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IMPACT EVALUATION OF COMMUNITY-BASED COASTAL RESOURCE MANAGEMENT PROJECTS IN THE PHILIPPINES

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Robert S. Pomeroy, Richard B. Pollnac
Canesio D. Predo and Brenda M. Katon

International Center for Living Aquatic Resources Management
(ICLARM)
Makati City, Metro Manila
Philippines

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ACRONYMS

AFFA	-	Ayungon Federation of Fishermen's Associations
AMFC	-	Ayungon Municipal Fisheries Code
AR	-	Artificial Reef
BDAP	-	Barangay Development Action Plan
BDSA	-	*Bantay Dagat Sugbo* Association
BFAR	-	Bureau of Fisheries and Aquatic Resources
BFD	-	Bureau of Forest Development
CABAFA	-	Calagcalag *Bakhawan* Fishermen's Association
CBCRM	-	Community-Based Coastal Resource Management
CBCRMP	-	Community-Based Coastal Resource Management Project
CEMRINO	-	Center for the Establishment of Marine Reserves
CENRO	-	Community Environment and Natural Resources Office
CEP	-	Coastal Environment Program
CLET	-	Composite Law Enforcement Team
CO	-	Community Organizer
CSC	-	Certificate of Stewardship Contract
CVRP	-	Central Visayas Regional Project
DA	-	Department of Agriculture
DENR	-	Department of Environment and Natural Resources
DSWD	-	Department of Social Work and Development
ECAN	-	Environmentally Critical Areas Network
ENRO	-	Environment and Natural Resources Office
ERDS	-	Ecosystems Research and Development Service
FAD	-	Fish Attracting Device
GDS	-	German Development Service
HBRMP	-	Honda Bay Resource Management Project
LGC	-	Local Government Code
LGU	-	Local Government Unit
MACMAI	-	Macarascas Coastal Mangrove Association, Inc.
MCMDAI	-	Manalo Coastal Mangrove Development Association, Inc.
MFA	-	Malhiao Fishermen's Association
NGO	-	Non-Government Organization
PD	-	Presidential Decree
PENRO	-	Provincial Environment and Natural Resources Office
PFA	-	Palanas Fishermen's Association
PCSD	-	Palawan Council for Sustainable Development
PIADPO	-	Palawan Integrated Area Development Project Office
PPDO	-	Provincial Planning and Development Office
PRMC	-	Provincial Resource Management Committee
RA	-	Republic Act
RFTC	-	Regional Fishermen's Training Center
RMD	-	Resource Management Division
SEP	-	Strategic Environmental Plan
SFA	-	Sta. Cruz Fishermen's Association
SMU	-	Site Management Unit
TFA	-	Tiguib Fishermen's Association
TSCFA	-	Tiguib Small Coconut Farmers' Association
TWA	-	Tiguib Water Association
UBFI	-	Ulugan Bay Foundation, Inc.
USAID	-	United States Agency for International Development
ZSFA	-	Zaragosa-Badian Small Fishermen's Association

EXECUTIVE SUMMARY

Recognizing the need to decentralize the management of coastal resources to local governments and resource users and to increase the participation of resource users in management, a number of locally- and foreign-funded projects were initiated by government and non-governmental organizations (NGOs) and others beginning in the early 1980's across the Philippines. These projects employed strategies of community-based management and co-management. During the period 1984 to 1994, over 100 community-based coastal resource management (CBCRM) projects (targeting fisheries, mangroves and coral reef resources) were implemented in the Philippines.

These CBCRM projects provide a vast pool of untapped information which can be analyzed to gain increased knowledge about variables and conditions for the successful planning and implementation of CBCRM. To date, there has been no comprehensive quantitative evaluation of these projects. While project evaluations were undertaken by project staff and consultants for many of the individual projects, no comparative evaluation of the CBCRM projects using a standardized methodology has been done.

The conduct of this review and evaluation study is to provide a critical assessment of the implementation, impact and performance of completed CBCRM projects to serve as a basis for improving planning and implementation of new CBCRM projects in the Philippines. The specific objectives of the study are: (1) to evaluate and assess the implementation, impacts and performance of selected CBCRM projects in the Philippines; and (2) to identify general principles and propositions which facilitate successful implementation of CBCRM projects.

Nine study sites were selected in the Central Visayas and Palawan. These two regions were selected for study since they would be the location of the new USAID Coastal Resources Management Project to be started in early 1996. Specific selection criteria were used for study site selection. The nine sites selected were the Central Visayas Regional Project-1 covering Badian and Ronda, Cebu and Ayungon, Negros Oriental; Coastal Environmental Program in Ulugan Bay, Puerto Princesa, Palawan, and Honda Bay Resource Management Project, Manalo, Puerto Princesa, Palawan. One "successful" and one "less successful" site was selected from each of the municipalities and/or projects except for Honda Bay where only one site was studied. The classification was based on implementation and sustainability of project material and organizational interventions evaluated by project staff.

Since the primary goal of this study was to determine factors influencing the success and sustainability of CBCRM projects, the issue of cross-project comparability of evaluation methods is significant. It was necessary to have common operational defintions of CBCRM project success, as well as factors associated with success, to conduct this type of analysis. To accomplish this, a baseline-independent technique for impact assessment was developed and used. This resulted in a standardized

methodology which could be applied to other CBCRM project impact assessments. Such comparability will facilitate quantitative analyses of variables impacting CBCRM project success.

Several important lessons have been learned, or confirmed, by the analysis of the nine CBCRM projects. Evaluations of project success by project staff and beneficiaries vary because they may use different criteria. Early and continuous participation of project beneficiaries in project planning and implementation is related to their positive evaluation of impacts. Positive cultural attitudes toward the efficacy of collective action were consistently related to perceptions of positive change. Mobilizing people for collective action is a time-consuming process that requires the presence of committed, competent and people-oriented project personnel and shared understanding of project objectives by both the cooperators and the project personnel. Capability-building efforts enhance the perception of empowerment and sense of confidence of project cooperators to undertake new tasks and to meet current and future challenges. Project cooperators, as well as non-cooperators, perceive positive changes in the impact indicators, with little difference between the two groups, indicating the "spread-effect" of the project and the importance of early, open involvement of all community members in the project. User rights to material interventions must be specified and enforced; leading to a much greater chance that the intervention will be maintained. Government support through legislation, funding and enforcement is crucial to sustaining the interventions. The data indicate that fishers like their occupation and would not necessarily change to another job, suggesting that the development of supplemental, rather than alternative, occupations may be the most effective strategy. Project interventions should build on the already existing occupational multiplicity of most fishers and fishing households.

Several important limitations of the study should be highlighted. The study cannot claim to be a complete or exhaustive evaluation of CBCRM projects in the Philippines. It evaluates only a small sample of the total number of CBCRM projects in the country. The evaluation was conducted without a control, and evaluations of natural resource conservation projects need a control, especially when evaluations of the resource are involved. It is possible that perceived improvement of the resource is either the result of the project or some non-project factor such as a change in oceanographic conditions which facilitate fish reproduction and/or growth. Likewise, improvement of household well-being could either be the result of the project or some unrecognized improvements in community participation, influence, and self-esteem; but would these improvements occur if the resource continued on its downward slide to disaster? Finally, it is possible that positive evaluations were nothing more than false praise administered by respondents with the hope that a new project will come their way with benefits for all.

IMPACT EVALUATION OF COMMUNITY-BASED COASTAL RESOURCE MANAGEMENT PROJECTS IN THE PHILIPPINES

1. INTRODUCTION

1.1 Statement of the Problem

Since 1975, fisheries management in the Philippines has been guided by Presidential Decree (PD) 704, otherwise known as the Fisheries Decree of 1975. Under PD 704, fisheries management is the responsibility of the government, both national and municipal. The management measures (mainly through regulatory instruments) undertaken by government during this time, however, have been ineffective in promoting the sustainable management and development of the country's fisheries. A recent report has identified five major problems still confronting the Philippine fisheries sector: (1) resource depletion in the coastal zone; (2) widespread environmental damage; (3) poverty among municipal fishers; (4) low productivity of aquaculture; and (5) limited utilization of offshore and exclusive economic zone waters by Philippine commercial fishers (FSP-PMO 1991).

Despite the plethora of fisheries management laws, rules and regulations in the Philippines, the above problems have persisted owing to poor implementation and enforcement and lack of fisher participation in the planning and management process. The effective capacity of fisheries managers in the Philippines to regulate activities in widely scattered fishing grounds of the archipelagic country is limited. It was felt by some fisheries experts that devolution of certain coastal resource management and allocation decisions to the community level may be more effective than management efforts which distant, understaffed and underfunded government agencies could provide.

Recognizing the need to decentralize the management of coastal resources to local governments and resource users and to increase the participation of resource users in management, a number of locally- and foreign-funded projects were initiated by government, non-governmental organizations (NGO) and others in the early and mid 1980's across the country which employed strategies for community-based management and co-management (defined as a partnership whereby authority and responsibility for coastal resource management is shared between various levels of government and the fishing community and resource users). During the period 1984 to 1994, over 100 community-based coastal resource management projects (targeting fisheries, mangrove, and coral reef resources) have been implemented in the Philippines (Carlos and Pomeroy 1995).

In 1991, the government recognized the need to increase participation in management and to devolve control over resource access to local levels through policy and institutional reforms. Among these are the decentralization of the management of nearshore fisheries to municipal

and local resource users under the Local Government Code (LGC) of 1991. Through the LGC and several other initiatives, the government now actively promotes community-based coastal resource management to conserve fisheries and coastal resources and diversify income sources of the low income small-scale fishers. A growing number of new community-based coastal resource management projects are being planned or implemented for the country with both local and foreign funds.

1.2 Rationale and Objectives of the Study

Compared to other countries around the world, the Philippines has recorded the most number of community-based coastal resource management (CBCRM) projects and experiences. Undoubtedly, the time, funds and collective efforts put into these projects have allowed implementors and participants to accumulate valuable knowledge and experience in the area of CBCRM. It is interesting to note that there has been no comprehensive documentation and evaluation of the experiences and lessons learned from these past projects. For this reason, an important source of information which could be used to rapidly improve new CBCRM initiatives has been left untapped. This is especially true for coastal and fisheries resources where efforts in community-based management and co-management are still in the development stage. Compared to experiences in community-based management as applied to other resource systems and sectors, such as forestry and irrigation, the number of CBCRM efforts is still relatively small.

Through this study, a systematic review and evaluation of CBCRM projects will allow for the: (1) identification of the successful and non-successful approaches; (2) assessment of the causes for project success or failure; (3) determination of the major intervention activities, impacts and sustainability of interventions; and (4) determination of the approaches and processes that work best in different environments and conditions that could be replicated to other locations in the country. By undertaking this review and evaluation, recommendations for the improvement and refinement of similar and future CBCRM projects can be made.

The conduct of this review and evaluation study will provide a critical assessment of the implementation, impact and performance of completed CBCRM projects to serve as a basis for improving planning and implementation of new CBCRM projects in the Philippines. The specific objectives of the study are:

1. To evaluate and assess the implementation, impacts and performance of selected CBCRM projects in the Philippines.

2. To identify general principles and propositions which facilitate successful implementation of CBCRM projects.

1.3 Site Selection

The selection of CBCRM project sites in the Philippines to be evaluated in this study was conducted by the authors in consultation with personnel of the United States Agency for

International Development-Manila (USAID). Initial site selection was accomplished by using a listing of CBCRM program and project sites in the country identified by Carlos and Pomeroy (1995). This desk study identified all major CBCRM programs and projects implemented in the Philippines between 1984 to 1994.

The first cut on the selection of study sites considered only projects in Central Visayas, and Palawan since these would be the location of the new USAID Coastal Resources Management Project to be started in early 1996. It was felt that study results would be of direct use to the new CBCRM project. In addition, only those projects with the following features were considered: (a) the project should have been completed as of December 1993 to allow enough time to measure impacts and performance; (b) the project should have, as components, activities such as community organizing, resource conservation and rehabilitation, alternative livelihood development, and training on sustainable resource management; and (c) the main beneficiary fisherfolks are still living in the project site and are willing to cooperate in the study. It should noted that the Coastal Environment Program in Ulugan Bay, Palawan was preselected by the funding agency for evaluation and so did not meet the selection criteria described above.

Using the above criteria, the following projects were suggested for study:

1. Central Visayas Regional Project-1 covering Ronda and Badian, Cebu and Ayungon, Negros Oriental.

2. Coastal Environment Program in Ulugan Bay, Puerto Princesa, Palawan.

3. Honda Bay Resource Management Project, Puerto Princesa, Palawan.

4. Rainfed Resources Development Project covering Cogton Bay, Bohol.

The top three projects were finally selected for study covering nine barangays in three provinces, three municipalities, and one city. The Rainfed Resources Development Project in Cogton Bay, Bohol was not selected due to difficulties in contacting people associated with the project and in reaching the area. Specific information about each site is given below.

