

**Mangrove Rehabilitation and
Coastal Resource Management
Project of Mabini-Candijay: A
Case Study of Fisheries Co-
Management Arrangements in
Cogtong Bay, Philippines**

Brenda M. Katon¹, Robert S. Pomeroy¹,
Marshall Ring² and Len Garces¹

¹ *International Center for Living Aquatic
Resources Management*

² *University of Manitoba*

WP No. 33 January 1998

ACKNOWLEDGMENTS

The authors wish to thank the Danish International Development Agency (DANIDA) for funding the co-management case study. Special thanks go to Ms. Josella Mayordomo, who assisted in data collection and processing, as well as to Mr. Emmanuel Genio and Ms. Maricel Gamo, who ran the statistical packages on the computer for the household survey data. Likewise, we would like to acknowledge Mr. Joe Traverro for translating the survey instrument into the Boholano dialect and the Cogtong School of Fisheries for assisting us in mobilizing field enumerators.

Our utmost appreciation also goes to Mr. John Dalton, Dr. Fred Vande Vusse, Mr. James Olavides, Mr. Jun Bojos, Mr. Bebot Mago, Mr. Ronnie Ravanera and other project staff who provided meaningful insights on project implementation. Finally, no amount of thanks will ever be adequate for the residents and officials of Candijay and Mabini, who generously gave us their time and attention. This case study would not have been possible without their valuable cooperation.

ACRONYMS

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

TABLE OF CONTENTS

CHAPTER 1	INTRODUCTION	
1.1	Background	1
1.2	Research Framework and Methodology	2
1.2.1	Data Collection and Sampling	3
1.2.2	Data Analysis	5
1.3	Overview of Case Study Sites	5
1.4	Summary of the Co-management Experience of Cogtong Bay	6
1.5	Plan of the Study	10
CHAPTER 2	REVIEW OF LITERATURE	
2.1	Causes of Mangrove Depletion	11
2.2	Methods of Managing Resources	13
CHAPTER 3	THE VILLAGE OF COGTONG, CANDIJAY	
3.1	Physical, Technical and Biological Attributes	18
3.1.1	Physical Attributes	18
3.1.2	Technical Attributes	21
3.1.3	Biological Attributes	24
3.2	Attributes of Stakeholders, Community and Fishers	31
3.2.1	Stakeholders	31
3.2.2	Fisher Community	32
3.2.3	Characteristics of Sample Fishers	33
3.2.4	Fisher Households	35
3.3	Market Characteristics	40
3.4	Community Institutional and Organizational Arrangements	42
3.4.1	Tradition of Collective Action	42
3.4.2	Decision-Making at the Village Level	45
3.4.3	Property Rights and Rules	46
3.4.4	Monitoring and Enforcement	50
3.5	External Institutional and Organizational Arrangements	52
3.5.1	Services from External Organizations	52
3.5.2	Decision-Making Arrangements	53
3.6	Exogenous Events	54
3.7	Incentives to Cooperate and Patterns of Interaction	55
3.8	Outcomes/Performance Indicators of Co-management	62

CHAPTER 4 THE VILLAGE OF MARCELO, MABINI

4.1	Physical, Technical and Biological Attributes	74
4.1.1	Physical Attributes	74
4.1.2	Technical Attributes	76
4.1.3	Biological Attributes	77
4.2	Attributes of Stakeholders, Community and Fishers	79
4.2.1	Stakeholders	79
4.2.2	Fisher Community	81
4.2.3	Sample Fishers	82
4.2.4	Fisher Households	83
4.3	Market Characteristics	88
4.4	Community, Institutional and Organizational Arrangements	89
4.4.1	Tradition of Collective Action	89
4.4.2	Decision-Making at the Village Level	92
4.4.3	Property Rights and Rules	92
4.4.4	Monitoring and Enforcement	97
4.5	External Institutional and Organizational Arrangements	99
4.6	Exogenous Events	101
4.7	Incentives to Cooperate and Patterns of Interaction	101
4.8	Outcomes/Performance of Co-Management	108

CHAPTER 5 SYNTHESIS OF THE COGTONG BAY EXPERIENCE

CHAPTER 6 CHARACTERISTICS OF CO-MANAGEMENT INSTITUTIONAL ARRANGEMENTS

LIST OF FIGURES

Figure 1	Resource Map of Cogtong Bay	7
Figure 2	Seasonality of Gear Types Used and Species Caught, Cogtong	23
Figure 3	Percentage of Living Coral Cover in Cogtong Bay	26
Figure 4	Depth of Fishing Operations by Gear Type	29
Figure 5	Timeline of Contextual Variables: Cogtong, Candijay	38
Figure 6	Summary of Contextual Variables, Major Events and Incentives By Project Phase: Cogtong, Candijay	59
Figure 7	Seasonality of Gear Types Used and Species Caught, Marcelo	78
Figure 8	Timeline of Contextual Variables: Marcelo, Mabini	86
Figure 9	Summary of Contextual Variables, Major Events and Incentives By Project Phase: Marcelo, Mabini	105

