

## CHAPTER 4

# THE VILLAGE OF MARCELO, MABINI

### 4.1 Physical, Technical and Biological Attributes of Marcelo Village

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.

#### 4.1.1 Physical Attributes

The village of Marcelo forms part of the Mabini municipality in Bohol. Mabini, which is found on the northern shore of Cogtong Bay, is accessible by a 95-kilometer, three and a half-hour bus ride from Tagbilaran City. Marcelo is more than twice the size of Cogtong village, but its population is less than one-fourth. Its 777 village residents live on some 207 hectares of land. Many houses line the road along the coast. Mud roads, which are difficult to traverse during the rainy season, link Marcelo to the Mabini town center. Most village residents are dependent on fishing for their primary income source.

Although there is more land in Marcelo than Cogtong, there are fewer land-based economic activities. Relatively steep upland areas limit the type of crops that can be grown in the area. Farmers primarily plant cassava on land that is brought under agricultural production.

Coastal resource use in Cogtong Bay has been marked by open access. Prior to the 1980s, mangrove areas in Marcelo have not had any boundaries, except those covered by concession license areas. For the fishery, very few restrictions existed on fish harvesting methods and none regulated fish catch, with the exception of a marine park in Mabini waters that was established in 1978. 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 MRCRMP marked the introduction of property rights to mangroves in Mabini. Fishing boundaries were also introduced when the fish sanctuaries were established 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. During the MRCRMP phase (1989-1991), turf-related issues hampered project implementation partly due to unclear delineation of functions among national government agencies (see section 3.1.2).

In 1991, the devolution of many of the functions of BFAR and DENR to the municipality altered the political boundaries and placed local government units in 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 3.1.2, which also holds true for Marcelo, Mabini.

- *Legal Provisions: Uses of Coastal Areas*

In 1978, the Mabini Municipal Council established a 500-hectare marine park in Lumayag, an island/reef exposed at low tide and marked by buoys. The Council allowed all fishers to fish in the area, but restricted the fishing gear to longline and the catch to household consumption.

Like Cogtong village, concession licenses (different from a cutting permit) were instituted to regulate mangrove cutting. The most common concession license was an “ordinary license” which lasted for four years. Responsibility for the issuance of concession licenses was with the Bureau of Forestry (later known as the Bureau of Forest Development). The concession license entitled the holders to the exclusive privilege to cut all the allowable harvestable timber in their respective concessions, and the additional rights of occupation, possession and control. Concession licenses were large-scale commercial licenses. Despite the provision of the license on sustainable yield harvesting, license holders 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 in the last twenty years.

In 1984, Proclamations 2151 and 2152 declared certain areas as mangrove wilderness and mangrove swamp forest reserve, respectively (Janiola 1996). In Cogtong Bay, four islands (Lumislis, Kati-il, Tabondio and Calanggaman) totaling 275 hectares fell under these areas. Consequently, “the entry, sale, settlement, exploitation of whatever nature or forms of disposition” of wilderness areas and mangrove swamp forests was not permitted. However, without strict enforcement, compliance with the proclamations was low.

In 1988, the Municipal Council redefined the Lumayag marine park as a fish sanctuary in response to the proposal of the Association of Barangay Captains. Access to the waters in this area was prohibited. The fish sanctuary, however, reverted to a marine park in 1995. Fishing was restricted, but not access to the waters. By then, the sandbars within the sanctuary’s boundaries had become popular tourist spots, prompting the Council to relax access to the area.

The end of one sanctuary marked the birth of another. In 1995, the Mabini Municipal Council passed Resolution No. 3, series of 1995 to establish a different fish sanctuary at Lumislis Island. Behind the resolution was the Board of Directors of the Mabini Federation of Small Fishers’ Associations (MAFESFA). The Municipal Council, however, did not pass an ordinance. Instead, it recognized MAFESFA’s rules and regulations. The new fish sanctuary was endorsed by the Municipal Council, but governed by MAFESFA rules. Access to the sanctuary was restricted to authorized personnel.

**Communal Boundaries.** Communal mangrove areas exist at the village level. Village residents can cut mangroves within the communal area, but none of the wood gathered can be sold outside Marcelo. A 1998 municipal ordinance prohibits the transport of raw forest products to areas outside of Mabini.

**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 Lumislis fish sanctuary. Lumislis Island is shared by the municipalities of Mabini and Cogtong since it is located at the middle of Cogtong Bay.

#### 4.1.2 Technical Attributes

**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 tool 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 Tagbilaran and Cebu.

At present, commercial cutters seldom come to Cogtong Bay. Those that do usually cut on one of the islands (especially Lumislis) 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.

**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 spent for fishing ranges from 6 hours or less. About 11 percent fish for more than 10 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 1-2 persons 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.

**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.

#### 4.1.3 Biological Attributes

**Live Coral Cover and Mangrove Community.** The findings discussed earlier on Cogtong also hold for Marcelo (Section 3.1.3).

**Fish Catch and Species Composition.** Various types of fish per gear type are caught in different months by Marcelo fishers, as shown by Figure 7. 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 25 shows the downtrend from the 1960s to the 1990s, based on information drawn from key informants.

**Table 25. 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, 80 percent of the fishers reported an average catch per fishing trip of 5 kilos or less. In 1988, or just before the MRCRMP implementation, only 68 percent caught 5 kilos or less of fish per fishing trip. Thus, the proportion of fishers who obtained this volume increased. Moreover, those who caught 6-10 kilos of fish per fishing trip decreased to 18 percent in 1997 from 30 percent in 1988.



**Fishing Grounds.** Based on the survey of fishing households in Marcelo, 90 percent of the fishers operate inside the Bay, while 10 percent fish outside the Bay. This 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 5 fathoms (15 m), while 9% fish in waters between 6 to 10 fathoms (18-30 m). Fishing operations outside the Bay (10%) are usually in waters deeper than 25 fathoms (75 m).

In terms of effective fishing time, most fishers (89%) spend long hours at sea (6 hours or less). The rest (11%) fish for more than 10 hours.

**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 80 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 a resource deterioration. About 68 percent felt that the resources are in a bad shape now (Table 26). Members and non-members of the fishers' association shared this perception. This is largely due to illegal fishing, lower fish catch, and overfishing. 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 attributed it to 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.

With regard to the perceived resource condition today, the percentage of respondents who regarded the mangrove condition as good reached 91 percent. They linked this 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.

**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.

**Table 26. 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		

**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.

## 4.2 Attributes of Stakeholder, Community and Fisher

### 4.2.1 Stakeholders

For an introduction on the concept of stakeholders, the reader is directed to section 3.2.1 of this study.

A number of different stakeholder groups can be identified in Marcelo. BOSFA (Bonbon Small Fishers' Association) and MAFA (Mabini Fishers' Association) are the main stakeholders. All members of the FAs are coastal resource users (mainly fishers). Most were involved with the MRCRMP in rehabilitating the mangroves as well as in enforcement efforts. The groups continued to operate even after the completion of the MRCRMP. They have been involved with the DENR through the Coastal Environment Project (CEP) by replanting trees in both the mangrove and upland areas. Also, both groups have continued to patrol the fish sanctuary and mangrove areas. Members of BOSFA and MAFA who are also CSC holders have property rights over sections of mangroves.

The Mabini Federation of Small Fishers' Associations (MAFESFA) is also a primary stakeholder. Its members are drawn from the representatives of FAs in Marcelo (i.e., BOSFA and MAFA). MAFESFA, otherwise known as the United Federation (UF), has passed legislation that individual FAs adopt. It has successfully pushed for the establishment of the new fish sanctuary and has coordinated the efforts of the *Bantay Dagat*.

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

Holders of FLAs also form part of the stakeholders. They have no formal organization. Members of the group are individuals who have a legal claim on the land and who have invested time and money into developing or attempting to develop a fishpond.

The 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 MRCRMP, participated in information campaigns, and passed legislation to better manage coastal resources.

The Mabini Municipal Council is another stakeholder. It lent moral and financial support to the project and passed legislation to provide a legal basis for rule enforcement. The Municipal Council also has jurisdiction over the Mabini waters.

The DENR was involved with project implementation, monitoring and enforcement. It has jurisdiction over mangrove areas that fall outside communal forests.

#### 4.2.2 Fisher Community

The village of Marcelo had grown by about 1.7 percent annually, or from 675 persons in 1988 (pre-project) to 777 persons in 1997. This translates to 120 households in 1988 and 144 households in 1997.

Overall, the village population is homogeneous in terms of ethnicity, religion, and occupation. Its socioeconomic characteristics have remained relatively stable between 1988 and 1997. When the MRCRMP 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 27). Fish vendors, drivers, and owners of small stores (*sari-sari*) account for 3 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 8 percent, to Born-Again Christians.

**Table 27. 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
<i>Total</i>	<i>100</i>	<i>100</i>

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 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.

### 4.2.3 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 28 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. They have undergone elementary schooling and have resided in Marcelo for 41 years. Most of the village fishers (61%) were born in the village. The rest trace their roots to other Visayan areas (28%), Mindanao (9%), and Luzon (2%). The average household size has about five members.