1.4 Limitations/ Caveats

This study cannot claim to be a complete or exhaustive impact and performance evaluation of CBCRM projects in the Philippines. It evaluates a sample of the total number of CBCRM projects implemented in the country between 1984 and 1994.

For projects implemented in the early 1980s, memory recall tended to be difficult for some key informants at the barangay level, particularly on time periods and sequences of events. In some instances those who were involved in the early project implementation phases were no longer around due to migration to other areas or to death. All possible means, however, were

exhausted in the search for key informants and project field personnel who could provide information on project implementation details. At best, project events had to be reconstructed based on available information and project documents.

The evaluation concentrates primarily on social, economic, cultural and political factors. While it provides some evaluation of biophysical factors, a more in-depth biophysical analysis is required to assess all impacts.

It was not possible to conduct the evaluation using an experimental research design of experiment and control group, e.g., CBCRMP community and non-CBCRMP community, due to limited project resources. Instead, within CBCRMP communities the evaluation was conducted with project beneficiaries and non-beneficiaries.

Evaluations of natural resource management projects need a control, especially when evaluations of the resource are involved. It is possible that perceived improvement of the resource is either the result of the project or some non-project factor such as a change in oceanographic conditions (temperature, salinity, levels of pollution, etc.) which facilitate fish reproduction and/or growth. Likewise, improvement of household well-being could either be the result of the project or some unrecognized improvements in the project community context. This type of problem applies less to improvements in community participation and influence, but would these improvements occur if the resource continued on its downward slide to disaster? Finally, is it possible that positive evaluations were nothing more than false praise administered by respondents with the hope that a new project will come their way with benefits for all?

2. EVALUATING FACTORS CONTRIBUTING TO THE SUCCESS OF COMMUNITY-BASED RESOURCE MANAGEMENT PROJECTS: A BASELINE-INDEPENDENT METHOD

The ultimate evaluation of a community-based coastal resource management project (CBCRMP) is its impact on the well-being of the coastal ecosystem, including both human and non-human elements. Ideally, the evaluation would compare information collected prior to project implementation (baseline data) with that collected sometime after project completion. Also ideally, information collected at both time periods would employ identical instruments, or operational definitions of variables (or indicators) being evaluated. Unfortunately, many factors associated with implementation of CBCRMPs result in a situation where the ideal evaluation is difficult, if not impossible, to achieve. Baseline information is frequently unavailable or inadequate. Methods used in the baseline may be inadequately described making it impossible to insure comparability between time-one and time-two measurements. Finally, funding for post-evaluation may be inadequate to replicate baseline methodologies.[1] Impact evaluation is further complicated by the fact that inadequacies and

[1] Although the costs associated with collection of data for adequate monitoring and evaluation would only be a small percentage of the total costs associated with many projects (cf. Pollnac 1989; Salmen 1987),

lack of baseline information as well as funding for post-evaluation may be differentially distributed across variables of interest. All these factors have a negative impact on the precision and comparability of impact analyses, but they should not inhibit attempts to estimate impacts using alternative methods.

Since the primary goal of the research is to determine factors influencing the sustainability of CBCRMP impacts, the issue of cross-project comparability of evaluation methods is significant. It is necessary to have common operational definitions of CBCRMP success, as well as factors associated with success, to conduct this type of analysis. It is therefore proposed that a baseline-independent technique for impact assessment should be developed and used in assessment of selected CBCRMPs. This will result in a standardized methodology which can be applied to other CBCRMP impact assessments. Such comparability will facilitate quantitative analyses of variables impacting CBCRMP success.

The process of evaluating factors influencing success of community-based coastal resource management projects (CBCRMP) is complicated and multidimensional. The ultimate goal of a CBCRMP is to improve, in a sustainable manner, the "well-being" of the coastal ecosystem, including both the natural and human communities. To achieve this goal, one usually identifies some sort of a bounded (either naturally or artificially) coastal ecosystem or political unit (e.g., a segment of coastline, a bay, etc.) and develops a set of strategies and intermediate objectives directed at improving the ecosystem's "well being". This is followed by implementation of strategies and activities directed at achieving intermediate and ultimate objectives. Each step in this process involves decisions and activities which can impact project success. Social, political, institutional, and economic aspects of the larger context of the project ecosystem; sociocultural, techno-economic, and biophysical attributes of the project ecosystem; CBCRMP strategies, objectives, and implementation processes are all variables which have been implicated in project success (cf. Pomeroy 1994; White, et al. 1994a,b; Dyer and McGoodwin 1994; Pollnac 1994; Pinkerton 1994; Pinkerton 1989a; McGoodwin 1990; Ostrom 1990). Hence, any attempt to account for a significant proportion of the variance in CBCRMP success must involve an examination of a wide range of variables.

Conceptually, the variables allegedly influencing CBCRMP success will be classified as independent variables. These independent variables are further subclassified as project variables and context variables. Project variables include aspects of CBCRMP planning and implementation. Context variables are non-project, independent variables; for example, social, political, and economic aspects of the larger context of the project ecosystem (e.g., resource management-related national legislation, markets for project ecosystem products, etc.); techno-economic, biophysical, and sociocultural aspects of the project ecosystem (e.g., technology used in harvesting the resource, value of resource for income and household nutrition, perceptions of resource abundance, natural boundaries of resource, etc.).

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financial concerns are frequently used to justify its exclusion from many projects. This point will not be debated here. We are concerned with responding to the lack of appropriate baseline data.

The dependent variables, CBCRMP success, will constitute the third general category of variables. This category of variables is also composed of two distinct subsets: first, achievement of intermediate objectives, and second, impacts on "well being" of the coastal ecosystem. The first subset of dependent variables, achievement of intermediate objectives will include consideration of degree of achievement of both material (e.g., mangrove planting, organization buildings, etc.) and non-material (e.g., training, institution building, etc.) objectives. The second subset of dependent variables, the ultimate evaluation of project impact, includes consideration of project influences on "well being" of the coastal ecosystem, which is composed of separate measures of the human and natural components. Each of these components is composed of distinct sets of variables (e.g., changes in income, access to resources, availability of resources, etc.). Project sustainability and cost versus benefits can also be considered as components of project success.

Although categorized as dependent variables for one level of analysis, the achievement of intermediate objectives can also be conceptualized as antecedent to project impacts on ecosystem well being; hence, as independent variables for the final level of analysis. All these dependent and independent variables, justifications for their consideration, and their operational definitions will be detailed in the following three sections of the paper. The final section of the paper details analytical procedures to be used to determine interrelationships between the independent and dependent variables in an attempt to elucidate the factors influencing the success of CBCRMP.

CONTEXT VARIABLES

Context variables are non-project variables. They form the immediate and larger context of the CBCRMP; e.g., aspects of the local community and physical environment as well as aspects of the larger socio-political matrix. Research has indicated that these contextual variables can play an important role in development projects in general and CBCRMPs in particular. Variables identified in the context range from the lofty heights (or abysmal depths) of national policies all the way down (or up) to individual beliefs and aspirations. These contextual variables can be classified into three categories or levels, each of which will be examined separately below. The three categories are: 1) supra-community level; 2) community level; and 3) individual and household level.

SUPRA-COMMUNITY LEVEL CONTEXTUAL VARIABLES Foremost among the supra-community variables related to CBCRMP success is enabling legislation and supportive government administrative structures at the national level. Felt (1990) suggests that successful co-management is related to the amount of decision making authority granted to participants. Jentoft (1989) writes that legislation delegating responsibility and authority to implement and enforce regulations is an essential factor in enabling fisher's organizations to participate in co-management of the resource (see also Kuperan Viswanathan and Abdullah 1994; Miller 1990). Most of Ostrom's (1994) design principles for sustainable community governed commons depend on enabling government legislation; e.g., a minimal recognition of resource users rights to organize and develop their own institutions without interference by external government authorities. It is also clear that enabling legislation is necessary for

groups of users to be authorized to define boundaries and obtain security in tenure for resource use rights (cf. Pomeroy 1994; Alcala and Vande Vusse 1994) as well as for users to participate in modifying use right rules, monitoring observance of rules, and devising and applying sanctions for infractions (Ostrom's "clearly defined boundaries", "collective choice arrangements", "monitoring", and "graduated sanctions" design principles, respectively; 1994:37-39).

One of Ostrom's design principles, "congruence between appropriation and provision rules and local conditions" (1994:37) requires flexibility in enabling legislation. This is important in terms of the degree of freedom that participants have in terms of fine tuning the management options. In effect, where traditional or informal management systems exist, legislation should allow for its recognition and formalization (cf. White, et al. 1994). Feeney (1994) emphasizes the importance of the ability to adapt collectively agreed upon resource use rules to changing situations. Jentoft and Kristoffersen (1989) note that one of the important features of the successful Lofoten fishery co-management system is that it can adapt to local variations and has flexibility in response to changing conditions. The degree of adaptability obviously depends on the specificity and flexibility of government guidelines and/or directives within which the local users must work. It is unrealistic to assume that the government would delegate all responsibility for management to the resource users with no guidelines whatsoever.

CBCRMPs can also be supported or thwarted by supra-community level organizations or institutions, both governmental and non-governmental (cf. Pollnac 1994). For example, local fisher's cooperatives may belong to a regional fishers' cooperative organization, which may, in turn, belong to a national organization. Usually this hierarchy of organizations performs supportive services such as linking the local organization to higher level sources of support. Ostrom refers to this hierarchical type of organizational structure as "nested enterprises", another of the design principles of sustainable community-governed commons (1994:41). Sometimes the supra-community institutions are not directly related, as with the fishers' cooperative example, but are in a position to perform services (e.g., training, information, supply, marketing, conflict resolution) for local level CBCRMP activities (White, et al. 1994). The government may delegate authority for aspects of resource management to the local community, as in the Philippines, but lacking certain types of support and changes (e.g., political will, funding for surveillance and enforcement activities, restructuring of administrative and institutional arrangements), local measures may prove to be ineffective (cf. Pollnac and Gorospe 1995; Pomeroy and Pido 1995; Pomeroy n.d.). Pinkerton (1989b) considers the existence of institutions providing a higher authority for appeal in terms of local equity, or institutions providing external support and for discussion (e.g., university scientists) as being favorable preconditions for co-management.

Other supra-community variables potentially impacting success of CBCRMPs are aspects of regional, national and international markets, including potential for changes in commercialization of resource products. Issues such as demand and price can impact resource use and rule compliance (cf. Pollnac 1984; Pomeroy 1995). Ostrom (1994:43-44) considers "rapid exogenous changes" as a threat to sustainable community-governed

commons. In terms of coastal resources, the most threatening changes would be market-related variables discussed above and technological changes. Externally developed technical changes diffuse rapidly throughout a fishery and can have multiple impacts on community-based coastal resource management systems (cf. Akimichi 1984; Matsuda and Kaneda 1984; Ohtsuka and Kuchikura 1984; Pollnac 1984; Miller 1989). For example, some changes might result in more efficient fishing technologies that could impact the effectiveness of temporally based resource management regulations (e.g., open seasons). Others, such as more seaworthy, mechanized vessels could result in "outsiders" long-distance fishing in local waters. Other rapid exogenous changes that could impact a CBCRMP are political instability which could influence enabling legislation as well as being a variable antecedent to market instability. Natural or man-made disasters (e.g., earthquake, floods, war) can also impact the functioning of CBCRMP, and these should be identified, if possible.

OPERATIONALIZATION PROCEDURES Enabling legislation Operationalization of "enabling legislation" must take into account all the important aspects of legislation discussed above. Published legislation must be evaluated in terms of: 1) allowing formation of resource user groups; 2) authorization of resource user groups to define boundaries for exclusive access; 3) provisions for tenure security; 4) providing general guidelines within which resource user groups can devise and implement locally appropriate management rules; 5) providing for recognition and formalization of traditional or informal management systems where they exist; 6) provision of supportive administrative structures for co-management functions; 7) provision for participation of user groups in developing surveillance and enforcement methods. The simplest operationalization would be seven basic questions answered either yes or no:

1. *Does the legislation allow formation of user groups?*

2. *Does the legislation authorize user groups to define boundaries for their exclusive access?*

3. *Does the legislation provide or allow for the development of mechanisms guaranteeing security of tenure?*

4. *Does the legislation provide general guidelines within which user groups can devise and legally implement locally appropriate management rules?*

5. *Does the legislation provide for recognition and formalization of traditional or informal management systems where they exist?*

6. *Does the legislation provide for supportive administrative structures for co-management functions such as:*

    a. *Resource monitoring?*
    b. *Surveillance ?*
    c. *Enforcement?*
    d. *Conflict resolution?*
    e. *Information ?*

7. *Does the legislation provide for participation of user groups in developing and implementing surveillance and enforcement methods?*

Each of the above questions can be treated as an independent variable. They could also be summed, resulting in a composite measure of "enabling legislation". If they are summed, a procedure would have to be developed to account for the 5 categories of supportive administrative structures; e.g., weight them 0.2 each, etc. Alternately, each of the six items could be analyzed at a more complex level; for example, analyzing exclusive access and boundary types (cf Pollnac 1984, 1995a,b; Pido, et al. 1995). This level of detail does not seem to be necessary for the type of evaluation proposed here.

