate and have been actively involved with the DENR's Coastal Environment Program (CEP). If one single event can be recognized as the main incentive to continue with the MRCRMP's goals in Marcelo, that event would be the growth 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.

Despite problems at both project sites (municipal and village levels) and the continuation of illegal fishing, the MRCRMP helped bring about a chain of events that continue to this day. The MRCRMP instilled in the residents a sense of empowerment and environmental awareness. Since then, many more positive changes have been introduced to Cogtong Bay. The most notable is the establishment of fish sanctuaries by both municipalities. Moreover, the FA in Barangay Cogtong has been re-activated to pursue other reforestation contracts. Both FAs in Marcelo have also been involved in subsequent reforestation activities. The MRCRMP shows that even the most dismal of situations can be improved through a partnership with the local residents.

#### **1.4 Summary of the Co-Management Experience of Cogtong Bay**

Cogtong Bay has an area of about 10,000 hectares and a relatively shallow depth of less than 10 m (5 fathoms), particularly at the inner portion. It is located on the eastern coast of Bohol, an island province in the Central Visayas region of the Philippines (Figure 1). Mangroves fringe the coastline with an estimated extent of 2,000 hectares. Of these, 1,400 hectares are still 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. These mangrove forest reserves extend from Barangay Panas to Lamanoc Point in the southern portion of the Bay. The mangrove wilderness areas are located on four islands: Lumislis, Kati-il, Tabondio and Calanggaman. Three rivers empty into the Bay, namely, Cabidian, Lunsoda-an and Sagumay rivers. Near the mouth of these rivers, fishponds are situated.

Figure 1. Resource map of Cogtong Bay.



Seagrass beds and corals fringe the outer edges of the reef on the north from Kabulao Point to Lumislis Island and on the south, from Lamanoc Point to Kawasihan. In Tagaytay reef, located east of Lumislis Island near the mouth of the Bay, corals are also present. Off the northeastern section of Lumislis Island, about 265 artificial reef concrete modules were deployed in the early 1990s by the MRCRMP.

Kabulao Point marks the Bay's northern border while Lamanoc Point demarcates the southern border. Limestone hills are found near the outer portions of the Bay. The inner portion has extensive mangrove stands, irrigated rice fields and coconut lands (Janiola 1996). Two municipalities, Mabini on the north shore and Candijay on the south, border Cogtong Bay.

Candijay has developed into more of a commercial center than Mabini with many small stores, mills and public markets. Commercial activity in Mabini is very limited. Although Candijay is economically more diverse than Mabini, two types of primary economic activity prevail within the *barangays* (villages) of both municipalities. The majority of inland village residents are farmers, while those in coastal villages are mostly fishers.

Historically, a well-defined system of coastal resource management did not evolve in Cogtong Bay because of its abundant resources. Prior to World War II, fishers in Cogtong recalled thick mangrove stands and rich coastal resources, such as fish, shells and other marine products. In general, residents of Candijay and Mabini harvested the resources, using low-intensive fishing and cutting methods. Fishers from neighboring areas sometimes fished in Cogtong Bay, but this was done primarily for subsistence. The low level of effort at that time did not call for collective resource management. Property rights and rules did not exist for the fishery, but a few mangrove stands in Cogtong village were recognized as belonging to family units. Most mangroves, however, remained open access.

After World War II, migrants from other parts of Bohol settled around Cogtong Bay because of the Bay's rich coastal resources. During the same period, cheap explosives entered the market that gave rise to blast fishing within the Bay. The ecosystem's health, however, was good enough to handle these perturbations. Fishers observed that fish catch did not immediately suffer in the late 1940s and 1950s.

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 fishpond technology, basically involving shrimps and milkfish. 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 in the village for fishpond development. Hundreds of hectares of mangroves along the Bay fell victim to such "development."

The late 1960s also marked the entry of large-scale commercial fishers to Cogtong Bay from areas outside of Candijay and Mabini. The 1970s saw heavy commercial fishing in the Bay. An additional stress on coastal resources came from commercial woodcutters who arrived in the area at the onset of the 1970s. Wood was loaded on large boats from neighboring towns and later sold 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 kilos per fishing trip in the 1960s to about 10 kilos in the mid-1970s. The downward trend continued in the 1980s. By 1988, or just before the MRCRMP started, the average fish catch per trip had dwindled to about seven kilos. This represented approximately 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 began to increase efforts to conserve fishery resources. The Mabini Municipal Council established a marine park in 1978 where only longline gear and catch intended for own consumption were considered legal. In the 1980s, both Municipal Councils also began passing more legislation that restricted the use of environmentally harmful fishing methods. However, the Bay had already become a haven for illegal fishers and mangrove cutters. On their own, the Municipal Councils could not fully deter violators.

The national government was largely uninvolved in Cogtong Bay until 1984 when, as part of the Integrated Social Forestry (ISF) program, the village residents of Cogtong replanted some mangrove areas. In exchange, the planters received Certificate of Stewardship Contracts (CSC).

From 1984 to 1989, the Municipal Councils in Candijay and Mabini struggled against illegal fishing and illegal mangrove cutting and clearing for fishponds. January 1, 1989 ushered in the official implementation of MRCRMP in Cogtong Bay, alongside greater law enforcement efforts to conserve mangroves and fisheries. The MRCRMP, patterned after the Nearshore Fisheries Component of the Central Visayas Regional Project (1984-1992), adopted a community-based coastal resource management strategy to address resource degradation and poverty in coastal areas.

The community-based approach recognized that the coastal residents are the day-to-day decision-makers on the use of coastal resources. The MRCRMP sought to transform the coastal resource users from merely resource users to both resource users and managers. The project implemented four components: 1) community organizing; 2) mangrove rehabilitation (150 hectares); 3) coastal management; and 4) mariculture. Monitoring and enforcement also emerged as an imperative project activity. This was carried out with the assistance of the newly-formed *Bantay Dagat*, literally translated as Guardians of the Sea, that conducted information campaigns, patrolled the coastal areas, and reported illegal fishing and mangrove cutting.

The staff of ACIPHIL, DENR, and DA all worked with the municipal and village government personnel, as well as with various fishers' associations (FA) organized by the MRCRMP, between 1989 and 1991. When ACIPHIL's contract expired in September 1991, ACIPHIL entered into a joint memorandum of agreement with the Network Foundation to sustain the project until December 1991 with a grant from the World Wildlife Fund (WWF-US). The project was finally turned over to the DENR on 22 March 1995.

In the post-project phase, village fishers continued to be active in patrolling their mangrove areas. They 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 displaced 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, negatively 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.

## **1.5 Plan of the Study**

Chapter 2 provides a review of literature. Chapter 3 presents the contextual variables, incentives to cooperate, patterns of interaction and performance of co-management in the village of Cogtong over time. Chapter 4 highlights the same aspects in the village of Marcelo, Mabini. Chapter 5 synthesizes the co-management experiences of the two case villages and provides the overall statistical results, while the final chapter draws out the characteristics of successful co-management arrangements.