In terms of fishing experience, the majority (61%) of the respondents indicated that 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 1-5 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 28. 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 29 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 10 meetings or less. Training activities, which often lasted for 1-3 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 29. Fisher Participation in the Project: Marcelo**

Variable	% Members	% Non-Members	% Total	X <sup>2</sup>	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

#### 4.2.4 Fisher Households

**Household Size and Out-Migration.** Approximately 70 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 5 percent pursued a college education. Age-wise, 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, they may choose to sell it instead of consuming it. 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 30 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.

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 1-2 furnishings/facilities in the household, while low pertains to 3-4 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 30. Percent Distribution of Assets: Marcelo**

Variable	% Members	% Non-Members	% Total	X <sup>2</sup>	P
House Structure				<b>1.32</b>	<b>0.72</b>
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				<b>5.38</b>	<b>0.07</b>
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	<b>0.05</b>	<b>0.82</b>
Ownership of motorized boats	88.9	77.8	83.3	<b>0.40</b>	<b>0.53</b>

**Occupational Multiplicity and Dependence on Coastal Resources.** Almost all respondents (91%) reported that fishing is their primary occupation. The majority report having multiple secondary occupations. Fishing provides at least half of the household earnings for 76 percent of the respondents.

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. 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%;  $X^2=0.31$ ,  $p>0.05$ ).

**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 31). 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%).

**Table 31. Job Satisfaction of Fishers**

Choice	% Member	% Non-Member	% Total	X <sup>2</sup>	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 6 percent said no due to psychological reasons. This finding 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.





### 4.3 Market Characteristics

**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 80 percent of the Marcelo respondents covered by the random sample survey in July 1997 indicated that they sold most their catch. Only 20 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 5. Summary of Present Market Characteristics

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)	
Length of <i>suki</i> relationship	33% with <i>suki</i> < 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 are normally packed in ice to retain their freshness and 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 are loaded on buses and sold in Candijay, Guindulman, Pilar, and Tagbilaran City.

Fish are sold by weight or by bundle (*tuhog*). Normally, prices are determined by the type of fish caught, available supply/fish volume, and fish size. The price of anchovy is relatively lower than that of snappers and mackerels by about 30 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 50-60 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 30-40 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 5-10 years (56%). Others (44%) are relatively more recent (less than 5 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*.

**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 bark, 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 store owner 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 are difficult. Annual village festivals also exert an upward pressure on firewood prices due to the large quantities of food cooked during the celebration.

#### 4.4 Community Institutional and Organizational Arrangements

The following section focuses on the tradition of collective action, attitudes toward collective action, decision-making, and responsibility sharing for coastal resource management in Marcelo. Highlighted in the discussion are the evolution of property rights and rules and insights into rule breaking. In addition, actual monitoring and enforcement of rules related to coastal resource management are presented.

##### 4.4.1 Tradition of Collective Action

Marcelo does not have a defined tradition of village-level collective action. An informal tradition of *dayong*, however, has deep roots in Marcelo. *Dayong* is akin to a social organization. When a village resident dies, members donate money to the grieving household. Local residents are unsure of the beginnings of this practice, but from their recollection, *dayong* has always existed.

For formal groups, the Parents' and Teachers' Association (PTA) has existed since the 1950s to support school-related activities in Marcelo. In 1972, the Farmers' Organization (especially for coconut farmers) was established, primarily to obtain hybrid coconut seedlings for its members. If a member had vacant land ready for planting, the Philippine Coconut Authority (PCA) provided financial assistance as well as seedlings for each hectare planted. Another formal group is that of the youth organization. Dating back to 1988, it has dedicated itself to helping the village youth develop a good moral character. At around the same time, the Barangay Health Workers Group was also formed. It is committed to helping the sick and elderly as well as to providing child care and immunizations.

The MRCRMP, as part of its community organizing goals, established two fishers' associations (FAs) in Marcelo because of the geographical distance between the two *sitios* (sub-village). 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 Labor and Employment in 1990. Community organizing evolved beyond the village level in Mabini. One month after the seventh coastal barangay FA in Mabini officially registered, an organization uniting all of the individual FAs in Mabini was also duly registered. It is known as the Mabini Federation of Small Fishers' Associations (MAFESFA). Individual MAFESFA membership was composed of the president and secretary from each of the seven village-based FA in Mabini. As an umbrella organization, the United Federation (UF), as MAFESFA is also called, promotes cohesiveness among the 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 MRCRMP. They were involved in collecting and planting propagules as well as forming artificial reefs. Both organizations helped enforcement efforts by joining the *Bantay Dagat*. No foot patrol was established in the village, but members of both groups were active in information campaigns on the importance of mangroves. Members also watched over, pruned and re-planted their own CSC area as well as monitored the village communal forest area. After the MRCRMP project concluded, both groups continued to function. They have engaged in other reforestation activities in the uplands and on Lumisli Island. To date, both groups are 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 borrow 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.

After the formation of BOSFA and MAFA, many new organizations in Marcelo were established. The Small Coconut Farmers was formed in 1990. The objectives of the Small Coconut Farmers are to unite the farmers at the municipal level, much like MAFESFA unites the fishers.

The Rural Improvement Club (RIC) also came into existence in 1990 as a women's group. Organized by the Department of Agriculture, the group aims to teach skills, such as mat weaving and gardening, that will improve the livelihood of rural residents.

In 1994, a Senior Citizen's Group was formed to help improve the lives of the elderly. Social activities and political cohesiveness are some of the concerns of the group.

**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 20 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 32). In the 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 32. Attitudes Toward Collective Action**

Attitude	% Member	% Non-Member	% Total	X <sup>2</sup>	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 (Table 33). About 42 percent expressed that the fishers should have more responsibility than the government. The rest (4 %) felt otherwise. Overall, there is a fairly strong support for co-management.

**Table 33. Attitudes Toward the Sharing of Responsibility for Resource Management**

Attitude	% Member	% Non-Member	% Total	X <sup>2</sup>	P
				3.38	0.18
The government and the fishers will have equal responsibility for resource management.	57.6	47.6	53.7		
The government will have less responsibility while the fishers will have most of the responsibility.	42.4	42.9	42.6		
The government will have most of the responsibility while the fishers will have relatively less.	---	9.5	4.7		

**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 MRCRMP in the future, regardless of membership in the FAs (70% versus 72%;  $X^2=0.09$ ,  $p>0.05$ ). This finding is encouraging, in light of arduous tasks carried out by ACIPHIL, Inc. and Network Foundation in Cogtong Bay.

When asked to quantify their contribution in terms of the types of fish and volume 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, such as anchovies. Others would share demersals (15%) and crabs (9%). The predominant volume to be contributed is 1-2 kilos per year.

#### 4.4.2 Decision-Making at the Village Level

At the village level, a *Barangay* Council consisting of 10 members is responsible for formal decision-making. Council membership is composed of representatives who are elected by constituents for a term of three years. A *Barangay* Captain, also elected for a three-year term by all village residents, heads the council. The *Barangay* Council has the authority to pass ordinances and to enforce laws within the village.

Before the MRCRMP, the Marcelo *Barangay* Council was not actively enforcing fishing regulations since the coastal waters at that time were under BFAR's jurisdiction. On rare occasions when illegal cutters were caught, the Council remained lax. The *Barangay* Captain, who was responsible for initially investigating illegal cutting and for forwarding the case to the Municipal Council if enough evidence was found, seldom conducted such investigations. Perhaps the similarly weak enforcement policy of the Municipal Council could not provide a driving force for the *Barangay* Council.

After the MRCRMP began, the situation changed. Residents were informed that investigations would be conducted and cases would be filed against law violators, if the evidence warranted legal action. This provided a signal to law violators that they could be apprehended and punished for their illegal activities.

Outside of stricter law enforcement, the Marcelo *Barangay* Council also lent support to the project. The Council provided verbal endorsements and moral support to project activities. It also participated in information campaigns on proper mangrove management. Some Council members even joined the *Bantay Dagat*. The *Barangay* Council also passed an ordinance imposing a fine of P25 per illegally cut log. In addition, it supported the establishment of communal mangrove areas. Today, the Council still supports the activities of BOSFA and MAFA.

#### 4.4.3 Property Rights and Rules

**Property Rights.** Customary rights and tenure for both mangroves and the 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 MRCRMP 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 areas under CSC, the property rights picture is ambiguous for some village residents. For instance, a landowner of an upland area in Popog complained that the CSC encroached on his land. DENR representatives visited the area in question and conducted an ocular survey. The survey confirmed that the boundaries are accurate and the land in question is CSC land. The ruling was made in favor of the CSC holder. The landowner cannot claim adjacent mangrove areas as part of his titled property. Mangrove areas, classified under forest lands, cannot be titled since they fall under inalienable state property.