Supra-community institutions The first step is to identify all supra-community level institutions and organizations that are somehow linked with or impact local fisheries or coastal management. Each should be classified according to level of operation, objectives, and impact/influence at the local level. Question format is as follows:

1. *What are the names of organizations or institutions outside your community that influence fisheries or coastal management?*

2. *For each institution, identify a) level of operation (e.g., national, regional, etc.),- b) type of link with local organizations, if any (e.g., horizontal, vertical, nested, etc.); c) objectives (from officer of institution or written objectives); d) local level impact (from local key informants).*

3. *Are government officials actively supportive of local organizations and institutional arrangements? (Question to key informant: When is the last time a government official visited the community to ask about or assist with [coastal resource activities]?).*

More complex characterizations of these external institutions (e.g., history, resources, etc.) could be identified (cf. Pido, et al. 1995), but this does not seem necessary for the type of evaluation proposed.

Supra-community markets Operationalization of the supra-community market variable would include questions on external market structure, availability, location and stability (including consideration of recent changes). Format for the questions is as follows:

1. *In terms of markets, what is the distribution of the relevant resource product?*

    a. *Local %*
    b. *Regional %*
    c. *National %*
    d. *International %*

2 *Have there been any recent changes to the market in terms of demand, structure, price or stability? If yes, what?*

Other supra-community "shocks" to the system Questions concerning introductions of new, non-project related technology (used by locals or "outsiders" now exploiting resources in the area) can be determined through interview of key informants. Other "shocks" (war, political instability, earthquake, typhoon, etc.) can be determined from secondary literature and key informants.

1. *Have any new technologies been used in the area since (the year the project began)? If yes, What? By whom?*

2. *Have any outsiders begun extracting local resources since (year project began)? If yes, from where? What are they doing?*

3. *Other post project implementation "shocks":*

   a) *natural calamities (e.g., typhoon, drought, flood, earthquake, etc.)*

   b) *political or economic restructuring (e.g., new tourism or other industry with coastal impacts, political instability, war, etc.).*

COMMUNITY LEVEL CONTEXTUAL VARIABLES Many of the variables having a direct impact on success of CBCRMPs are found at the community level. At this level we concentrate on both the physical and social environment in terms of potential relationships with CBCRMP success. A review of the literature indicates that a number of community level, contextual factors have been proposed as being related to success of aspects of CBCRMP: 1) crisis in resource depletion perceived by local leaders (Pinkerton 1989b); 2) target species composition and distribution (Pollnac 1984); 3) environmental features influencing boundary definition (Pollnac 1984); 4) technology used to extract coastal resource (Akmichi 1984; Matsuda and Kaneda 1984; Ohtsuka and Kuchikura 1984: Pollnac 1984, 1994; Miller 1989); 5) level of community development (Schwartz 1986; Pollnac 1988; Poggie and Pollnac 1991); 6) degree of socioeconomic and cultural homogeneity (Jentoft 1989; Pinkerton 1989b; Doulman 1993; White, et al. 1994a); 7) tradition of cooperation and collective action (Jentoft 1989); 8) population and population changes; (Pollnac 1994); 9) degree of integration into economic and political system (Doulman 1993); 10) occupation structure and degree of commercialization and dependence on resources (Pollnac 1984, 1994); 11) local political organization (Pinkerton 1989b; Pollnac and Sihombing n.d.); 12) supportive local leadership (White, et al. 1994); 13) coastal resource use rights and management systems, formal and informal (Pinkerton 1994, 1989b; Pollnac 1994; Pomeroy 1994; White, et al. 1994a). The structure and content of the above variables will be detailed in the operationalization procedure. Relationships of the variables with aspects of CBCRMP are described in the references cited.

OPERATIONALIZATION PROCEDURES Many of the above variables, although superficially simple, are actually rather complex and difficult to operationalize for use in cross-project quantitative analyses. These complexities are evident in the operationalization of the variables below. In some cases, the need for cross project comparison will actually result in what some will perceive as simplification of an inherently complex variable. In other cases, only certain aspects of the dependent variable are related to CBCRMP success. Explanations will be provided along with the operational definitions.

Perceived crisis in resource in resource depletion This is a retrospective account concerning perceptions of resource depletion by local leaders (e.g., mayor, president of fishers' association, and other opinion leaders) at the time of CBCRMP implementation. The information will be gathered from selected key informants, in response to the following question:

1. *At the time of project implementation the (relevant resource) was:*

   a) *in very good shape*
   b) *in good shape*
   c) *neither good nor bad*
   d) *in bad shape*
   e) *in very bad shape.*

This variable will also be treated as an individual level variable, and the question posed to a sample of resource users. In terms of the community-level variable, modal response and distribution of responses provided by the key informants will be used as the indicators. Distribution of responses is also used as an indicator due to the fact that degree of consensus among opinion leaders may influence attitudes of other users and ultimate success of the CBCRMP.

Target species composition and distribution We are only interested in limited aspects of species identification and distribution. The distribution of a target species obviously influences fishing localities, and if the species are concentrated in a relatively small area (e.g., around limited reef areas, in several deep holes, on a small expanse of mudflat, etc.) increases in numbers of harvesters or effort will rapidly result in conflict-generating pressure on the resource. Species composition and distribution are also mediating variables with respect to the influences of levels of commercialization and technological changes. For example, if a highly localized species becomes commercially valuable, or if technological changes result in better and more efficient access to a species, CBCRMP efforts could be thwarted.

Several techniques can be used for determining important types of flora and fauna harvested. The simplest is the use of secondary information where available. Many countries collect some form of fisheries statistics, and these could be reviewed as a potential source of information. Since fishery and other coastal resource statistics are notoriously difficult to collect, usually only focus on commercially significant species, and are frequently only available as grouped data for a larger region, they can be misleading and should only be used

as material supplementary to information from key informants unless recent landing statistics, collected in the project community are available.

Information from key informants can be obtained by requesting different categories of users of the relevant resource to list, in order of importance, the most important species they capture for income and home consumption (separately). Information must be gathered from the different categories of users of the relevant resource because users of different gear types frequently target different species. This type of information should be collected from at least five representatives of each major gear type (e.g., gear types used by at least one-fourth the resource exploiters). Commercial significance can be cross-checked through interviews with key informants from the marketing sector. Informants should be asked where they harvest each important type. Questions can take the following form:

1. *Taking the entire year into consideration, in terms of income what are the most important species harvested? (list in order of importance).*

2. *Taking the entire year into consideration, in terms of home consumption what are the most important species harvested? (list in* order of importance).

3. *For each type listed, determine the location they are harvested.*

4. *For each listed determine perceived changes in abundance.*

There are important considerations to be taken into account when collecting this type of information. First, importance of different species change according to season. It is important to obtain the ranking for the entire year, not just the season that the interview is taking place. Second, it is important to determine the taxonomic level of the terms obtained in the ranking exercise. For example, important fish species are frequently more highly differentiated in local languages than less important species. Nevertheless, there is frequently a term which groups the different types into a larger, more inclusive category. It is most often this more inclusive term which will be given to outsiders in response to a question about important species when, in fact, only a few of the type are important. They might all be important, but the researcher must make this determination. Hence, it is important to determine for each type listed if it is a general category or a specific type. A picture book can be used, with the help of local fishers to make scientific identifications if the interviewer does not know the local terms.

Environmental features influencing boundary definition It is obvious that an area with numerous reference points, such as a rocky, much indented coastline, with rocks jutting out of the water, small offshore islands and reefs, and numerous shoreside features would facilitate demarcation of use right areas. In contrast, a long, broad, sandy beach with a relatively even, sand or mud bottom gradual drop-off, and no offshore islands would create difficulties in boundary demarcation. Information to be obtained is as follows:

1. *Provide a verbal description of the reference points of the project area.*

2. *Make an ordinal evaluation of the difficulty involved in defining boundaries for the relevant parts of the project area.*

Technologies used in relevant coastal area This will involve a simple description of the types of technologies used in activities carried out in the relevant coastal area (e.g., fishing, aquaculture, mangrove harvesting, sport diving, etc.). Descriptions should include a brief description of deployment of technologies (e.g., How are nets used? How are boats anchored offshore? etc.)

1. *Describe technologies and techniques used in relevant coastal areas.*

Level of community development A scale of level of community development based on availability of basic services provides a general context for the CBCRMP. Items for the scale are as follows:

1. *hospital*
2. *medical clinic*
3. *resident doctor*
4. *resident dentist*
5. *secondary school*
6. *primary school*
Z *public water supply piped to homes*
8. *sewer pipes or canal*
9. *sewage treatment facility*
10. *septic or settling tanks*
11. *electric service*
12. *telephone service*
13. *food market*
14. *drugstore*
15. *hotel or inn*
16. *restaurant*
I7. *gas station*
18. *public transportation*
19. *hard top road access*
20. *banking services*
21. *television reception*
22. *radio reception*

Information for the scale can be obtained by a combination of observation and key informants. Each item will be checked as present or absent, and a summary scale can be constructed by summing the items. After sufficient numbers of evaluations are conducted, the items can be subjected to some sort of scale analysis (e.g., factor analysis) for more sophisticated investigations of the relationship between community development and CBCRMP success.

Degree of socioeconomic and cultural homogeneity There are several types of community homogeneity/heterogeneity. Socioeconomic homogeneity can be evaluated through an examination of income distribution, but reliable surveys of income are difficult and time consuming; hence, it would be unrealistic to try to conduct such a survey for the purposes of this evaluation. Socioeconomic heterogeneity can also be evaluated through an examination of distribution of occupations, a type of data discussed above. If the entire community is composed of fishers, it would be occupationally homogeneous. It would be less homogeneous if there were variations between households with respect to source of income; hence, number of distinct occupations could be considered as a measure of occupational heterogeneity. This figure would have to be qualified with a statement concerning the relative concentration of households in any single occupation. For example, a statement indicating that there are 7 distinct occupations, but 70 percent of the families depend on farming would indicate a lower level of heterogeneity than 7 occupations with 10 percent of the population in each. Cultural heterogeneity can be measured based on the number of religious and ethnic groups in the community, but a similar qualification concerning relative percentages in each group would have to be presented. A search will be conducted to find a method for converting these distributions into a summary figure.

1. *Identify total number of occupations present in the community and determine percent of households engaged in each occupation (data collected as part of occupation structure above).*

2. *Identify total number of ethnic groups in community and percentage of population represented by each ethnic group.*

3. *Identify total number of religious groups in community and percentage of population represented by each religious group.*

Tradition of cooperation and collective action An indicator of a tradition of cooperation and collective action would be the number and duration of local groups (associations, cooperatives, etc.) formed for cooperative or collective action. A list of groups active at some time during the past 10 years should be constructed. The groups indicative of cooperative or collective action should be identified through an examination of reported group activities. The number of years each of these groups was active should be determined. A summary figure, "group-years", could be calculated by multiplying number of groups times number of years active and used as a relative measure of tradition of cooperative and collective action.

1. *Identify groups indicative of cooperative or collective action which were active sometime during the past 10 years*

2. *Describe actions undertaken by each group*

3. *Determine the total number of years each of these groups was active.*

Population and population changes Population figures for the CBCRMP area can be obtained from census material. These figures are usually available at ten year intervals. The current population can be obtained from the most recent census, and the rate (average annual change) can be calculated from the ten year change. If local census are conducted at more frequent intervals, a variable can be added to qualify the average rate. This variable would indicate if the rate is more or less rapid during the preceding few years.

1. *Obtain most recent census figures and figures from 10 years in the past for CBCRMP area.*

Degree of integration into national economy and political system This will be an evaluation based on summed ordinal evaluations of links (market, transportation, communication, political) to the larger society.

1. Market:
-no links = 0
-low level of links (some specialty products (e.g., dried sharkfin) are collected by a few buyers who occasionally visit the community) = 1.
-medium level of links (limited amounts of fish are processed (iced, smoked, etc.) and daily shipped by in small quantities, either by public transportation or small, privately owned trucks to nearby urban areas) = 2.
-high level of links (most of the catch is processed in processing facilities and trucked to urban areas and/or airfreighted to more distant areas) = 3.

2. Transportation:
-no links = 0.
-low level of links (only unimproved roads, seasonally impassable, with no more than a few small public transportation vehicles (public taxis, pickup trucks with seats in the back, etc.) passing through daily) = 1.
-medium level of links (improved roads, several daily links via vans or small buses to transportation centers with links to the rest of the country) = 2.
-high level of links (good roads, frequent bus departures for other areas, frequent local transportation) = 3.

3. Communication:
-none = 0.
-low (no telephones, only telegraph or radio link with other areas) = 1.
-medium (few telephones, usually only in mayor's office or army post) = 2.
-high (many telephones, both private and public) = 3.