LIST OF BOXES

Box 1	Possible Criteria to Distinguish Among Stakeholders	31
Box 2	Summary of Present Market Characteristics: Cogtong	40
Box 3	Incentives to Cooperate and Patterns of Interaction: Cogtong	56
Box 4	Performance Indicators of Co-management	62
Box 5	Summary of Present Market Characteristics: Marcelo	88
Box 6	Incentives to Cooperate and Patterns of Interaction: Marcelo	102

Box 7	Performance Indicators of Co-management	108
Box 8	Physical, Technical and Biological Attributes: Cogtong and Marcelo	124
Box 9	Attributes of Fishers and Fisher Community: Cogtong and Marcelo	126
Box 10	Market Attributes: Cogtong and Marcelo	128
Box 11	Decision-Making Arrangements: Cogtong and Marcelo	130

LIST OF TABLES

Table 1	Power Analysis for Different Sample Sizes	5
Table 2	Structural Comparison of Mangrove Stands in Cogtong Bay	27
Table 3	Trends in Catch Rates of Selected Fishing Gear in Cogtong Bay	28
Table 4	Perceived Resource Conditions : Cogtong	30
Table 5	Distribution of Households by Primary Occupation: Cogtong	33
Table 6	Characteristics of Sample Fishers	34
Table 7	Fisher Participation in the Project: Cogtong	34
Table 8	Percent Distribution of Assets: Cogtong	36
Table 9	Job Satisfaction of Fishers: Cogtong	37
Table 10	Attitudes Toward Collective Action	44
Table 11	Attitudes Toward Responsibility Sharing for Resource Management	45
Table 12	Actual Responsibility Sharing for Enforcing Rules and Regulations	52
Table 13	Perceived Pre-Project to Post-Project Changes in Performance Indicators for all Respondents: Cogtong	63
Table 14	Perceived Pre-Project to Post-project Changes in Performance Indicators for Members and Non-Members: Cogtong	64
Table 15	Differences between Members and Non-Members with Respect to Perceived Pre-Project to Post-Project Changes: Cogtong	65
Table 16	Correlation Between Performance Indicators and Social Variables: Cogtong	66
Table 17	Correlation Between Performance Indicators and Project Variables	67
Table 18	Correlation Between Performance Indicators and Attitudinal Variables	67
Table 19	Correlation Between Performance Indicators and Occupational Variables	68
Table 20	Correlation Between Performance Indicators and Economic Variables	68
Table 21	Correlation Between Performance Indicators and Resource-Related Variables	69
Table 22	Principal Component Analysis of Performance Indicators: Cogtong	70
Table 23	Regression Analyses of Performance Indicators, Cogtong: with the Principal Components	71
Table 24	Regression Results of Performance Indicators, Cogtong: without the Principal Components	72
Table 25	Trends in Catch Rates of Selected Fishing Gear in Marcelo	77
Table 26	Perceived Resource Conditions: Marcelo	79
Table 27	Distribution of Households by Primary Occupation: Marcelo	81
Table 28	Characteristics of Sample Fishers: Marcelo	82
Table 29	Fisher Participation in the Project: Marcelo	83
Table 30	Percent Distribution of Assets: Marcelo	84
Table 31	Job Satisfaction of Fishers: Marcelo	84
Table 32	Attitudes Toward Collective Action	91
Table 33	Attitudes Toward Responsibility Sharing for Resource Management	91

Table 34	Actual Responsibility for Enforcing Fishery Rules and Regulations	99
Table 35	Perceived Pre-Project to Post-Project Changes in Performance Indicators for All Respondents: Marcelo	109
Table 36	Perceived Pre-Project to Post-Project Changes in Performance Indicators for Members and Non-Members: Marcelo	110
Table 37	Differences Between Members and Non-Members in Perceived Pre-Project to Post-Project Changes: Marcelo	111
Table 38	Correlation Between Performance Indicators and Selected Social Variables	112
Table 39	Correlation Between Performance Indicators and Project Variables	113
Table 40	Correlation Between Performance Indicators and Attitudinal Variables	113
Table 41	Correlation Between Performance Indicators and Occupational Variables	114
Table 42	Correlation Between Performance Indicators and Key Economic Variables	115
Table 43	Correlation Between Performance Indicators and Resource-Related Variables	116
Table 44	Principal Component Analysis of Performance Indicators: Marcelo	116
Table 45	Regression Analyses of Performance Indicators in Marcelo: with the Principal Components	118
Table 46	Regression Analyses of Individual Performance Indicators in Marcelo: Without the Principal Components	121
Table 47	Perceived Changes in Performance Indicators Before the Project And Now: Cogtong and Marcelo	133
Table 48	Differences Between Members and Non-Members with Respect To Perceived Changes Before the Project and Now: Cogtong and Marcelo	134
Table 49	Principal Component Analysis of Performance Indicators: Cogtong and Marcelo	134
Table 50	Regression Analyses of Performance Indicators, Cogtong and Marcelo: with the Principal Components	136
Table 51	Regression Analyses of performance Indicators, Cogtong and Marcelo: without the Principal Components	138

ANNEX

Annex 1	Household Survey Instrument
---------	-----------------------------

DEFINITIONS

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

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

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

Common Property (Common Pool) Resources: A class of resources for which exclusion is difficult and joint use involves subtractability (Berkes 1989; Feeny et al.1990).

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

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

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

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

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

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

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

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

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

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

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

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