No land conflicts with FLA owners have been reported in Marcelo. In Barangay Tambo, Municipality of Mabini, however, an example can be found of conflicts between CSC and FLA holders. During the MRCRMP, an FLA land that was not developed was subdivided into CSC land. The fishpond operator complained to the DENR because the fishers were saying that cutting trees and developing the fishpond was no longer legal. The DENR recognized that both parties had legal interest in the land, but fully supported the rights of the CSC holders. Further, the DENR ruled that no cutting permit would be given for the land in question. The FLA holder, dissatisfied with the DENR position, began making a dike around the FLA area. Making a dike is the first stage of developing a fishpond. The FLA holder brought in workers from the neighboring Cebu province and instructed the security guard to shoot trespassers.

In response to the complaint filed by MAFESFA, the local DENR office sent a forest guard to implement 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 insisted that without a court order, the workers would not stop. Later, representatives from the DENR Regional Office went to the contested area and asked for the FLA. The security guard could not produce the FLA. The FLA holder was not present. DENR officials told the security guard that the owner must submit the document to the Central Talibon Office on the following day. Subsequently, the DENR forwarded the case to the Regional Trial Court, hoping for a court order to restrict fishpond development on said FLA land. The incident is very recent relative to this research. The second visit by DENR officials from the Regional Office and the subsequent filing of the court case coincided with the period covered by this research. As such, a court decision has yet to be reached. However, given the involvement of DENR and the previous recognition of CSC rights, the probability of ruling against fishpond conversion is extremely high.

Areas not bounded by CSC but subject to FLA seem to be moving towards a communal property ownership. Since the MRCRM started, and continuing until the present, village residents have petitioned the national government to recognize the rights of residents versus the FLA operators' privilege. The petitions push for the cancellation of FLAs and their re-definition as communal swamp land. Local residents have argued that the 1987 Constitution confers the right to the preferential use of resources to residents of localities with marginal fishing and marine resources. FLAs only grant the holder the privilege to develop the land into a fishpond. Residents claim that their rights exceed the fishpond operators' privilege. Some FLAs in Candijay have been cancelled according to this argument.

*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 Lumisli 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.

**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 3.4.3 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, provided re-planting is done for every tree cut. 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 fish nets within two hundred meters from fish traps. Since 1993, powerful lights (i.e., 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. These rules are used by resource users, officials or external authorities in deciding 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, both the government and local resource users have collective choice rules.

The Forest Management Bureau (FMB), previously known as the Bureau of Forest Development,

has legal jurisdiction over mangrove areas outside communal forests. Therefore government collective choice rules relative to the mangroves are vested within the act which established the operation of the FMB.

At the fisher level, the constitutions of BOSFA and MAFA state that for rules to be introduced, there must be a quorum. Once a meeting is recognized as legal, rules can be passed with a simple majority vote.

Members monitor the rules casually. If one member noticed that another member failed to replant mangrove trees that had died, then the issue would be raised. Fines are the main punitive measures against rule breakers. No one, however, ever had to pay such fines. When posed a hypothetical question of “What would happen if the person refused to pay the fine?” respondents expressed that the association would have to vote on the appropriate action required. However, the question seemed quite silly to members. One MAFA member seemed to summarize the sentiments of the group by saying, “Everyone follows the rules because the rules are to the land’s best interest.”

The other punitive measure is revoking a person’s membership in 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.

BOSFA members recall one instance of discontentment. During the early stages of the MRCRMP, some members were reportedly unclear of the project’s goals and talked badly about BOSFA outside association meetings. During the next BOSFA meeting, the purpose of the project was again explained. The discontented members were then satisfied with BOSFA. No problems have been encountered afterwards.

Similarly, MAFA members reported only 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 some MAFA members beforehand. However, the group still voted to impose a fine on the president for not attending the meeting. The fine was also increased to three times the amount of the regular fine for missing a meeting because the rule violator was the president. Informed of the fine, the president claimed the amount as unjust, paid the fine, and then resigned from his position.

**Constitutional Rules.** Constitutional rules (Ostrom 1991) determine the types of rules that are permissible and who has collective choice rights (governance and modification). 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 is 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 4.5.2).

The second set of constitutional choice rules is associated with the FAs (BOSFA, MAFA and MAFESFA). All have formal rules stipulating the process of passing and approving rules.

The situation of BOSFA is similar to MAFA. 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; be truly interested in the organization; and be willing to comply with the responsibilities of a member. An applicant must apply to the organization. The Board of Directors assesses the individual based on 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 acceptance or non-acceptance. 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 organizations have been successful and have expanded their capital. At present, BOSFA imposes a membership fee of P1,000 and MAFA, P800.

All members of BOSFA and MAFA can present ideas for discussion. For the idea to be accepted, a simple majority vote 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 present ideas to the Board of Directors. The Board can then endorse the proposal and send it to the general assembly for action. A simple majority vote is taken to arrive at a decision.

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. Originally, MAFESFA had 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 to send two representatives to join MAFESFA. Approval of proposed measures or ideas is subject to a simple majority vote.

**Knowledge of Fishery Rules.** A survey of 54 fishers in Marcelo in July 1997 showed that 59 percent of the fishers are not aware of formal fishery rules. 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 MRCRMP during the project phase.

**Attitude Toward Rules.** More than half (56%) of the respondents felt that rule-breaking is unacceptable. About 30 percent expressed that rule-breaking is acceptable at times, while 14

percent were 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 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%).

#### 4.4.4 Monitoring and Enforcement

Monitoring and enforcement have a different history for each time period: before the MRCRMP, during the MRCRMP, immediately after the MRCRMP and present day. Before the MRCRMP, a sea patrol funded by the Municipal Council existed in Mabini. With a rented boat, the sea patrol sporadically patrolled the area around the marine park. Fines were usually imposed on apprehended illegal fishers. No real efforts, however, were directed to deter illegal mangrove cutters. Key informants recalled that a DENR representative sometimes visited Marcelo to look for illegally cut logs from the uplands. However, the same concern was not as apparent for mangroves.

During the MRCRMP phase, 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 crew of the MRCRMP boat based in Cogtong village. The Municipal Council paid for the boat's gas from a weekly budget. When costs exceeded the budget, the MRCRMP covered the difference. Police, deputized members of the various FAs, and sometimes even the mayor helped patrol the waters. *Bantay Dagat* members were authorized to inspect and confiscate equipment used for illegal fishing. The violations were reported to the Municipal Council. In turn, the Council forwarded legal cases to the Provincial Court. Four official violations were recorded during project life. One apprehension resulted in a five-month prison sentence. Confiscated equipment was returned after the violator paid the fine.

A physical presence was not the only measure used to discourage illegal activities. DENR started an information campaign on existing laws and on the imposition of penalties on illegal cutting. It 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 to reinforce DENR's messages. Members of BOSFA and MAFA informed the village residents of the new policies

through personal conversations. 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 MRCRMP concluded, the *Bantay Dagat* program weakened. A sea patrol operated only three times a week. Coordination between the sea patrol and the UF members stopped when the new mayor was elected. By January 1997, the UF-led *Bantay Dagat* program had halted completely due to non-release of funds from the municipal budget. The municipal sea patrol still continues, but at a reduced effort. To some residents, the members of the present sea patrol are not as credible as the original *Bantay Dagat*.

**Recorded Violations.** Recorded violations do not account for the number of individual violators. Rather, if many individuals acting in concert are apprehended, the occurrence 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 village. Therefore, the violations for the town of Mabini are presented. Since 1961, 22 violations have been recorded. During the years 1961 to 1987 (before the MRCRMP started), there were nine recorded violations. Dynamite fishing was the most common with seven violations (78%). Possession of dynamited fish and of illegal fishing equipment accounted for one violation each (11%).

During the MRCRMP, there were five violations: one on dynamite fishing, three on other illegal fishing methods, and one on illegal cutting. Section 68 of Presidential Decree 705 requires individuals to secure a license before gathering, cutting and/or collecting timber. Violation of this law, however, occurred outside Marcelo.

After the MRCRMP officially ended, eight violations were recorded. Baby trawl fishing accounted for six instances (75%) and dynamite fishing for two (25%). All illegal fishing cases were forwarded to the Provincial Court for action.

**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 2 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 7 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 34). About 13 percent indicated that only the fishers are responsible. The rest (11%) expressed that only the government is responsible. Thus, for most respondents, a shared responsibility for rule enforcement is apparent.

**Table 34. Actual Responsibility for Enforcing Fishery Rules and Regulations**

Responsible Unit	% Member	% Non-Member	% Total	X <sup>2</sup>	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		

#### 4.5 External Institutional and Organizational Arrangements

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

##### 4.5.1 Services from External Organizations

Before the MRCRMP, Marcelo was largely outside the mainstream of external assistance. During the MRCRMP, the village began to receive services from external organizations, primarily from ACIPHIL Inc., Network Foundation, and DENR. This was made possible through the funds provided by the United States Agency for International Development (USAID) to the DENR for the MRCRMP. Services covered community organizing, mangrove rehabilitation, artificial reef construction, mariculture and law enforcement.