4. Political:
-none (no politicians at the level of governor or congress visit the area) = 0.
-low (politicians visit rarely, less than once per year=1.
-medium (politicians visits at least once a year) =2.

-high (politicians visits more than once a year)=3.

The ordinal values for each component of this variable can be considered separately, and they can be summed into a total figure to represent degree of integration into the national economy and political system.

Occupation structure, degree of dependence on and level of commercialization of coastal resource This is a description of the income generating activities carried out which depend on coastal resources; e.g., fishing, aquaculture, tourism, extraction of mangrove products, sand or coral mining, etc. Other income generating activities should be briefly described in terms of category (e.g., farming, mining, forestry, industry, service) and total employment. Descriptions of coastal dependent activities will be detailed, including number of firms (e.g., hotels, dive shops, boats, etc.), size (rooms in hotels, area devoted to aquaculture, etc.) and individuals employed in each activity. The following types of information will be obtained from secondary information (e.g., local census) or key informants:

1. *For coastal dependent activities: List all activities by type (fishing, aquaculture, tourism). For each type identify a) number of firms (e.g., boats, hotels, recreational fishing firms fishpond operators, etc.);. b) size (total number of hotel rooms, total area of fish ponds, etc.); c) number of individuals employed.*

2. *For non-coastal dependent activities: List all activities by category (farming, forestry, industry, service). For each category identify the number of participants.*

3. *Have several local, key informants (e.g. mayor's office, chamber of commerce members, etc.) rank/order all the activities in terms of their relative importance to the local economy.*

4. *Community degree of dependence on coastal resources is a function of number of participants in coastal activities, as well as relative ranking from question number 3.*

Local political or organization This would involve a basic description of formal, governmental political organizations at the local (municipal, district) level in terms of positions and duties. Techniques for conflict resolution will also be described in terms of roles and positions of involved individuals.

1. *Describe local formal political organization*

.

2. *Describe local techniques (formal and informal) for conflict resolution.*

Coastal resource use rights, formal and informal Determining use rights can be relatively straightforward unless boundaries are illegally maintained (cf. Pollnac 1984). In the relatively straightforward cases, key informants can provide information concerning: 1) rights to what (e.g., habitat, species, gear, recreation, etc.); 2) level of formality (e.g.) based on formal legislation or local agreement; 3) types (e.g., whether the access is open, communal, or

private); 4) what the boundary maintenance system is like (e.g., are boundaries clear and strictly maintained, or are they diffuse, with minor transgressions permissible; see Acheson 1988); 5) whether and how use rights can be transferred; 6) existence of conflicts in use rights; and 7) types of surveillance and enforcement, if any. This may involve describing the system introduced by the CBCRMP. If so, determine if any systems existed prior to the CBCRMP and describe them as well.

1. *In terms of the relevant resource, are there or have there ever been any restrictions concerning who has rights to harvest the resource?*

2. *Are the rights restricted to a) an area or region? b) a particular species? c) use of a particular gear? d) certain recreational activities? e) other (specify)?*

3. *How long has this system been in effect? If no longer in effect, when was it in effect and/or how long?*

4. *If yes, is there written legislation concerning these rights or are the rights based on an informal agreement?*

5. *Is there or was there a group or leader to manage and enforce these rights?*

6. *Who has the right of access and who is excluded?*

7. *Describe the boundaries in terms of distinctness.*

8. *Is it possible to transfer the access rights (eg., by inheritance, by selling them or giving them away, etc.).*

9. *How would one be caught if they break the access rule?*

10. *How would they be punished?*

11. *What is the level of compliance (e.g. frequent violations, etc.)?*

Coastal resource management (other than use rights), formal and informal This variable involves a description of local level resource management efforts, both formal and informal. Information can be obtained from key informants and documents, where available. This may involve describing the system introduced by the CBCRMP. If so, determine if any systems existed prior to the CBCRMP and describe them as well. The information collected will be as follows:

1. *In terms of coastal resources, are there or have there been in the past, any rules concerning harvesting or resource conservation?*

2. *Are the rules restricted to a) an area or region? b) a particular species? c) use of a particular gear? d) certain recreational activities? e) other (specify)?*

3. *How long (was or has been) the system in effect?*

4. *If yes, is there written legislation or are the rules based on an informal agreement?*

5. *Is there or was there a group or leader to manage and enforce these rights?*

6. *How would one be caught if they break a rule?*

7. *How would they be punished?*

8. *What is the level of compliance (e.g. ,frequent violations, etc.)?*

INDIVIDUAL AND HOUSEHOLD LEVEL CONTEXTUAL VARIABLES In the final analysis, it is the individual who is responsible for making the decision to carry out CBCRMP activities. Numerous researchers have indicated that individual variables may influence receptivity to CBCRMP. For example, Feeney (1994:26), based on a review of the literature, suggests that individual variables such as education, experience, size and scope of operation, technology, "cultural values", degree of lifetime commitment to the industry, and "...their preferences over non-pecuniary aspects of their employment" all have some impact on the effects of resource management regulations. The latter two of these variables have been referred to as "job satisfaction" (cf. Pollnac and Poggie 1988) in terms of their impacts on fishery resource management.

Ecological knowledge of users is a factor increasingly recognized as both influencing receptivity to and providing information significant for governance (cf. Wilson, et al. 1994; White, et al. 1994; Ruddle 1994b: Felt 1994; Chambers 1983; Johannes 1981), use rights and actual management efforts (traditional and/or official), if any. Part of this ecological knowledge will involve perceptions of the status of the resource, a variable which Pinkerton (1989b) related to the development of co-management systems. It is important to note that there is intracultural variation with respect to ecological knowledge (cf. Felt 1994; Berlin 1992; Pollnac 1974). Some of this variation is related to division of labor in the community (e.g., if females glean for shellfish, they will know more about shellfish than males), and some will be related to degree of expertise, area of residence, fishing experience, and other factors. Hence, if we want to understand factors influencing success of CBCRMP it is essential to understand variation in user ecological knowledge.

The individual level variables proposed as impacting CBCRMP are the following-

1. *Education*

2. *Experience*

3. *Size and scope of operation*

4. *Technology used*

5. *"Cultural values"*

6. *Job satisfaction*

7 *Ecological knowledge*

8. *Occupational multiplicity*

As will be seen in the operational definitions below, some of the above variables are relatively complex, being composed of several "sub-variables".

OPERATIONALIZATION PROCEDURES Operationalization of the individual level contextual variables will be based on using survey methodology. It will be necessary to obtain the information from a sample of community members in order to make generalizations about the community as a whole and understand the distribution of differential participation in CBCRMP.

Education. Education is a relatively straight-forward variable referring to years of formal education as well as any technical education. Technical education could involve short courses operated by fisheries training centers, NGOs, etc.

1. *Years of formal education.*
2. *Other training (e.g., short courses, technical school, etc. describe type and duration).*

Experience Two types of experience are of interest here: work experience and "group" experience. Work experience focuses on activities dependent on coastal resources such as fishing, aquaculture, extractive activities in the mangrove area, etc. It is assumed that all individuals in the sample will be conducting some type of coastal resource related activity. The type of activity at the present time, years involved in this activity, previous activities, and years involved in each are to be determined. "Group" experience will focus on membership in associations, such as fishers' cooperatives. The respondent's age and years of residence in the CBCRMP area will also be considered as "experience" variables.

1. *What is your current occupation?*

2. *How many years have you done this type of work?*

3. *Have you done any other type of work?*

4. *For each previous occupation, how many years in each? If you have done other work in the past, why did you change to your present occupation?*

5. *Do you presently belong to some sort of group or association? If yes, what? What is the purpose of the group? How long have you belonged?*

   If no, Did you ever belong to some sort of group or association? What was the purpose? Why did you leave the association?

6. *What is your age?*

7. *How long have you lived in this area?*

Size and scope of operation This variable is interpreted to refer to vessel sizes and numbers and ownership status (if a fisher), and pond sizes (if aquaculture) and estimated production. In all cases, number of co-workers in the operation (boat, pond, harvesting from the mangrove) must be determined.

1. *Number of units (boats, ponds, cages, rafts, etc.).*

2. *Size of each unit.*

3. *Number of workers (e.g., crew size).*

4. *Production (annual; calculate from easily recalled units, especially for fishers; [e.g., average daily catch X trips per week X weeks fished per year =estimated annual production]).*

Technology This variable identifies aspects of the technology used by the respondent in relation to his/her coastal resource based occupation. If a fisher, this would refer to whether or not the vessel fished from is motorized, types of gear used, etc. If an aquaculturalist, it would refer to general aspects of pond stocking, aeration, fertilization, etc. If mangrove harvesting, whether or not chainsaws are used, etc. In general, what is desired is a brief, basic description of the occupation's tools and their deployment.

1. *If a fisher: motor (inboard, outboard, HP); gear type (be specific, not just "net", describe type and deployment); average trip length and average number of trips per month (if trip length is one day or less, get number per week and calculate number per month. Determine if there are any months when fewer trips are taken).*

2. *If aquaculturist: use of pumps or gravity for water transfer; material used for enclosures or grow-out locations (e.g. cages, ponds, etc.).*

3. *Others: descriptions analogous to the above two.*

Cultural values One way to evaluate cultural values is to infer them from responses to attitude questions. The following attitude questions refer to values significant to CBCRMP.

1. *Do you think that the people in this community can work together to solve community problems (for example, digging a well, clearing a road, etc.)?*

2. *Do you think fishermen could work together to solve a problem in the fishery such as illegal fishing (blastfishing, use of poisons, etc.) ?*

3. *Should the government, the fishers, or both work together to solve a problem in the fishery?*

Job satisfaction There are complicated and there are simple ways to measure job satisfaction (cf. Pollnac and Poggie 1988). Although the more complicated provide detailed information concerning non-pecuniary aspects of an occupation, it has been suggested that perhaps the best indicator of job satisfaction is the response to a question "If you had your life to live over, would you still become a .... ? (cf. Robinson, et al. 1969). Meaningful, qualitative information can be obtained by simply appending an open ended question, asking "why?", to the latter question. Since CBCRMP include the potential for alternative occupations, it is important to obtain a bit more detail than that single question would generate; hence, several more questions are contained in the operational definition of the variable used here.

1. *If you had your life to live over, would you still become a (fisher, fish farmer, etc.)?–Why or Why not?*

2. *If you could make the same income in an occupation other than (fisher, fish farmer, etc.) would you change your job ? --Why or why not?*

3. *What do you like about (fishing, fish farming, etc.) in comparison to other jobs you could do?*

Ecological knowledge Due to the fact that CBCRMP can involve different aspects of the coastal ecosystem, it is difficult to arrive at a brief, easily administered, generally applicable operational definition for "ecological knowledge". If it were focused only on fishers, it would be possible to identify a folk taxonomic subgrouping of fish that is relatively highly differentiated in the project area and ask the respondent to list the names of the members of the subgroup. The number of terms, recalled would be an indicator of ecological knowledge. A fisher could also be requested to respond to a question concerning perceived trends in resource availability and reason for the trends.

1. *Is the [resource... amount of fish, crabs in the mangroves, whatever the CBCRMP focus] better off, worse off, or about the same as it has been over the past ten years? If worse/better off, is it a little worse/better off, just worse/better off, or a lot worse/better off? Why?*

2. *What are the different types of resource [appropriate, highly differentiated type] that you know?*

Occupational multiplicity This variable is directed at determining the relative importance of coastal resources in family income and subsistence. For example, if the person is being interviewed as principally a fisher, it is important to determine: a) if his/her household has sources of income or subsistence other than his/her fishing activity and b) if the additional activities are based on coastal resources. For example, this variable is expected to obtain information such as relative dependence of household nutrition on subsistence fishing, hunting, or coastal zone gleaning.

1. *Does your household have any sources of income other than (fishing, fishfarming, other coastal resource related principal occupation)? Does your household receive money from anyone living outside the household (e.g., in the city, abroad, etc.)? –In terms of income, which of these activities (or sources,- e.g., remittances from overseas would not be an activity) is the most important? Second most important? Third most important? –Do any of the activities provide over half your income? [this would be the most important if it provides over one half]*

2. *In terms of food, does your household have any sources of food other than what you buy or bring home from (fishing, fish farming, other coastal related principal occupation)? –In terms of food, which of these activities is the most important? Second most important? Third most important?–Do any of these activities provide more than half your food?*

Assets This is a substitute for income, which is frequently difficult to measure in a reliable manner. It will involve the following indicators which will have to be further defined to be locally appropriate:

1. *Ownership of productive equipment (boat, pond, cages, as appropriate). owner, co-owner, group ownership (describe), none.*

2. *House structure: minimal, low, medium, high.*

3. *Furnishings: minimal, low, medium, high.*

PROJECT VARIABLES

INTRODUCTION Project variables include aspects of CBCRMP planning and implementation. Most of the variables are assessed in terms of project reports, which provide details concerning relevant issues such as project objectives and strategies. Other variables, such as individual participation in and attitudes towards project activities will be assessed at the individual level, through the use of survey research methodology.

PROJECT IMPLEMENTATION STRATEGIES Much has been written concerning the potential effects of project implementation procedures on project success in general (e.g., Chambers 1983; Cernea 1991) and CBCRMP in particular (e.g., Pomeroy 1994b). Perhaps most fundamental to achievement of project success and sustainability is early and continuous participation of potential beneficiaries (cf. Chambers 1983; White, et al. 1994b). Cernea (1987) has clearly demonstrated that failure to institutionalize participation in projects can lead to non-sustainability. Early involvement of the community can make project objectives congruent with needs of the participants, a factor linked to success of CBCRMPs (White, et al. 1994; Pomeroy 1994). If beneficiary participation is real and continuous throughout project implementation, projects will need to adapt to frequent inputs from participants; hence, adaptive flexibility must be a component of project implementation (cf. Uphoff 1991). What better way to fulfill Ostrom's design principles of sustainable community governed commons that call for "congruence between appropriation and provision rules and local conditions" and "collective choice arrangements" (1994:37) than to have local participation in the development and implementation of the rules? Participation also reduces the potential impact of two of Ostrom's "threats to sustainable community development": "blueprint thinking" (e.g., universal project models) and "international aid that ignores indigenous knowledge and institutions" (1994:42, 45). The benefits of participation have been known to international development social scientists for decades, but they have only recently been acknowledged in coastal resource management. White, et al. (1994b), after an in depth review of CBCRM with respect to coral reefs, conclude that it is extremely important to identify a core group in the community to be trained for leadership in resource management. They also emphasize the importance of community education and training as well as the need to communicate clearly defined project objectives to the participants. Another important aspect of project implementation is communication and coordination between groups involved with the project (e.g., NGOs, government agencies, research institutions, aid agencies, etc., see Agbayani and Siar 1994). CBCRMP are frequently characterized by multiple agency and multiple group involvement, requiring careful coordination. Also with respect to CBCRMP several researchers have indicated the importance of full time development workers and community organizers living in beneficiary communities (cf. Alcala and Vande Vusse 1994; Agbayani and Siar 1994). All these considerations result in the following indicators for evaluation of project implementation; 1) early participation in project planning; 2) continued participation in planning and implementation; 3) flexibility to adapt as project is implemented; 4) full-time development workers and community organizers living in project communities; 5) identification of a core group of participants for leadership development; 6) establishment of community education associated with project objectives; 7) coordination of all involved groups; 8) communication of clearly defined objectives to participants.

OPERATIONALIZATION PROCEDURES Information on indicators can be determined through review of project documents, interview of key informants, and survey of project participants. Social survey questions will be identified by being preceded with the phrase "social survey question".

1. *According to project documents, did the project use beneficiary participation in project planning and implementation? Describe how beneficiary participation was used (e.g., at*

what phases and how used). Did project objectives originate with the community members, with an external source, or with both?

2. *Was the CBCRMP adaptive, in the sense that implementation strategies could be changed to meet inputs from beneficiaries as well as local conditions?*

3. *Did the CBCRMP have full-time personnel living in the community? If yes,, what was the category (e.g., community organizer, social worker, biologist) and responsibility of each worker?*

4. *Did the CBCRMP involve the establishment of organization(s) to solve problems and mobilize resources?*

5. *Did the CBCRMP identify and develop a core group of participants for leadership?*

6. *Did the CBCRMP involve community education and training?*

7. *Did the CBCRMP establish procedures to link project objectives to participant needs? What kind of procedures did they use ?*

8. *What provisions were made for coordination of activities of all involved groups (e.g., agencies, local government units, NGOs, etc.)?*

9. *Social survey question--Do you feel that you or any of the other (users, e.g., local fishers) had any influence on planning (aspect of project).*

10. *Social survey question--Do you feel that you or any of the other (users) could influence changes in (aspect of project) after it began?*

11. *Social survey question--If training was part of project. Did you attend any training sessions? If yes, what was the topic and length of training?*

12. *Social survey question--Did you attend any meetings where the project was discussed? If yes, how many?*

13. *Social survey question--Are you a member of the (user) association (fan association exists).*

14. *Social survey question--what were the project objectives?*

IMPACT VARIABLES

As noted in the introduction to this evaluation guide, the impact variables are divided into two subsets: first, achievement of intermediate objectives, and second, impacts on "well being" of the coastal ecosystem. The first subset of dependent variables, achievement of intermediate objectives will include consideration of degree of achievement of both material (e.g., mangrove planting, organization buildings, etc.) and non-material (e.g., training, institution building, etc.) objectives. The second subset of dependent variables, the ultimate evaluation of project impact, includes consideration of project influences on "well being" of the coastal ecosystem, which is composed of separate measures of the human and natural components. Each of these components is composed of distinct sets of variables (e.g., changes in income, access to resources, availability of resources, etc.). Project sustainability and cost versus benefits can also be considered as components of project success. Although categorized as dependent variables for one level of analysis, the achievement of intermediate objectives can also be conceptualized as antecedent to project impacts on ecosystem well being; hence, as independent variables for the final level of analysis.

ACHIEVEMENT OF INTERMEDIATE OBJECTIVES Evaluation of achievement of intermediate objectives is basic to any project evaluation. It is a matter of determining stated objectives from project planning documents, and determining whether or not the objectives have been met. For example, if one of the objectives was the replanting of 50 ha of mangrove, achievement of this objective must be evaluated. If another objective was to obtain some type of legal use right contract for the mangrove area, the obtaining of this contract must be documented. Project reports usually detail achievement of such objectives. This evaluation will also determine maintenance of intermediate objectives (e.g., are the artificial reefs still in existence? Is there still a functional fishers' organization in the community? etc.) as well as achievement of institutional design characteristics associated with sustainable systems (e.g., attributes associated with successful user associations or community based management of the commons).

Evaluation of design characteristics of participatory coastal resource management systems, including user groups associated with participation should be based on the findings of reviews of case studies cited above (e.g., reports in Dyer and McGoodwin 1994; Pomeroy 1994; White, et al. 1994a,b; Pinkerton 1989a,b). For example, the importance of use rights and user associations was documented above. Additionally, Kuperan Viswanathan and Abdullah (1994), citing Miller (1990), note that reasons for regulations should be understood by participants and be both enforceable and enforced. The negative impacts on the future of coastal resource management resulting from unenforced regulations have been commented on by several researchers (cf. Kuperan Viswanathan 1994; Pollnac and Gorospe 1995). Finally, and in addition to previously mentioned attributes, Ostrom's (1994) nine design principles for sustainabilty, Pinkerton's (1989b) favorable pre-conditions for co-management, and Pollnac's (1994) summary of use of local organizations for participation in fisheries management indicate that the following design attributes influence success of community based management and involved user organizations: a) use rights; b) distinctness of boundary definition; c) appropriateness of rules in regard to local conditions; d) provisions for

user participation in rule making, modification, monitoring, and enforcement; e) access to local conflict resolution mechanisms; f) nesting of user organizations; g) degree of multiplicity of user organization functions; h) organizational scale (size of membership and regional scope); i) socioeconomic homogeneity of organization members;

OPERATIONALIZATION PROCEDURES Most of the indicators can be assessed using project reports, information from key informants, and visual inspection. Several indicators will require use of survey methodology, and the description is preceded with "social survey question."

1. *Make a list of the project's intermediate objectives.*

2. *Determine degree of achievement of objectives.*

3. *Evaluate current status of achievements:*

Material Aspects:

--For each material objective, determine the manner in which achievements have been sustained; e.g., are the artificial reefs still in place and being used as described in objectives; are the mangrove plantings still growing and being cared for as in objectives; etc.

Institutional and Organizational Aspects.

3a. Use Rights <u>developed from project efforts</u> are evaluated using the categories listed for evaluation of use rights as a contextual variable.

--a1. In terms of the relevant resource are there any restrictions concerning who has rights to harvest the resource?

--a2. Are the rights restricted to a) an area or region? b) a particular species? c) use of a particular gear? d) certain recreational activities? e) other (specify)?

--a3. If yes, is there written legislation concerning these rights or are the tights based on an informal agreement?

--a4. Who has the right of access and who is excluded?

--a5. Describe the boundaries in terms of distinctness.

--a6. Is it possible to transfer the access fights (e.g.., by inheritance, by selling them or giving them away, etc.).

--a7. How would one be caught if they break the access rule?

–a8. How would they be punished?

3b. Are adequate provisions made to monitor compliance with rules, (e.g., availability of guards, patrol boats, etc. as needed)?

3c. Are the rules being obeyed? This question *should be posed to all key informants, including some users, enforcement personnel, government representatives, project personnel, etc.*

3d. What types of user participation is provided for in terms of rule making, rule modification, monitoring, and enforcement.

3e. In cases of conflict between users of the resource, how are the conflicts resolved?

3f. Are user associations developed for use in CBCRM?

3g. If yes, for each association: What are the functions? what is the leadership? what is the number of members and what is the current trend in membership? from what area are members drawn? What are social categories of members (occupational categories)? Is the association included as a member of a group of associations? If yes, describe the structure of the grouping of associations.

3h. Social survey question–Why is there a rule .... ? (fill in with regulation developed as a part of the CBCRMP. Repeat for each CBCRMP developed resource management regulation).

3i. Social survey question–What do you think of this regulation? (appended to question 3h).

3j. Social survey question–What are the benefits of belonging to the [... j association?

IMPACTS ON THE COASTAL ECOSYSTEM The ultimate evaluation of a community based coastal resource management project (CBCRMP) is its impact on the well-being of the coastal ecosystem, including both human and non-human elements. As discussed in the introduction to this paper, the evaluation should compare information collected prior to project implementation (baseline data) with that collected sometime after project completion, using identical instruments or operational definitions of variables. For reasons given above, this is frequently impossible due to unavailable or inadequate baseline data or lack of adequate funding to replicate baseline methods for the evaluation. All these factors have a negative impact on the precision and comparability of impact analyses, but they should not inhibit attempts to estimate impacts using alternative methods.

IMPACT INDICATORS "Well-being of the coastal ecosystem" is a fuzzy, but intuitively understandable concept. Both human and natural communities are included in the coastal ecosystem, so we are concerned with the "well-being" of both. Ideally, aquatic ecosystem

health would be assessed using indicators such as species richness and composition, trophic composition, organism condition (eg., health) and abundance (Karr, et al. 1986). Karr, et al. (1986) developed a summary index based on a weighted summing of attributes of each of the indicators. Others (e.g., Rapport 1984, as cited in Hannon 1992) have identified indicators of natural ecosystem stress, including evaluations of nutrient loss, primary productivity, diversity and size distribution, and system retrogression. Costanza (1992) suggests construction of an overall system health index composed of system vigor weighted by indices for system organization and resilience, each of these indices constructed from other indicators. Clearly, assessment of "well being" of the natural component of the ecosystem can be a complex, expensive process.

Assessment of human community "well-being" can likewise be a complex, expensive process. Variables often mentioned as indicators include income, health and nutrition status, housing, and education. If some of these variables are available from baseline studies, there is frequently reason to question the reliability of measures used. For example, health and nutrition status are notoriously difficult to assess in developing country contexts. There is mounting evidence to question the reliability of informant recall as a method to obtain such information (cf. Ricci, et al. 1995; Bernard, et al. 1984), and employment of biological anthropological techniques such as skin fold measurements would be both expensive and time consuming. Income information is also difficult to obtain, especially among fishers whose day-to-day catches vary so extensively that informant recall is highly unreliable (cf. Stevenson, Pollnac, and Logan 1982). This results in the use of complicated techniques asking for income on good days, average days, and bad days, then trying to obtain information to calculate the approximate number of each type of day per fishing season, etc. , then calculating an estimated income. More accurate information can be obtained from landing statistics, but they are rarely collected and frequently unreliable. Frequently the estimate is made based on an "average" (as variously understood by individual fishers) fishing trip, which tells us very little. Finally, the estimate of income are further complicated by the occupational multiplicity that characterizes rural areas in developing countries. Education and housing are a bit easier to assess. Housing is frequently assessed using some type of material style of life scale composed of house construction and furnishings attributes (cf. Pollnac, et al. 1989).

Sometimes these highly interrelated variables are combined in some fashion and referred to as "quality of life." A traditional, single item indicator of quality of life is infant mortality rate. This is a fairly good measure of general nutrition and health care, indicators concerning satisfaction of some basic human needs as well as indicators related to income and education. Newland (1981:5) writes that "no cold statistic expresses more eloquently the differences between a society of sufficiency and a society of deprivation than the infant mortality rate. Secondary sources might provide this information for the CBCRMP target , but it is most likely aggregated for some larger area; hence, inappropriate for estimating project impacts. Regional health services may have the disaggregated data which could be used to calculate an index for the CBCRMP context, but the population might be so small that an excessively long series of data would be required to arrive at a reliable infant mortality rate

suggesting that attempts to use the rate to evaluate changes over a period of several years would be inappropriate.