The DENR has been an active agency of the national government. DENR staff 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 (US \$7,500).

##### 4.5.2 Decision-Making Arrangements

**National Level.** Centralized government control over coastal resources was reinforced with the passage of Presidential Decrees (PD) 704 and 705 of 1975. Popularly known as the Fisheries Decree of the Philippines, PD 704 revised and consolidated all fishery-related laws and decrees in the Philippines. The decree defined the boundaries for municipal and commercial fishing. Some of the most important 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. It centralized 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 at DENR to manage mangroves.

National laws supporting MRCRMP activities and goals have stemmed from the CRMC. The most germane example is DENR Administrative Order Number 15 Series of 1990. Section 4.0 states that the “conversion of thickly vegetated mangrove areas into fishponds shall no longer be allowed.” The same section also calls for the reversion to forest land of abandoned or undeveloped FLAs.

Also important in influencing national level decision-making was the new Philippine Constitution enacted in 1987. 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 limits exclusive use and development of marine wealth to Filipino citizens. 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).

**Municipal Level.** Prior to the MRCRMP, the Mabini Municipal Council was slightly more involved than the Candijay Municipal Council in coastal resource management. Concerned with a declining fish catch, the Council formally established in 1978 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. In the absence of a patrol boat, however, there was no concerted effort to monitor the area. The Council merely rented a boat from time to time. When fishers were apprehended for illegal fishing in the Mabini waters, the Municipal Council forwarded the case to the Provincial Court. Illegal cutters, however, were seldom punished.

During the MRCRMP phase, the municipal government lent moral and financial support. The mayor attended some of the earlier project meetings and helped explain the purpose and benefits of the project. A *Bantay Dagat* was officially established in 1989. The favorable action by the Bohol Provincial Government on the request of the Mabini Municipal Council for a patrol boat enhanced monitoring and enforcement efforts. Also provided were a weekly fuel/gas allotment, a boatman, and policemen. Unlike the pre-project phase, laws on illegal cutting were also enforced more strictly. All fines from illegal fishing were earmarked to fund the *Bantay Dagat* operations.

The Municipal Council also extended aid beyond physical support. It enacted new legislation to discourage illegal fishers and cutters. One such piece of legislation was the imposition of a fine of P500 on illegal fishers. Also, the Council adopted on a municipal-wide basis a law from Barangay Marcelo that subjected illegal cutters to a fine of P25 per log. Another ordinance restricted the transport of raw forest products to areas outside of Mabini. At the village level, the Council conducted information campaigns on coastal resource management. It also officially requested the Bureau of Forest Development (BFD), a national government agency, to disapprove any

applications for FLAs in Mabini.

After the completion of the MRCRMP, 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 continued. The Council remained receptive to new ideas from MAFESFA, which led to a formal agreement to designate communal mangrove areas and informally allow harvesters to gather dead trees from the communal area for firewood. In 1995, it approved the motion of MAFESFA to establish a fish sanctuary around Lumislis, using the rules and regulations that the UF set forth. To encourage the UF *Bantay Dagat* program, the Council channeled to the UF 50 percent of fines paid by illegal fishers who were apprehended by MAFESFA members.

During the post-project phase, the election of a new mayor negatively influenced the involvement of the Mabini Municipal Council in coastal resource management. The failure of the incumbent mayor to get re-elected was partly due to the campaign waged by illegal fishers against him. Resentful of the ban on destructive fishing operations, illegal fishers apparently encouraged family and friends to vote for a new mayor. When the new mayor's term began, the Municipal Council did not involve the UF anymore. The police also refused to coordinate enforcement efforts with the UF.

Nonetheless, the UF *Bantay Dagat* continued its patrolling efforts, using a boat provided by the DENR through the new Coastal Environment Program (CEP). Limited fuel/gas funds, however, reduced patrolling activities to 2-3 times a week. The area covered was restricted to the fish sanctuary. By January of 1997, the UF *Bantay Dagat* stopped its operations. Though the Municipal Council has a budgetary allocation of P36,000 for the *Bantay Dagat*, the non-release of funds has hampered enforcement efforts.

**Provincial Level.** 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 in law enforcement. As for mangrove management, it lies outside the jurisdiction of the provincial government.

#### 4.6 Exogenous Events

Two identifiable exogenous events had a direct influence on coastal resources in Marcelo. The first event dates back to the late 1960s, when commercial fishers started to come to the Bay, and to the early 1970s when commercial cutters followed. The MRCRMP implementation may be regarded as the second exogenous event. The project organized BOSFA and MAFA and reduced illegal activities due to more vigilant enforcement efforts. Both FAs have continued to operate and have pursued resource management activities.

#### 4.7 Incentives to Cooperate and Patterns of Interaction

Box 6 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 6. Incentives to Cooperate and Patterns of Interaction: Marcelo**

Incentives to Cooperate	Patterns of Interaction
<b>• Among Resource Users</b>	
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 MRCRMP activities in Marcelo → growth of equity due to expanded membership in credit cooperatives
Tangible evidence of the 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
<b>• Among Government Organizations (Gos) and Non-Government Organizations (NGOs).</b>	
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)
<b>• Among Resource Users, GOs and NGOs</b>	
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

**4.7.1 Among Resource Users**

Incentives for the resource users to cooperate are partly due to a common dependence on coastal resources for food and income. Resource degradation threatened the survival and livelihood of Marcelo fishers. A declining fish catch, which was attributed to fewer mangrove stands surrounding the Bay, destructive fishing practices, and overfishing, intensified the problem of feeding a growing population.

Consequently, village residents shared the need to take action on deteriorating resource conditions.

When the MRCRMP was implemented in Marcelo, they joined project-related activities and assisted in law enforcement. Most local residents also agreed to recognize newly-established property rights over previously open access mangroves.

FA members in Marcelo decided to form credit cooperatives to improve their livelihood. Since mariculture was not part of project activities in Marcelo, BOSFA and MAFA decided to form credit cooperatives instead.

A few years after the MRCRMP, fishers began to notice the growth of aquatic life in replanted mangrove areas, such as shrimps, crabs, shells and fingerlings. This encouraged fishers to comply with the rules and be more conscious of proper mangrove management.

#### **4.7.2 Among Government Organizations (GOs) and Non-Government Organizations (NGOs)**

Three reasons motivated the government, ACIPHIL, and Network Foundation in implementing the MRCRMP. 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.

#### **4.7.3 Among Resource Users, Government Organizations (GOs) and Non-Government Organizations (NGOs)**

Open access and the use of non-destructive practices worked well for Marcelo residents only until the late 60s. With the commercial exploitation of mangrove and fishery products in the 1970s, the situation changed. Cogtong Bay became a haven for both illegal fishers and illegal mangrove cutters due to the lack of law enforcement, inadequate legislation, and open access to coastal resources.

The need to collectively take action on illegal fishers and mangrove cutters drove village fishers and resource users to cooperate with GOs and NGOs. The subsequent establishment of formal property rights through the issuance of 25-year mangrove stewardship contracts encouraged mangrove planters to care for their mangrove areas and protect them from illegal cutters. Joint patrol teams from the NGO, fishers' association, and government agencies were organized to fight illegal cutters and illegal fishers in Cogtong Bay.

In the beginning of the MRCRMP phase, however, conflicting government policies dampened the enthusiasm of mangrove planters and hampered project efforts. The issuance by the DA of Fishpond Lease Agreements (FLAs) discouraged the planters. Either the trees would be cut down under an FLA or, if the trees survived long enough, illegally cut and sold in Cebu.

To address the problem of conflicting government policy, the MRCRMP staff assisted the FAs in filing petitions to the DENR to stop the issuance of cutting permits for FLA areas. The petitioners also asked the DENR to revert to communal swamp lands all existing lands under FLA agreements

that have not been cleared or have been abandoned. The DENR assured the residents that it would no longer issue cutting permits for FLA areas. Without a cutting permit, cutting trees on FLA lands would be illegal.

To deal with illegal activities, the MRCRMP staff, members of the fishers' federation, and the *Bantay Dagat* personnel monitored activities in the coastal areas. The sea patrol from Mabini worked closely with the Cogtong-based sea patrol, effectively discouraging illegal fishers and cutters. The firm resolve of the MRCRMP staff in stopping fishpond construction, illegal fishing, and illegal cutting encouraged the village residents to support coastal resource management.

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 (US \$211), two female goats, and a pig for breeding purposes.







#### 4.8 Outcomes/Performance Indicators of Co-Management

For this section, the methodology used resembles that of Cogtong (see section 3.8). 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 10 steps, where 10 represented the best possible scenario and 1 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 7 summarizes the performance indicators.