Clearly, the complexity and number of this set of this set of variables appropriate for evaluating coastal ecosystem "well being" indicates that the entire set will rarely be available in existing CBCRMP baselines, and if some are, there will probably be questions concerning reliability and/or cross project comparability. Unfortunately, most CBCRMPs are not, and probably will not be, in a position to conduct adequate baselines and/or evaluations of the coastal ecosystem using such complex, expensive measures. Further, with respect to the human component of the ecosystem, the indicators, while extremely important, reflect for the most part material concerns (e.g., income, material style of life, etc.), food, and health. These are basic needs, basic to maintaining life, but humans have other needs, social and psychological needs such as family and community integration and self-actualization (cf. Maslow 1954) which are important to the "well-being" or "quality of life" of the human community. For example, satisfaction with one's occupation is based on fulfillment of basic as well as other social and psychological needs. CBCRMPs have the potential of impacting aspects of coastal occupations; hence, influencing satisfaction of these needs, and extensive research has related job satisfaction to a host of variables impacting "well-being", ranging from family violence and impaired social relations to psychosomatic illness and heart disease (see Pollnac and Poggie 1988 for a review of this literature).

Finally, with respect to impact indicators, sustainability of a project is based in large part on participants' reactions to the project. In turn, these reactions are based on user perceptions of impacts, which are not always in accord with objective, quantifiable evidence; witness the number of people who continue to smoke cigarettes despite overwhelming evidence of their negative effect on health.[2] Hence, if there is an interest in understanding sustainability of CBCRMP, it is essential to understand perceptions of the present and possible future impacts of these projects. Perceptions of impacts may explain some of the variance in long-term, as well as short-term, project success. Impact indicators suggested for this study are as follows:

1. *Overall well-being of individual/family.*
2. *Overall well being of the resource.*
3. *Local income.*
4. *Access to resources.*
5. *Control over resources.*
6. *Ability to participate in community affairs.*
7. *Ability to influence community affairs.*
8. *Self-esteem.*
9. *Community conflict.*

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[2]User perception of "well-being" of the natural environment is one indicator that, in some cases, will differ from that of resource scientists. For example, in cases where the natural environment was degrading, a resource scientist would label a steady state as an improvement, or view it positively. Likewise, if restrictions are placed on fishing areas or methods, fishers may view decreased catches as indicating that CBCRMP activities are not improving the natural environment.

10. *Community compliance with resource management.*
11. *Amount of traditionally harvested resource in the water.*

It should be noted that self-esteem was eliminated after including it at the first site, Calagcalag, because it was too difficult to evaluate.

OPERATIONALIZATION PROCEDURES Since one of the primary goals of this project is to determine factors influencing the sustainability of CBCRMP impacts, the issue of crossproject comparability of evaluation methods is significant. It is necessary to have a common operational definition of CBCRMP success to conduct this type of analysis. Ideally, this operational definition will be at a level of precision which maximizes our ability to interpret interrelationships between the independent and dependent variables. It is therefore proposed that a baseline-independent technique for impact assessment should be developed and used in assessment of selected CBCRMPs. This will result in a standardized methodology which can be applied to other CBCRMP impact assessments. Such comparability will facilitate quantitative analyses of variables impacting CBCRMP success.

If the method is to be useful, it should also be able to deal with variability in perceptions. It is clear that different individuals within a community will be differentially impacted by CBCRMP; hence, influencing their perceptions of impacts and reactions to the project. The ability to evaluate these differentially perceived impacts will permit analyses to determine sociocultural and socioeconomic factors influencing different perceptions. It will also facilitate analyses of distribution of perceived impacts; hence an analysis of equity in distribution of perceived project benefits.

Ideally the method used will be able to take advantage of the human ability to make graded ordinal judgments concerning both subjective and objective phenomena. For example, one has the ability to evaluate real world objects in terms of some attribute such as size and not only make the judgment that one is larger than the other, but also that one is a little larger, much larger, etc. Human behavior is based on graded ordinal judgments, not simply a dichotomous judgment of present or absent. For example, a person is more likely to take action if they perceive that an activity will benefit them "greatly" in contrast to "just a little. This refined level of measurement allows one to make more refined judgments concerning CBCRMP impacts, as well as permitting use of more powerful non-parametric statistical techniques to determine relationships between perceived impacts and potential predictor variables. There are several techniques which could be used to evaluate individual perceptions of the above indicators.[3]

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[3]The author is aware that psychologists, social psychologists, and other social scientists have developed and tested multi-item scales for many of the indicators used in this study. Here, we are assuming that an overall perception, or gestalt, with respect to the indicator will be sufficient for our purposes. Additionally, the large number of indicators would result in an unacceptably long research instrument, especially considering the fact that informants will be requested to make judgments for three time periods.

First, one could be requested to express degree of satisfaction or dissatisfaction along a seven (or other) point scale. This procedure would involve informing the subject that he/she will be requested to report how satisfied or dissatisfied they are with certain aspects of their environment and living conditions. Then for each topic, the subject will be requested to respond whether they are satisfied, dissatisfied, or neither. If they respond "satisfied", they will be asked if they are very satisfied, satisfied, or just a little satisfied. The same procedure would be applied to a "dissatisfied" response. Including the "neither" or neutral response, this results in a seven point scale, with 1 indicating very dissatisfied and 7 very satisfied. Respondents would be requested to make these judgments for three time periods: today, pre-CBCRMP, and 5 years in the future. Clearly, this would be a cumbersome, time-consuming process with 11 indicators. Additionally, the technique might prove to be unreliable for uncovering minor changes between time periods due to the size of the categories used.

Another technique which could be used is a visual, self-anchoring, ladder like scale which would allow for making finer ordinal judgments,[4] place less demands on informant memory, and be administered more rapidly. Using this technique, the subject is shown a ladder-like diagram with 15 (or whatever number) steps. The subject is told that the first step represents the worst possible situation. For example, with respect to coastal resources, the subject might be informed that the first step indicates an area with no fish or other resources, that the water is so foul nothing could live in it. The highest step could be described as a rich, clean water, filled with fish and other wildlife. The subject would then be asked where it was pre-CBCRMP and where he/she believes it will be 5 (or 10) years in the future. See the questionnaire form in Appendix C for the application of this method to the indicators.

The two techniques do not provide the exact same type of information. The information is similar, but subject to slightly different interpretations. For example, a position on the self-anchoring scale does not necessarily indicate satisfaction or dissatisfaction, and we might be in error if we interpret a scale value above the mid-point as indicating individual satisfaction. Likewise, satisfaction with an attribute (e.g., income) does not tell us where in the perceived range of income the individual places him/herself. The self-anchoring scale, however, will be both easier to administer and more sensitive to the changes we want to evaluate.

Perceived changes are only one aspect of the evaluation. It is also important to determine individual explanations for the changes (if all 11 indicators are used, it will be necessary to be selective as to which ones to get this type of information for). This can be achieved by asking the subject why a given change has occurred. This open-ended type of question can provide valuable insights related to community perceptions of factors influencing perceived changes.

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[4] I would argue that such scales can be treated as "quasi-metric" permitting the use of parametric statistics with fewer reservations than with the previously discussed technique.

SAMPLING AND ANALYSIS

INTRODUCTION There are two distinct levels on which sampling and analysis can take place: 1) a population of CBCRMPs and 2) within a CBCRMP. The two levels are referred to here as "general" and "site specific" respectively. At both levels the samples would ideally include a control group (from a nearby area not impacted by CBCRMP) as well as an experimental group (from the CBCRMP area) to control for non-project related changes in the natural resources (cf. Pollnac 1989). Neither the time nor resources are available to sample from a real control population; hence, a substitute control will be non-CBCRMP participants in the CBCRMP area. It should be noted that CBCRMP associated coastal resource improvements (e.g., increases in fish populations) will be shared by non-participants in a common property resource situation, reducing the value of the control group for perceptions of resource abundance and impacts of resource abundance on incomes and household well-being.

SITE SPECIFIC METHODS Sampling It is suggested that the social survey sample be composed of at least 30 households, divided approximately equally between CBCRMP participants and non-participants. This sample size was carefully selected, with research costs in mind, on the basis of: a) a consideration of the operational definition of the dependent variable; b) the degree of difference between participants and non-participants with respect to the dependent variable that is deemed "significant" and c) the desired "power" of the statistical research design (cf. Cohen 1988). Each of these points is detailed below.

a) The dependent variable is perceived well-being of the coastal ecosystem, including both human and natural aspects. The operational definition of the dependent variable, as described above, is perceived change along a 15 step visual scale as applied to each of the eleven indicators. The level of measurement is better than ordinal -- a level that some refer to as quasi-metric and the number of scales steps along with the self-anchoring aspect of the scale (cf. Cantril 1963), suggests that it is appropriate to use parametric statistics in the analysis.

b) It is suggested that a 2 point scale difference is "significant." This is practical, not statistical significance. One may think the amount was arbitrarily chosen (and in part, it was), but "better" is "better", and two points on a fifteen point scale is a modest degree of "better."

c) Power refers to the probability of finding a statistically significant relationship in a sample when there is in fact a significant difference in the population. It is always possible that although there is a significant difference in the population, a specific sample will not result in a statistically significant finding. Since we want to increase the probability that the research design is strong enough to find a statistically significant difference, if in fact one does exist, it is important to consider the concept "power" in determining sample size (Cohen 1988).

Prior to conducting the power analysis, the following assumptions were made: 1) a difference of at least 2 points separates participant and non-participant groups on dependent variable measures; 2) the standard deviation for each group is 2.0; the *alpha* is set at 0.05, two-tail; 3) sample size for each group equals 15. Analysis indicates that the difference between the two groups (N=15 for each group) has to be at least 1.5 to achieve statistical significance with the parameters established. With the sample size of 15 in each group, the power of the statistical design is 0.75. In other words, the probability that any given sample would have differences which are statistically significant is .75. Conversely, that means that there is one chance in four that the test on the sample will not be statistically significant, when in fact there is a significant difference in the population. If we change the parameters to use a one-tailed statistical test (we are justified by the fact that we are predicting the direction of the difference between the two groups), the power increases to .85, which is respectable. A probability of at least .9 that I will find a statistically significant difference if, in fact, one exists is preferred, but .85 is close enough (it rounds up to .9). The table below provides the power associated with group samples of between 9 and 25 in each group for both one- and two-tailed tests.

Power analysis for different sample sizes

Group size	Power	
	2-Tail	1-Tail
25	.93	.97
23	.91	.95
21	.88	.94
19	.85	.92
17	.80	.89
15	.75	.85
13	.68	.80
11	.60	.73
9	.51	.65

Analysis How are these ordinal measures of perceived impact to be used in project evaluation? First, with respect to the ladder-type scales, it will be possible to compare modal or average values for the number (and direction) of scale steps between pre- and post-project time periods. This will tell us little except that "overall" things have improved, stayed the same, or deteriorated a certain number of scale steps. Clearly, there will be a distribution of perceived costs and benefits in the community, and it will be important to examine the character of the distribution as well as its correlates. For example, the distribution itself can be examined in terms of equity in individual share of perceived changes. Correlates of perceived changes will help identify factors related to achievement of perceived impacts. For example, it will be possible to relate individual characteristics (e.g., education, occupation, association membership, participation in project activities, etc.) to perceived changes in "well being" or some other index.

2.1 Data Collection

Primary and secondary data were collected to generate comparative and longitudinal insights on community-based coastal resource management projects. For comparative purposes, a project "showcase" and a less successful site in a given municipality were selected to highlight differences in the project experience. Essentially, the selection of showcase barangays and non-showcase barangays was guided by the observations of project implementors, who were more knowledgeable on site-specific situations. Showcase projects included those sites which have sustained most project interventions since project completion and whose project-nurtured organizations have continued to operate even after the community organizers have phased out. Within each barangay, members and non-members of beneficiary associations were deliberately included in the sample survey to draw out and compare variables associated with membership or non-membership in beneficiary organizations.

Longitudinal insights were gathered by examining scenarios/ trends before and after project implementation. Developments external to the project, such as the passage of new ordinances and the enforcement of LGU-initiated Baywatch programs, were also carefully noted to isolate elements which have affected project performance.

Locally-based field enumerators were hired to assist in the household surveys. The recruitment of field enumerators was done with the assistance of *barangay* captains and other local leaders, guided by the following considerations: 1) fluency with the dialect in the project site; 2) familiarity with the project site; and, 3) at least high school graduates or have enrolled in a college/university. To provide a firm understanding of the objectives of the study, survey instrument and interviewing tips, the training of field enumerators preceded the actual survey of fishing households. This was complemented by a subsequent sharing of experiences in other survey sites by the research team, which helped deepen the enumerators' understanding of the task at hand.