##### Box 7. Performance Indicators of Co-Management

<p style="text-align: center;"><b>Equity</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Participation in community affairs               <ol style="list-style-type: none"> <li>1. Community affairs in general (PARTICIPATION IN GENERAL)</li> <li>2. Coastal resource management (PARTICIPATION-CRM)</li> </ol> </li> <li><input type="checkbox"/> Influence over community affairs               <ol style="list-style-type: none"> <li>1. Community affairs in general (INFLUENCE IN GENERAL)</li> <li>2. Coastal resource management (INFLUENCE-CRM)</li> </ol> </li> <li><input type="checkbox"/> Control over mangrove resources (CONTROL)</li> <li><input type="checkbox"/> Fair allocation of mangrove harvesting rights (ALLOCATION-HARVEST)</li> <li><input type="checkbox"/> Satisfaction with mangrove management (SATISFACTION-MANGROVE MGT)</li> <li><input type="checkbox"/> Benefits from the mangrove area (BENEFITS-MANGROVE AREA)</li> <li><input type="checkbox"/> Overall well-being of the household (HOUSEHOLD WELL-BEING)</li> <li><input type="checkbox"/> Household income (INCOME)</li> </ul>	<p style="text-align: center;"><b>Sustainability</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Overall well-being of coastal resources (COASTAL RESOURCE WELL-BEING)</li> <li><input type="checkbox"/> Community compliance with rules               <ol style="list-style-type: none"> <li>1. Mangrove rules (COMPLIANCE – MANGROVE)</li> <li>2. Fishery rules (COMPLIANCE – FISHERY)</li> </ol> </li> <li><input type="checkbox"/> Knowledge of mangroves (KNOWLEDGE - MANGROVES)</li> <li><input type="checkbox"/> Exchange of information               <ol style="list-style-type: none"> <li>1. Mangroves (INFO EXCHANGE - MANGROVE)</li> <li>2. Fishery (INFO EXCHANGE – FISHERIES)</li> </ol> </li> </ul> <p style="text-align: center;"><b>Efficiency</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Collective decision-making on rules governing the use of mangrove resources (COLLECTIVE DECISION-MAKING)</li> <li><input type="checkbox"/> Quickness of resolving community conflicts on mangrove issues (CONFLICT RESOLUTION)</li> </ul>
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**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 35 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.

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 35. Perceived pre-project to post-project changes in performance indicators for all respondents: before the project and now**

Indicator	All			
	Today (T <sub>2</sub> )	Before (T <sub>1</sub> )	T <sub>2</sub> -T <sub>1</sub>	P
<b>Equity</b>				
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
<b>Efficiency</b>				
a. Collective decision-making	5.52	2.57	2.94	<0.01
b. Conflict resolution	5.87	2.91	2.96	<0.01
<b>Sustainability</b>				
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

Table 36 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.

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 37 shows that the only statistically significant difference between these two groups lies in control over mangroves ( $p<0.05$ ), where members perceived a larger change. This is understandable because the FA members are the direct recipients of property rights over mangrove areas they have rehabilitated.

**Table 36. Perceived pre-project to post-project changes in performance indicators for members and non-members: before the project and now**

	Member				Non-Member			
	Today (T <sub>2</sub> )	Before (T <sub>1</sub> )	T <sub>2</sub> -T <sub>1</sub>	P	Today (T <sub>2</sub> )	Before (T <sub>1</sub> )	T <sub>2</sub> -T <sub>1</sub>	P
<b>Equity</b>								
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
<b>Efficiency</b>								
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
<b>Sustainability</b>								
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

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.

The third step in the analysis was to examine the relationships between perceived changes in the performance indicators and independent variables selected from Sections 4.1 to 4.4 of this case study. These variables can be further classified into: 1) basic social variables (age, length of formal education, household size, and length of residence in the village); 2) project-related variables (attendance at meetings, influence on project planning, membership in fishers' association, and knowledge of project objectives); 3) attitudinal variables (mangrove growers can work together, fishers can work together, rule breaking is unacceptable, and equal sharing of responsibility for resource management between the fishers and government); 4) occupational variables (number of fishing gear used, existence of a secondary occupation, dependence on mangroves, and job satisfaction); 5) economic variables (fishing as a primary income source and receipt of external remittances); and, 6) resource-related variables (perceived pre-project condition of mangroves, perceived pre-project condition of fisheries, and level of ecological knowledge).

**Table 37. Differences between members and non-members on perceived pre-project to post-project changes in performance indicators: Marcelo**

Indicators	Members T2-T1	Non-Member T2-T1	T-Value	Probability
<b>Equity</b>				
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
<b>Efficiency</b>				
a. Collective decision making	3.15	2.62	0.98	>0.05
b. Conflict resolution	3.03	2.86	0.41	>0.05
<b>Sustainability</b>				
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

Simple correlation results on Table 38 show that age is positively correlated with participation in general community affairs, suggesting that older fishers tend to perceive a higher involvement. The length of formal education is positively associated with perceived compliance with fishery rules, knowledge of mangroves, and information exchange on fisheries management. Those who have more years of schooling are likely to perceive larger changes in rule compliance, resource knowledge, and exchange of information due, in part, to their better understanding of the resource situation. However, education is negatively correlated with the perceived allocation of mangrove harvesting rights and with the perceived well-being of coastal resources ( $p < 0.05$ ). This implies that better educated respondents are likely to be more critical of changes in the allocation of harvesting rights and in the condition of coastal resources, perhaps due to their awareness of gaps between actual and ideal resource situations.

Household size is positively linked to perceived changes in household income. This applies to households whose members have reached working age and are already contributing to household earnings. The length of residence in the village is positively correlated with perceived participation in community affairs, conflict resolution, and information exchange on fisheries. Attempts to achieve perceived gains in these indicators need to consider the involvement of long-time residents in the village, who are likely to show concern for village affairs, share information on fisheries management, and foster harmony in the village.

**Table 38. Correlation between performance indicators and selected household and social variables**

Performance Indicators	Age	Years of Education	Household Size	Years of Residence
Participation in general	0.298*	-0.214	0.117	0.281*
Participation – CRM	0.193	-0.132	0.248	0.219
Influence in general	0.178	0.045	0.122	0.113
Influence –CRM	-0.126	0.003	0.071	0.052
Control – mangroves	-0.137	0.091	0.047	-0.108
Allocation – harvest	0.152	-0.274*	0.177	0.180
Satisfaction-mangrove management	0.069	-0.112	0.011	0.079
Benefits-mangrove area	0.113	-0.170	0.092	0.249
Household well-being	0.093	0.014	-0.054	-0.021
Household income	0.053	-0.077	0.269*	0.054
Collective decision-making	-0.001	-0.089	0.077	-0.088
Conflict resolution	0.059	-0.045	0.151	0.284*
Coastal resources well-being	0.139	-0.310*	0.090	0.133
Compliance-mangrove rules	-0.102	0.169	-0.109	0.066
Compliance – fishery rules	0.099	0.338*	-0.063	0.304*
Knowledge-mangrove	-0.002	0.328*	-0.030	0.201
Information exchange-mangrove	-0.029	0.204	0.120	0.133
Information exchange-fisheries	-0.034	0.379**	0.134	0.350**

\*\* p &lt; 0.01

\* p &lt; 0.05

Attendance at project meetings is positively associated correlated with perceived changes in participation in community affairs and in coastal resource management as well as in satisfaction with mangrove management (Table 39). The exposure to interactive sessions and deliberations during project meetings broadened opportunities to get involved in village concerns and resource management efforts. Influence on project planning, likewise, is associated with perceptions of positive and statistically significant changes in satisfaction with mangrove management and in influence over community affairs. The experience of having one's opinion counted during project planning exercises may have spilled over to broader village concerns and may have produced a sense of satisfaction with measures to manage mangroves in the village. Membership in the village fishers' association is also linked to perceptions of satisfaction with mangrove management. Knowledge of project objectives, however, is negatively correlated with perceived control of mangrove resources. Those who are versed in what the project sought to achieve appear to perceive smaller increases in resource control. This may be partly due to observed gaps in law enforcement efforts and the resumption of illegal activities after project completion, which influenced perceptions of resource control.

Table 40 presents the correlation between co-management performance indicators and attitudinal variables. The attitude that rule-breaking is unacceptable is negatively associated with the perceived well-being of coastal resources and perceived compliance with fishery rules. Those who believe that rules should be followed apparently perceive shortfalls, if not smaller increases, in these two indicators due to the resumption of rule violations and the adverse consequences on coastal resources. The attitude that the government and the fishers must share equal responsibility for resource management is negatively correlated with perceptions of five indicators: participation in coastal resource management, household well-being, household income, coastal resource well-being, and compliance with fishery rules. When one party (i.e., government) is perceived to have been unable to do its share, it tends to have a negative influence on these five indicators. It somehow dampens fisher participation in resource management and limits the perceived change in

material and ecological gains.

**Table 39. Correlation between performance indicators and project-related variables**

Indicator	Attend meetings	Influence on planning	Member	Objectives Known (#)
Participation in general	0.273*	0.057	0.188	0.150
Participation—CRM	0.276*	0.199	0.187	0.088
Influence in general	0.222	0.279*	0.108	-0.100
Influence – CRM	-0.064	0.016	0.006	-0.209
Control – mangroves	0.076	0.098	0.060	-0.384**
Allocation – harvest	0.229	0.087	0.266	-0.254
Satisfaction – mangrove mgt	0.345*	0.296*	0.319*	-0.044
Benefits –mangrove area	0.058	0.080	0.104	-0.076
Household well-being	0.007	-0.117	-0.028	0.168
Household income	0.023	-0.084	-0.026	-0.058
Collective decision-making	0.156	0.136	0.134	-0.047
Conflict resolution	0.084	0.032	0.057	0.010
Coastal resources well-being	0.023	-0.141	-0.083	0.122
Compliance – mangrove rules	0.038	0.135	0.040	0.026
Compliance – fishery rules	0.117	-0.044	0.219	0.087
Knowledge – mangrove	0.131	0.110	0.082	-0.130
Information exchange – mangrove	0.117	0.183	0.144	-0.054
Information exchange – fisheries	0.159	0.032	0.261	-0.193

\*\* p < 0.01

\* p < 0.05

**Table 40. Correlation between performance indicators and attitudinal variables**

Indicators	Mangrove growers can work together	Fishers can work together	Rule breaking is unacceptable	Equal responsibility between fisher and gov't
Participation in general	0.028	-0.096	-0.106	-0.104
Participation –CRM	-0.012	-0.086	-0.192	-0.276*
Influence in general	0.033	-0.040	-0.006	-0.106
Influence – CRM	0.106	0.007	-0.152	-0.048
Control – mangroves	0.083	0.014	0.076	-0.002
Allocation – harvest	0.038	-0.108	0.002	-0.084
Satisfaction – mangrove mgt	-0.040	-0.107	0.011	-0.041
Benefits – mangroves	0.112	-0.087	-0.019	0.091
Household well-being	0.037	-0.043	-0.198	-0.330*
Household income	-0.040	-0.159	-0.230	-0.470**
Collective decision-making	0.160	0.090	0.122	-0.035
Conflict resolution	0.102	0.164	-0.222	-0.232
Coastal resources well-being	0.016	-0.093	-0.314*	-0.500**
Compliance – mangrove rules	0.262	0.217	-0.177	0.109
Compliance – fishery rules	0.031	-0.060	-0.277*	-0.341*
Knowledge – mangrove	0.044	-0.092	-0.040	0.210
Information exchange – mangrove	0.090	-0.126	0.033	0.283*
Information exchange – fisheries	-0.010	-0.083	-0.016	0.013

\*\* P < 0.01

\* p < 0.05

Note: The variable "community can work together" is constant.

Table 41 shows a statistically significant and positive correlation between the number of fishing gear used and perceptions of four performance indicators directly related to resource management: compliance with mangrove rules, knowledge of mangroves, information exchange on mangrove management, and information exchange on fisheries management. Those who use more fishing gear tend to perceive larger changes in rule compliance, knowledge, and information exchange. The number of fishing gear used, however, is negatively linked to perceived changes in the overall well-being of the household and of coastal resources. This suggests that those who used more gear tend to feel a limited improvement in meeting the food, shelter, and health needs of their households. Likewise, they perceive a limited change in improving the well-being of coastal resources. The existence of a secondary occupation is also negatively associated with perceived changes in household well-being. Despite an additional occupation, it appears that the supplemental earnings are still not enough to bring about a perceived improvement in the overall well-being of the household. Dependence on mangroves, on the other hand, is positively correlated with perceived increases in participation in community affairs.

**Table 41. Correlation between performance indicators and occupational variables**

Indicator	No. of Gear	Secondary Occupation	Choose fishing	Change Occupation	Mangrove income (%)
Participation in general	-0.003	0.142	0.264	0.079	0.472**
Participation – CRM	0.123	0.084	-0.066	-0.226	0.128
Influence in general	-0.027	-0.077	0.196	-0.164	0.004
Influence – CRM	0.219	-0.162	0.036	0.106	0.035
Control – mangroves	0.035	0.093	0.039	-0.008	-0.021
Allocation – harvest	0.006	0.109	-0.034	0.081	0.003
Satisfaction – mangrove mgt	0.166	-0.089	-0.019	-0.006	0.081
Benefits – mangroves	0.102	0.033	-0.234	0.159	0.069
Household well-being	-0.272*	-	0.242	-0.079	0.078
		0.291*			
Household income	0.047	-0.121	-0.117	-0.085	-0.054
Collective decision-making	0.154	-0.221	-0.016	-0.090	0.004
Conflict resolution	0.197	-0.122	0.044	-0.006	0.188
Coastal resources well-being	-0.423**	-0.076	0.192	0.074	-0.009
Compliance – mangrove rules	0.299*	-0.062	-0.045	0.059	-0.010
Compliance – fishery rules	0.109	-0.049	0.093	0.131	0.025
Knowledge-mangrove	0.279*	0.181	0.016	0.230	0.054
Information exchange – mangrove	0.314*	0.156	-0.047	0.073	0.054
Information exchange – fisheries	0.323*	0.162	0.001	0.124	-0.070

\*\*  $p < 0.01$

\*  $p < 0.05$

Dependence on fishing is negatively linked to perceived changes in participation in community affairs, household well-being, and compliance with fishery rules (Table 42). Fishing-dependent households that derive at least half of their earnings from fishing tended to perceive limited gains in these indicators. The pressing concern for survival, long fishing hours, and the difficulty of making ends meet must have hampered perceptions of improvement in these areas. The problem of inadequate earnings and the desire to improve living conditions are part of current realities that fishers have to deal with.

The receipt of external remittances is associated with perceptions of positive and statistically significant changes in participation in coastal resource management and in the allocation of mangrove harvesting rights. Those households that can fall back on outside remittances for their survival are likely to have more spare time to participate in collective resource management. They

also tend to perceive positive changes in the allocation of mangrove harvesting rights.

**Table 42. Correlation between performance indicators and key economic variables**

Performance Indicators	Fishing as a primary income source	Outside Remittances
Participation in general	-0.312*	0.179
Participation – CRM	-0.039	0.299*
Influence in general	-0.114	0.225
Influence – CRM	-0.178	0.082
Control – mangroves	-0.004	0.187
Allocation – harvest	-0.177	0.276*
Satisfaction – mangrove management	-0.148	0.248
Benefits – mangroves	0.082	0.178
Household well-being	-0.273*	0.117
Household income	-0.173	0.178
Collective decision-making	-0.238	0.218
Conflict resolution	0.031	0.071
Coastal resources well-being	-0.260	0.107
Compliance – mangrove rules	0.079	0.033
Compliance – fishery rules	-0.316*	0.014
Knowledge – mangrove	0.061	0.068
Information exchange – mangrove	0.188	0.153
Information exchange – fisheries	-0.012	0.159

p < 0.05

Table 43 shows the correlation between performance indicators and resource-related variables: perceived pre-project condition of fishery resources, perceived pre-project mangrove resource condition, and ecological knowledge. Those who felt that fishery conditions were bad 15 years ago tended to perceive larger increases in household income. Perceptions of bad mangrove conditions 15 years ago are positively associated with perceptions of information exchange on mangrove management. Those who had higher levels of ecological knowledge perceived larger changes in participation in coastal resource management, conflict resolution, knowledge of mangroves, control over mangroves, and fair allocation of harvesting rights. (Ecological knowledge was based on the number of characteristics of the sea and coast that help the fish to grow and be healthy that the respondent could give).

As the fourth step in the analysis, the co-management performance indicators were subjected to a principal component analysis (with varimax rotation) to determine if relationships between the indicators were such that they could be reduced to fewer composite indicators for further analysis. Table 44 shows the results. Within each component, indicators with factor loadings of 0.50 and above were retained in the component analysis.

Performance indicators loading highest on Component 1 are those directly related to coastal resource management, such as knowledge of mangroves, information exchange on mangrove management, compliance with mangrove rules, information exchange on fisheries management, and benefits from mangrove areas. Indicators loading highest on Component 2 are resource-related equity indicators: fair allocation of mangrove harvesting rights, control over resources, satisfaction with mangrove management, and influence over coastal resource management. Those loading highest on Component 3 reflect a combination of behavioral indicators (i.e., fishery rule compliance and information exchange on fisheries management) and direct benefits (i.e., household income, household well-being, and coastal resource well-being).

**Table 43. Correlation between performance indicators and resource-related variables**

Performance Indicators	Perceived pre-project fisheries resource condition	Perceived pre-project mangrove resource condition	Level of ecological knowledge
Participation in general	-0.176	-0.104	0.253
Participation – CRM	0.022	-0.059	0.372**
Influence in general	-0.085	-0.119	0.148
Influence – CRM	0.023	-0.215	0.248
Control – mangroves	-0.014	-0.025	0.397**
Allocation – harvest	-0.044	-0.099	0.418**
Satisfaction – mangrove mgt	-0.074	-0.108	0.264
Benefits – mangrove area	0.053	-0.008	-0.030
Household well-being	0.163	0.159	0.032
Household income	0.322*	-0.006	0.066
Collective decision-making	0.167	0.181	-0.146
Conflict resolution	0.111	-0.001	-0.006
Coastal resources well-being	0.041	0.042	0.250
Compliance – mangrove rules	0.092	0.147	-0.242
Compliance – fishery rules	0.074	0.005	0.232
Knowledge – mangrove	0.027	0.067	-0.131
Information exchange – mangrove	-0.195	0.281*	-0.166
Information exchange – fisheries	-0.037	-0.022	-0.100

\*\* p &lt; 0.01

Indicators loading highest on Component 4 are associated with collective/community equity indicators, such as influence over community affairs, participation in community affairs in general, and participation in coastal resource management. Finally, those loading highest on Component 5 are efficiency indicators (i.e., conflict resolution and collective decision-making) as well as tangible gains (household well-being).