During the actual survey of fishing households, daily meetings with enumerators took place at the end of the day primarily to review the survey results. As a built-in control measure, the research team conducted spot checks to verify the actual conduct of interviews by field enumerators with sample respondents.

The sample of respondents for the survey was drawn from an updated list of barangay households by occupation. First, given the fishery-specific nature of the survey instrument, the sample included only households which are directly involved in fishing, either as a primary activity or a supplementary source of livelihood. Second, respondents were further classified as members or non-members of project beneficiary associations. Finally, to arrive at the sample of respondents, random sampling was employed.

From each barangay, at least 30 respondents were interviewed, half of whom were members of the beneficiary association and the other half non-members. The sample size was based on the concept of power analysis (see discussion above). From November 1995 to February

1996, approximately 314 respondents were interviewed in nine (9) barangays — 4 barangays in Cebu, 2 in Negros Oriental, and 3 in Palawan.

The research team conducted key informant interviews to probe into the project experience and to establish scenarios before, during and after project implementation. Key informants included former and current barangay captains; past and current officers of beneficiary associations; members of beneficiary organizations and other community-based organizations; fish traders; community organizers, field staff, and other project implementors; and, various personnel of local government units (LGUs) at the municipal and provincial levels. Several questions were asked of the wife of the male association member or non-member respondent to evaluate their involvement and income earned from both coastal resource related economic activities and other non-coastal resource related economic activities. In addition, questions were asked about female participation in the CBCRMP. Secondary data were collected to support the primary data. The secondary data included local legislation/ordinances, socio-economic-demographic profiles, project preparation documents, project progress reports, and project completion reports.

2.2 Data Analysis

Descriptive and inferential statistics, both univariate and multivariate, were used to summarize and analyze primary data. The descriptive analysis covered frequency counts, percentages, means and standard deviation to provide a distribution of respondents across contextual variables. For hypothesis testing and quantitative analysis, several inferential statistical tools were employed in the study, namely: chi-square, t-test (paired and independent sample), principal component analysis, correlation analysis, ordinary least square (OLS) regression, and dichotomous choice model analysis (logit analysis).

For nominal/categorical variables, chi-square tested the hypothesis of independence between samples of respondents, e.g., members and non-members. To test for significance of difference between two time periods, the paired t-test was adopted. The independent sample t-test, on the other hand, tested for significance of differences between two independent samples (e.g., members versus non-members).

Correlation and regression analysis were employed to determine the relationship between dependent and independent variables. Principal component analysis, a variable reduction procedure, was adopted to assess if relationships could be reduced into a smaller number of components or composite variables that could account for most of the variance in the observed variables. This was needed to deepen the analysis of the findings. Lastly, logistic regression analysis was done to look at factors affecting participation in associations established by CBCRMP, including the probability of participation as the influential variables are changed.

3. PROJECT PERFORMANCE, PROCESS AND SUSTAINABILITY: A CASE STUDY ANALYSIS

This section includes the detailed evaluation and assessment of the community-based coastal resource management projects. This section begins with a brief discussion of the national level legislation and policies for coastal and fisheries resource management in the Philippines. This is followed by the nine project case studies. A brief overview of each of the three project studies (Central Visayas Regional Project-1, Coastal Environmental Program and Honda Bay Resource Management Project) begins each sub-section.

3.1 Supra-Community Context of Coastal Resource Management: National Context

3.1.1 Enabling Legislation

Foremost among the supra-community variables related to CBCRM project success is enabling legislation and supportive government administrative structures at the national level. The fundamental law in the Philippines affecting small-scale fisheries and fishery resources is the 1987 Constitution, which contains express provisions directly concerned with fisheries and marine resources. The Philippine Constitution of 1987 clearly states that the ownership of all natural resources, including fisheries and living aquatic resources, is vested in the State (Section 2, Article 12). The direct utilization of fisheries and living aquatic resources is possible only if Congress allows such through a licensing or permit system that regulates access to these resources. The provisions of the Constitution establish a preference in favor of marginalized subsistence fishers, whether or not belonging to the local community, to use rivers, lakes, bays and lagoons, offshore, and other fishing resources. Section 7, Article 13 states that local communities receive preference in exploitation of communal marine and fishing resources.

Presidential Decree No. 704, otherwise known as the Fisheries Decree of 1975, and subsequent PDs, Letters of Instructions (LOIs), and Fisheries Administrative Orders largely govern the management of fisheries, emphasizing both conservation and development. These measures were adequately summarized (PMO 1994:69) as follows:

> PD 704 considers the following activities illegal: (1) the use of nets with mesh sizes less than 3 cm when stretched, (2) fishing with explosives or poisons, and (3) possession of explosives or poisons by fishermen. It also prohibits commercial trawling (greater than 3 GT) in waters of 7 fathoms deep or less. Later PDs and LOIs banned commercial trawls and purse seines within 7 km of the coastline in specific areas or set the procedures for establishing such localized bans. LOI 1328 of 1983 extended the ban on commercial trawls and purse seines within 7 km of the coastline in all provinces. The restrictions on the area where trawlers may operate, as stated in PD 704 and LOI 1328, are often combined and referred to as the 7 km/7 fathom ban. LOI 1328 and Fisheries Administration Order (FAO) 164 set boundaries within which commercial trawls and purse seines and *buli-buli* should not operate.

Under PD 704, the Bureau of Fisheries and Aquatic Resources (BFAR), a staff bureau of the Department of Agriculture, is responsible for the management, conservation, protection, utilization, and disposition of all fishery and aquatic resources, with authority to regulate and supervise the production and gathering of fish and other aquatic products. The BFAR's specific powers include licensing, supervision and regulation, and investigation and adjudication. The other higher level government agencies involved directly with fisheries include the Philippine Fisheries Development Authority, the Fishing Industry Development Authority, and the Department of Environment and Natural Resources.

Regarding coral reefs, the gathering of ordinary corals as well as the export of precious and semi-precious corals is prohibited by PD 1291 (Coral Resources Development and Conservation Decree) as amended by PD 1698. Certain coral reef resources, such as the mollusks Charonia and Casis are also protected (Fisheries Administrative Order 158, 1986 series). There are also laws which sanction the establishment of marine parks or reserves to protect coral reefs (PMO 1994). Significant with respect to mangrove reforestation, the government grants, through the Department of Environment and Natural Resources, 25-year renewable lease agreements for reforested areas. This provides mangrove dependent, small-scale producers in coastal areas with security of tenure over areas they have replanted (Alcala and Van de Vusse 1994; Van de Vusse 1991).

While these national laws still impact use of fisheries and living aquatic resources, the Local Government Code (LGC) of 1991 (Republic Act 7160) places the management of municipal waters clearly under the jurisdiction of municipal or city governments. The LGC states that "local government units shall share with the national government the responsibility in the management and maintenance of ecological balance within their territorial jurisdiction... and the ... enforcement of fishery laws in municipal waters including conservation of mangroves" (Roldan and Sievert 1993). Hence the municipal governments are expected to both enact and enforce necessary living aquatic resource ordinances and other regulatory measures. This is a major change from the provisions of PD 704 where the municipal or city government had rather limited jurisdiction and responsibility over management, conservation, utilization, and disposition of all fishery and aquatic resources found in municipal waters. Under PD 704 all municipal and city ordinances and regulatory measures required approval by the Secretary of the Department of Agriculture upon recommendation of the BFAR Director. Under the LGC, a general mandate is granted to each local government unit to adopt such measures as may be necessary to protect, safeguard, and conserve the natural environment. These powers extend to the penalization of acts which endanger the natural environment.

The LGC facilitates CBCRM projects by decentralizing decision making concerning management of coastal resources and stimulating local participation in the process. A general operative principle is a provision that the local government units (LGU) may group themselves, consolidate or coordinate their efforts, services and resources for purposes commonly beneficial to them. Section 35 specifically states that LGUs may enter into joint ventures and such other cooperative arrangements with people's organizations (PO) and NGOs to engage in the delivery of certain basic services, capability building and livelihood projects, and to develop local enterprises designed to diversify fisheries, among others.

Municipalities shall have the exclusive authority to grant fishery privileges in municipal waters, up to 15 km from shore, and impose rentals, fees and charges. In terms of fishery rights, the organizations or cooperatives of marginal fishers shall have preferential rights to fishery privileges within the municipal waters such as the erection of fish corrals and gathering of fish fry free of any rental, fee or charge (de Sagan 1992, Tabunda and Galang 1992).

While legislation is enacted and enforced by the municipality, the LGC recognizes the barangay as the basic political unit functioning as the primary planning and implementing unit of government programs, projects, and activities in the community (Tabunda and Galang 1992). The *Lupong Tagapamayapa* is headed by the *punong barangay* (chief executive of the *barangay* government) and has jurisdiction over disputes between parties residing in *barangays* in the same municipality with certain restrictions (e.g., not applicable to: offenses punishable by imprisonment of more than one year or a fine exceeding 5,000 pesos; where a party is the government or a public employee and the dispute involves performance of official functions; cf. Tabunda and Galang 1992). The LGC has expanded the jurisdiction of the *Lupong Tagapamayapa* to include non-criminal cases, referred by the court for amicable settlement (Tabunda and Galang 1992).

3.2 Community-Based Coastal Resources Management Projects: Case Study Analysis

3.2.1 Central Visayas Regional Project - 1 (CVRP-1)

The Central Visayas Regional Project-1 (CVRP-1) was a response to the continuing degradation of renewable natural resources and increasing poverty in rural communities, particularly among artisanal fishers, upland farmers and forest occupants. It was the first major foreign-assisted project in the Philippines to support regionalization. Early on, CVRP-1 recognized the imperatives of devolving many decision-making powers from the central office to the regional level to effectively address pressing resource management issues. Designed around the principles of participatory resource management and the devolution of power, the project was meant to stabilize and improve the resource base (Bojos 1994; CVRP-1 1992).

Using the watershed as the planning unit, three primary project components — nearshore fisheries, upland agriculture and social forestry — were supported by institutional strengthening of government agencies, infrastructure, applied communications, research, training and technical assistance. The fisheries component utilized around 10% of the total project budget (Bojos 1994). The project lasted for 8.5 years from July 1984 to December 1992 at an estimated cost of US$ 44 million.

From an overall project perspective, CVRP-1 sought to achieve a threefold objective, namely: 1) increase incomes and living standards of small-scale rural fishers, farmers and forest occupants; 2) improve the management of the region's marine, upland and forest resources in critical watershed areas; and, 3) help increase the capacity for regionalization of decision-making and program implementation.

The nearshore fisheries component, in particular, addressed the following:

1) Establish and allocate user's rights to an extensive system of artificial reefs in waters adjacent to the four upland sites in the region;

2) Establish effective coral reef management of all coral reefs at the four project sites, along with municipal marine sanctuaries covering 15-20% of the reef area;

3) Replant mangroves in all suitable sites, manage existing mangrove timberlands by smallholders and allocate user's rights to these areas;

4) Strengthen participating regional line agencies, specifically the Department of Agriculture (Fisheries) and the Department of Environment and Natural Resources;

5) Undertake special studies to support nearshore habitat management goals;

6) Conduct general surveys to provide a technical basis for project replication in other parts of the region and elsewhere.

These objectives were partly based on a situation analysis conducted during the project design phase in late 1981 and early 1982, largely involving conversations with artisanal fishers in Central Visayas. The complaints of fishers covered several areas, namely: a) existence of too many fishers; b) declining fish catch and income; c) depleted and damaged natural resources, especially nearshore fisheries, mangroves and coral reefs; d) intense competition between artisanal and commercial fishers and extremely efficient small-scale gears such as baby trawls, *hulbot-hulbot* (bottom set encircling nets), *likum-likum* (micro purse seine) and large beach seines; e) use of destructive methods such as explosives, poisons, and very fine mesh nets; and f) government failure to provide artisanal fishers with powered boats and more efficient gear (Van de Vusse 1991). Hence, potential participants (artisanal fishers) had early inputs to the development of general project objectives (CVRP-1 1992: 26).

During project implementation, a learning process approach ran through the experiences across project sites. Taking off from a situation analysis, which identified resource opportunities and constraints, appropriate solutions were devised to overcome major constraints. Implementing the solutions and analyzing the new situation followed. The same learning process opened up opportunities for modifying project strategies, as illustrated by the shift from bamboo artificial reefs to those made of longer lasting materials, and the inclusion of "haponesa" (or fish pots) in response to identified preferences of fishers in certain sites like Palanas, Ronda in Cebu.

To catalyze the process, a community organizer was responsible for fostering community awareness, developing local managers and community-based organizations, and linking the community to service delivery agencies. Prior to deployment, community organizers underwent instruction on social preparation, which consisted of a rigorous two-month training and a four-month field immersion held under the auspices of the CVRP-hired Ilaw Foundation.

Participatory planning and implementation at the barangay level, supported by appropriate line agencies and local government units, was part of a conscious effort to achieve an enduring and self-sufficient system. Meetings and consultations were held with individual beneficiaries, user groups, and barangay officials, in keeping with the participatory spirit of CVRP-1. Community organizers, moreover, were key players in resolving community conflicts and fostering harmonious relationships.