**Table 44. Principal component analysis of performance indicators: Marcelo**

Performance Indicators	Component				
	One	Two	Three	Four	Five
Knowledge of mangroves	<b>0.89</b>	0.06	0.05	-0.03	0.02
Information exchange on mangrove management	<b>0.87</b>	0.03	-0.16	0.03	-0.03
Compliance with mangrove rules	<b>0.75</b>	-0.15	-0.08	-0.09	0.19
Information exchange on fisheries management	<b>0.57</b>	0.18	<b>0.57</b>	-0.10	0.08
Benefits from mangrove areas	<b>0.51</b>	0.27	-0.15	0.02	0.08
Fair allocation of mangrove harvesting rights	0.05	<b>0.86</b>	0.21	0.22	0.08
Control over resources	-0.06	<b>0.85</b>	-0.17	0.11	-0.10
Satisfaction with mangrove management	0.08	<b>0.82</b>	0.06	0.02	0.25
Influence over coastal resource management	0.25	<b>0.52</b>	-0.18	0.25	0.01
Compliance with fishery rules	0.10	-0.01	<b>0.89</b>	0.11	-0.03
Household income	-0.23	-0.02	<b>0.71</b>	-0.08	0.27
Coastal resource well-being	-0.24	-0.10	<b>0.71</b>	0.20	0.09
Household well-being	-0.47	0.02	<b>0.50</b>	0.03	<b>0.57</b>
Influence over community affairs	0.01	0.17	-0.13	<b>0.79</b>	-0.21
Community participation in general	0.02	0.09	0.19	<b>0.76</b>	0.18
Participation in coastal resource management	-0.20	0.24	0.15	<b>0.75</b>	0.29
Conflict resolution	0.09	-0.10	0.06	0.17	<b>0.80</b>
Collective decision-making	0.26	0.19	0.14	-0.09	<b>0.75</b>
<i>Variance</i>	<i>17.9</i>	<i>14.9</i>	<i>14.6</i>	<i>11.0</i>	<i>10.6</i>

**Regression analysis using the principal components.** The fifth step in the analysis is to determine the relationships between the component indicators and the contextual variables mentioned earlier

(Tables 38 to 43). Independent variables significantly related to any of the two components were selected and used in a stepwise multiple regression analysis. The purpose was to determine the set of independent variables that explained most of the variance in each component. In this analysis, the criterion for entry into the regression equation was  $\alpha < 0.10$ . Partial correlations are examined at each step for indications of changes that could be the result of multicollinearity. Where there is reason to suspect multicollinearity, which can result in unstable regression coefficients, the offending variable is not used in the regression analysis (Pomeroy, Pollnac, et al. 1996). Table 45 presents the results.

Out of 22 independent variables, two variables emerged in the regression equation for Component 1: number of fishing gear used and length of formal education of the respondent. These two independent variables account for 21 percent of the variance in Component 1 (adjusted  $R^2=0.214$ ). The regression equation is statistically significant ( $p<0.01$ ). Respondents who use more gear tend to perceive larger increases in Component 1, which is associated with resource management-related indicators. More educated fishers, however, tend to perceive smaller changes in the component, implying that they are more critical of the extent of perceived changes in mangrove knowledge, information exchange, rule compliance, and benefits from mangrove areas.

For Component 2, two variables were retained in the regression equation: receipt of external remittances and length of fishing experience. Together, they account for 9 percent of the variance in Component 2 (adjusted  $R^2=0.092$ ). The regression equation is statistically significant ( $p<0.05$ ). A closer look at the regression coefficients shows that the receipt of external remittances has a positive coefficient, and is therefore associated with perceptions of larger changes in the component. The length of fishing experience, however, has a negative coefficient, implying that those who have fished longer tend to score low on this component. Component 2 consists of resource equity indicators (i.e., fair allocation of mangrove harvesting rights, resource control, satisfaction with mangrove management, and influence over coastal resource management. Long-time fishers must have felt that changes in resource control and other related indicators are inadequate due to the continuing downtrend in their average fish catch.

For Component 3, which comprises a mix of behavioral and tangible benefits, four explanatory variables were identified: length of formal education, sharing of responsibility for resource management between the government and fishers, size of land owned, and the attitude that fishers can work together to solve fishery problems. Together, they account for 33 percent of the variance in Component 3 (adjusted  $R^2=33.4$ ). The regression equation is statistically significant ( $p<0.01$ ). Among the four explanatory variables, only the size of land owned emerged with a positive regression coefficient. This implies that those who own larger landholdings are likely to perceive larger increases in household income, household well-being, and coastal resource well-being as well as in rule compliance and information exchange. Land used for farming and other uses offers an additional source of earnings for the household and reduces the extent of dependence on coastal resources. The perceived pressure on the resource is less, enhancing perceived improvements in resource well-being and in rule compliance.

**Table 45. Regression analyses of performance indicators in Marcelo: with the principal components**

Dependent Variable: Component One	Standardized Coefficient	T-Value	Probability (2-Tail)
<b>Independent Variables</b>			
Number of gear used	0.361	2.877	0.006
Length of formal education	-0.337	-2.688	0.010
<i>R = 0.495; R<sup>2</sup> = 0.245; Adjusted R<sup>2</sup> = 0.214</i>			
<i>N = 54; F = 7.808; p = 0.001</i>			
<b>Dependent Variable: Component Two</b>			
Receipt of external remittances	0.303	2.211	0.032
Length of fishing experience	-0.255	-1.863	0.069
<i>R = 0.359; R<sup>2</sup> = 0.129; Adjusted R<sup>2</sup> = 0.092</i>			
<i>N = 54; F = 3.548; p = 0.037</i>			
<b>Dependent Variable: Component Three</b>			
Length of formal education	-0.351	-2.953	0.005
Distribution of management responsibilities	-0.416	-3.568	0.001
Size of land owned	0.238	1.975	0.054
Fishers can work together to solve fishery problems	-0.195	-0.684	0.099
<i>R = 0.622; R<sup>2</sup> = 0.387; Adjusted R<sup>2</sup> = 0.334</i>			
<i>N = 54; F = 7.274; p = 0.000</i>			
<b>Dependent Variable: Component Four</b>			
Length of residence in the village	0.395	3.341	0.002
Boat ownership	-0.400	-3.128	0.003
Knowledge of project objectives	0.459	3.312	0.002
Choose fishing if one were to live one's life over	0.255	2.130	0.039
Holder of CSC (Certificate of Stewardship Contract)	0.232	1.777	0.082
<i>R = 0.620; R<sup>2</sup> = 0.385; Adjusted R<sup>2</sup> = 0.317</i>			
<i>N = 54; F = 5.633; p = 0.000</i>			
<b>Dependent Variable: Component Five</b>			
Existence of a secondary occupation	-0.403	-3.041	0.004
Land ownership	0.244	1.878	0.067
Number of gear used	0.237	1.819	0.075
Rule breaking is unacceptable	-0.219	-1.719	0.092
<i>R = 0.507; R<sup>2</sup> = 0.257; Adjusted R<sup>2</sup> = 0.193</i>			
<i>N = 54; F = 3.983; p = 0.007</i>			
<b>Dependent Variable: Total Perceived Performance</b>			
Fishing as primary source of income	-0.182	-1.894	0.065
Receipt of external remittances	0.274	3.018	0.004
Length of formal education	-0.438	-4.674	0.000
Rule breaking is unacceptable	-0.233	-2.391	0.021
Existence of a secondary occupation	-0.163	-1.687	0.099
Completion of training	0.335	3.579	0.001
Number of gear used	0.248	2.676	0.011
Size of land owned	0.212	2.275	0.028
Sharing of responsibility for resource management	-0.200	-2.112	0.041
<i>R = 0.833; R<sup>2</sup> = 0.694; Adjusted R<sup>2</sup> = 0.627</i>			
<i>N = 54; F = 10.347; p = 0.000</i>			

The negative regression coefficients of the three other independent variables suggest that those who are better educated, those who believe in the equal sharing of responsibility for resource management, and those who feel that fishers can work together perceived limited gains in Component 3. Most likely, some of their expectations were not met in relation to this component.

For Component 4, five variables were entered into the regression equation. These include: length of residence in the village, boat ownership, knowledge of project objectives, job satisfaction (i.e., choose fishing if one were to live one's life over), and possession of legitimate property rights through a Certificate of Stewardship Contract. Together, these variables account for 32 percent of the variance in Component 4. The regression equation is significant ( $p < 0.01$ ). The findings imply that perceived increases in influence over community affairs, participation in community affairs, and participation in coastal resource management can be hastened by working more closely with fishers who have lived longer in the village, by enhancing satisfaction with fishing as an occupation, by instilling a good grasp of project objectives, and providing secure property rights over resource use. Boat ownership, however, has a negative regression coefficient. This must be due to the preoccupation of most small boat owners with fishing and earning a living, that influenced the extent of perceived changes in their participation and influence over community affairs.

For Component 5, four explanatory variables emerged: existence of a secondary occupation, ownership of land, number of gear used, and attitude toward rules (i.e., rule breaking is unacceptable). Together, these variables account for 19 percent of the variance in Component 5. The regression equation is significant ( $P < 0.05$ ). Of the four explanatory variables, land ownership and number of fishing gear used have positive regression coefficients. Thus, attempts to influence perceived improvements in conflict resolution and collective decision-making could look into enhancing the ownership of productive assets, such as land and fishing gear, to help reduce conflicts in the village and hasten collective decision-making. The other two variables, existence of a secondary occupation and the attitude toward rule-breaking, emerged with negative regression coefficients. This suggests that those who are engaged in a secondary occupation and who feel that rule-breaking is unacceptable perceived smaller changes in Component 5. It also suggests that the types of secondary occupations being pursued at present may not be adequate to substantially improve perceptions of household well-being.

The next step in the analysis was to sum up the component scores for the five components to obtain an overall measure of perceived changes, or total perceived performance (TPP). The correlation of the total perceived performance with the independent variables was calculated. Variables manifesting significant correlations with the dependent variable were selected during the stepwise multiple regression analysis.

The results show that a change in the TPP of co-management in Marcelo village is strongly influenced by nine explanatory variables. These include: 1) fishing as a primary income source; 2) receipt of external remittances; 3) length of formal education; 4) attitude toward rule-breaking (i.e., rule-breaking is unacceptable); 5) existence of a secondary occupation; 6) training completion; 7) number of fishing gear used; 8) size of land owned; and, 9) distribution of resource management responsibilities between the government and fishers. These variables jointly account for 63 percent of the variance in total perceived performance (adjusted  $R^2 = 0.627$ ). The regression equation is statistically significant ( $p < 0.01$ ).

Among the nine variables, four have positive regression coefficients. Perceptions of larger

improvements in the total perceived performance of co-management are positively influenced by the receipt of remittances from relatives living outside the village, completion of training related to resource management, number of fishing gear used, and size of land owned. Smaller changes in the total perceived performance are associated with reliance on fishing as a primary occupation, length of education, attitude that rule-breaking is unacceptable, existence of a secondary occupation, and attitude toward the distribution of management responsibility (i.e., equal responsibility between the government and fishers for resource management).

The findings suggest that diversifying economic assets (cash, fishing gear and land) and strengthening local capabilities for coastal resource management are vital in bringing about perceived improvements in the TPP. Also called for is a closer analysis of the factors that shape people's attitudes toward rules and toward responsibility sharing. Apparent discontentment with law enforcement and with the extent of responsibility sharing during the post-project phase has led some fishers to appraise certain changes more critically, or to express reservations on the perceived magnitude of change in the TPP. The findings also indicate that those who are more dependent on fishing, are less educated, and are engaged in a secondary occupation perceive limited gains in the TPP. This draws attention to the need for co-management arrangements to address the improvement of income and other benefits from fishing and secondary occupations. The need is pressing, particularly in the context of poverty in most coastal villages.

**Regression results without using the principal components.** As an additional analysis, the independent variables were directly regressed against each performance indicator, instead of the component clusters or component indicators. The intent was to identify dominant variables in explaining perceived changes in each performance indicator.

Table 46 indicates that six indicators exhibited statistically significant regression equations ( $p < 0.05$ ): participation in coastal resource management, control over fisheries resources, overall well-being of coastal resources, overall household well-being, compliance with fishery rules and conflict resolution.

The regression results show that knowledge of ecological characteristics is a key explanatory variable underlying perceived changes in participation in coastal resource management and in control over resources. Greater ecological knowledge is a positive factor in the perception of improvements in these two indicators.

The receipt of remittances from external sources favors perceived changes in participation. For control over resources, influence on project planning tends to exert a positive effect.

Education is important in explaining perceived gains in the overall well-being of coastal resources and compliance with fishery rules. The negative regression coefficients imply that more educated fishers tend to be perceive smaller (or negative) changes in these performance indicators. This may be attributed to their awareness of discrepancies between the ideal situation and the actual situation in terms of resource conditions, as well as of rule observance at the project sites. To help bring about perceived gains in rule compliance, focus should be given to improving satisfaction with the rules on fish harvesting, fostering satisfaction with rule enforcement practices, encouraging membership in fishers' associations, and increasing the size of land owned.

**Table 46. Regression analyses of individual performance indicators, Marcelo: without the principal components**

<b>Dependent Variable: Participation in coastal resource management</b>	<b>Standardized Coefficient</b>	<b>T-value</b>	<b>Probability (2-Tail)</b>
<b>Independent Variables</b>			
No. of characteristics cited	0.397	3.331	0.002
Distribution of management responsibilities	-0.271	-2.277	0.027
Receipt of external remittances	0.252	2.129	0.038
<i>R = 0.537; R<sup>2</sup> = 0.328; Adjusted R<sup>2</sup> = 0.286</i>			
<i>N = 54; F = 7.824; p = 0.000</i>			
<b>Dependent Variable: Control over fisheries resources</b>			
No. of known objectives	-0.520	-3.806	0.000
Influence on planning	0.317	2.321	0.025
No. of ecological characteristics cited	0.245	2.013	0.050
<i>R = 0.542; R<sup>2</sup> = 0.296; Adjusted R<sup>2</sup> = 0.250</i>			
<i>N = 54; F = 6.671; p = 0.001</i>			
<b>Dependent Variable: Overall well-being of coastal resources</b>			
Distribution of management responsibilities	-0.306	-2.837	0.007
Respondent's education	-0.409	-3.828	0.000
No. of gears used	-0.401	-3.881	0.000
Attitude that rule breaking is sometimes acceptable	-0.215	-2.089	0.042
Condition of fishery resources 15 years ago	0.190	1.700	0.096
<i>R = 0.741; R<sup>2</sup> = 0.549; Adjusted R<sup>2</sup> = 0.499</i>			
<i>N = 54; F = 10.963; p = 0.000</i>			
<b>Dependent Variable: Overall household well being</b>			
Fishing as main source of income	-0.273	-2.050	0.045
<i>R = 0.273; R<sup>2</sup> = 0.075; Adjusted R<sup>2</sup> = 0.057</i>			
<i>N = 54; F = 4.202; p = 0.045</i>			
<b>Dependent Variable: Compliance with fishery rules</b>			
Change occupation now	-0.264	-2.434	0.019
Respondent's education	-0.303	-2.754	0.009
Satisfaction with rules on fish harvesting	0.346	3.093	0.003
Distribution of management responsibilities	-0.376	-3.327	0.002
Membership in fishers' association	0.206	1.913	0.062
Land size	0.235	2.066	0.045
Satisfaction with rule enforcement on fish harvesting	0.194	1.706	0.095
<i>R = 0.712; R<sup>2</sup> = 0.508; Adjusted R<sup>2</sup> = 0.429</i>			
<i>N = 54; F = 6.479; p = 0.000</i>			
<b>Dependent Variable: Conflict resolution</b>			
No. of years living in the area	0.228	1.788	0.080
Distribution of management responsibilities	-0.345	-2.627	0.012
No. of household members	-0.248	-1.944	0.058
No. of fishing gear types used	0.238	1.842	0.072
<i>R = 0.513; R<sup>2</sup> = 0.263; Adjusted R<sup>2</sup> = 0.200</i>			
<i>N = 54; F = 4.193; p = 0.006</i>			

*Note: Performance indicators that did not exhibit statistically significant regression equations ( $p < 0.05$ ) are not shown in this table.*

The attitude toward the distribution of management responsibilities also manifested a negative regression relationship with three other indicators: participation in coastal resource management, overall well-being of coastal resources and conflict resolution. Those who felt that the government and the fishers should have equal responsibility for coastal resource management tended to perceive negative changes in these three indicators due largely to observed shortfalls in enforcement efforts.

Fishing as the source of household income showed a negative relationship with the perceived household well-being. This implies that fishing income is perceived to be inadequate in meeting the needs of the household.

The perceived changes in the resolution of resource-related conflicts are positively associated with the length of residence in the village and number of fishing gear used. Those who deployed more gear and who have lived longer in the area tended to have positive perceptions of the magnitude of change in this indicator. Bigger households, however, have a negative influence on perceived changes in resolving conflicts.