Community organizing, in particular, was carried out in seven (7) identifiable phases, as follows: a) project site selection; b) immersion/integration and community profiling; c) issue selection and prioritization; d) contact building and identification of potential local leaders; e) formation and strengthening of a core group; f) training and mobilization; and g) setting up of a community organization (Bojos 1994).

At the outset, major concerns focused on reversing the decline in fisheries productivity and restoring nearshore fish-producing habitats with the participation of community organizations. Guided by the need to promote technologies that were within the capability of fishers to implement with minimum support services, project interventions consisted of mangrove reforestation, deployment of artificial reefs and fish attracting devices (FADs), establishment of marine sanctuaries, sea ranching, and control of destructive fishing methods.

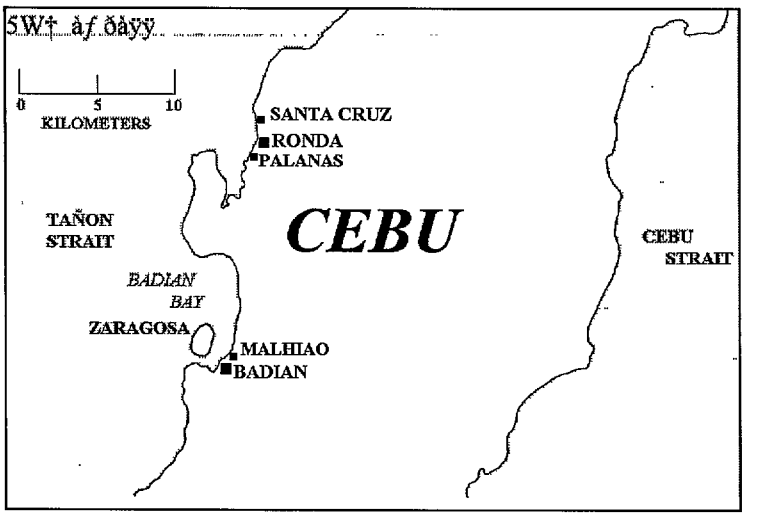
Artificial reefs were viewed then as entry points in fisheries management. Within six months from deployment, they were expected to demonstrate positive results in terms of a better harvest, apart from providing a mechanism for strengthening the participatory process. Making the fishers realize that they themselves could take positive steps to solve marine resource problems was, by itself, a crucial milestone. Corollary to this was training people to deal with their collective rather than individual needs and problems, hand in hand with involving them in activities that require working together.

Mangrove reforestation and management, as a project intervention, was part of rehabilitating coastal resources and providing tenurial security to the planter through a 25-year lease (stewardship contract). The establishment of marine sanctuaries, meanwhile, materialized only in the latter part of project implementation since sanctuaries inherently involved giving up some production in the short term to improve the reef's long-term productive capacity. It called for closing a portion of the coral reef to fishing and controlling destructive fishing practices. The sanctuaries would be developed after the community witnessed increased fish production due to mangrove plantings and artificial reefs. This was expected to motivate the community to further improve fish habitats.

Locally appropriate fish attracting devices (FADs), on the other hand, were relatively minor interventions which were meant to enhance the management of the pelagic fishery within municipal waters. They were envisaged to offset the use of "payao" by commercial fishers, which attracted mostly juvenile fish and encouraged total harvest attempts with surrounding nets (Bojos 1994). The "talarok," another type of FAD, was designed for low cost handline fishing from an unmotorized boat. Though this fishing gear limited individual harvests to about five kilos of fish a day, it encouraged the fish to linger in the area. Apart from these

interventions, CVRP-1 promoted sea ranching and small-scale sea farming in certain sites to provide alternative livelihoods with minimal start-up capital.

The nearshore fisheries component of CVRP-1 was implemented in 16 coastal municipalities and 182 barangays across the provinces of Cebu, Negros Oriental, Bohol and Siquijor. By the end of the project in 1992, the component generally exceeded its original targets by more than 100%, except for the issuance of certificates of stewardship contracts which had an accomplishment rate of 93% (or 1622 instruments). Some 1,037 ha of mangrove were reforested while 4,621 ha were covered by coral reef management. Moreover, around 1,164 clusters of artificial reefs were established by the project and 93 ha devoted to mariculture. The project distributed 278 units of fish attracting devices (CVRP-1 1992: 30, 32, 34). Notwithstanding the high accomplishment rates of the nearshore fisheries component, the post-project experience in sustaining the interventions varied across sites, as shown in subsequent sections of this study.



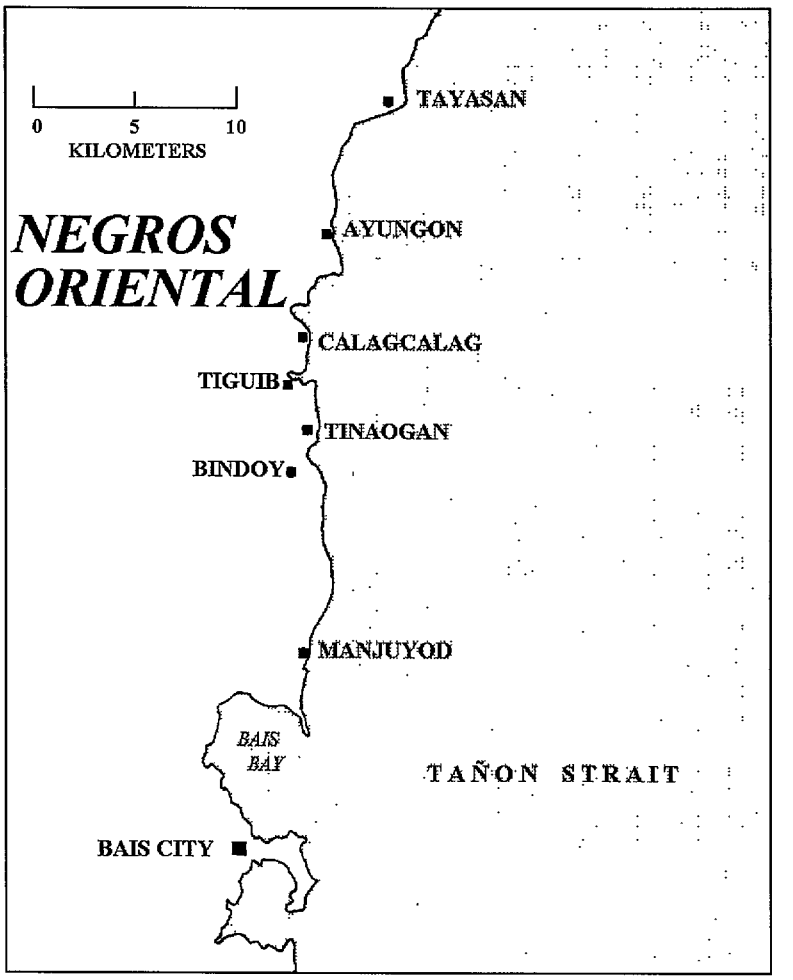


Figure 1. Location map of CVRP-1 sites covered by the impact evaluation.

3.2.1.1 Calagcalag, Ayungon, Negros Oriental

Site Description

Calagcalag is a coastal barangay of the municipality of Ayungon, Negros Oriental in the Central Visayas region. Located just south of Calagcalag Bay on the east coast of Negros, the fishers of Calagcalag fish waters enriched by both coral reefs and modest stands of mangrove. A narrow shelf, with coral reefs at the drop off, stretches along the shores of the municipalities of Ayungon and Bindoy to the south. A 1.5 kilometer long reef extending southeastward from the shore just north of Calagcalag Bay partly sets it off from Tanon Strait which separates the islands of Negros and Cebu (Pryke 1983). The beach of Calagcalag is dark, composed of small to large pebbles, chocolate brown silt, bits of broken coral, and sheets of apparently pyroclastic rock (tuff and pumice), probably from the extinct volcano which backs Calagcalag to the west. Ranks of mangrove plantings stand green against the dark beach which is backed by coconut palms. Cattle, goats, pigs and chickens graze, root and browse the green undergrowth. Sugar cane, maize, highland rice, cassava, coco yam and other vegetable crops, as well as fruit trees (mango and papaya) are grown on the narrow strip of coastal lowlands of Calagcalag. The nearby hills and mountains of Negros, as well as those of Cebu clearly visible across the strait, are largely cleared of forest, contributing to the sediments that stain the nearshore waters brown in the rainy season.

At almost any time of the day, but usually in the morning, fishers can be seen in their boats, or standing in the shallows, deploying their nets to capture the small pelagic fish species that are so important in the people's diet and for their livelihood. Some boats stand apparently empty in the water, but are tied to diving spear fishers who are probing the reefs for octopus and fish. Some boats can be seen moored high on the narrow beach, but most are dragged or carried to locations along or behind the houses strung along the strand. The nearshore resources targeted by these fishers have long been under heavy fishing pressure, some of it destructive and illegal.

Site Project Variables

Barangay Calagcalag was considered a showcase of a beneficiary community in Negros Oriental. As an early pilot site of CVRP-1, activities began in July 1984. The project concept was introduced to the residents of Calagcalag through a community assembly. A part-time community organizer (CO) who lived in Bindoy, a town just south of Ayungon, was responsible for establishing the project and working with both barangay officials and residents. In the absence of an existing fishers' association, the CO proceeded to organize the residents. A core group was identified and developed with a series of training activities on leadership and value formation. Strategic planning exercises, moreover, were conducted with barangay residents in a participatory manner to assess resources, needs, problems, solutions and key players. Later, this led to the annual preparation of a barangay development action plan (BDAP), where coastal resource management concerns were consciously integrated.

Other capability-building efforts involved the technical preparation of association members, largely through training on various project interventions such as mangrove reforestation and management, artificial reefs, coral reef management with fish sanctuary, fish attracting devices (FADs), mariculture, and livestock integration as a supplemental livelihood. Later, a visit to Apo Island, where Silliman University initiated a marine sanctuary, proved to be a turning point in heightening the receptivity of the beneficiaries and local officials to the concept and in motivating them to develop a sanctuary in Calagcalag. Joining the visit at that time was a composite team drawn from the officers of the beneficiary association, the mayor, councilors and the barangay captain.

The CVRP-1 interventions in Calagcalag included: mangrove reforestation (12 ha), artificial reefs (40 clusters), sanctuary (30 ha), fish attracting devices (3 units), sea farming (300 kgs of Eucheuma and 180 kgs of dalo-dalo seed stocks cultured on an area of 0.44 ha), and goat dispersal (3 heads).

Coordination between participating groups in CVRP-1 was achieved through regular meetings. To date, this type of coordination is still carried on with regular monthly meetings between the Center for the Establishment of Marine Reserves in Negros Oriental (CEMRINO), the German Development Service (GDS), and the Resource Management Division of the Provincial Planning and Development Office (PPDO).

In 1988, CVRP-1 was elevated to a provincial-level activity with the creation of a Provincial Resource Management Committee (PRMC). The members consisted of the Governor as Chairman, the Manager of the Site Management Unit (SMU) as Vice-Chairman, and the heads of different agencies as members. Seed funds came from CVRP-1 to support PRMC operations. Sectoral workshops were conducted to operationalize resource management plans, while monthly meetings were held to monitor accomplishments, resolve issues, and thresh out areas for action.

CVRP-1 phased out from Calagcalag in 1992. Prior to this, the provincial government received regular project reports to update officials on project milestones and problems. Through the intervention activities of the PRMC, the local government unit was assisted and prepared to assume responsibility for sustaining CVRP.

After CVRP-1, the re-election of the Governor of Negros Oriental favored the continuity of project initiatives on coastal resource management (CRM). The integration of CRM concerns into provincial plans and programs has been institutionalized through the creation of the Resource Management Division under the Provincial Planning and Development Office (PPDO). Through a tie-up with the German Development Service, the maintenance of marine sanctuary facilities, such as a guard house, has been sustained.

The municipal Mayor of Ayungon, on the other hand, has made it a policy to issue permits on the use of coastal resources only after receiving the endorsement of the president of the Calagcalag *Bakhawan* Fishermen's Association (CABAFA). This represents a clear demonstration of the recognition of a community-based effort to consciously safeguard the

coastal resources of Calagcalag and to pursue CRM as a collaborative effort between the local residents and the local government unit.

A survey of community members was conducted to determine their degree of participation in CBCRMP planning and implementation, as well as knowledge of project objectives (Table 1). Overall, the results indicate that project cooperators (association members) had the greatest amount of participation as well as knowledge concerning project objectives. Seventeen association members and 17 non-members were interviewed. Eighty-eight percent of association members were knowledgeable about project objectives while 82 percent of non-members reported no knowledge of project objectives. Seventy-one percent of association members (multiple responses possible) reported the objectives of the project were to improve the coastal resources and the community welfare, 35 percent stated to protect coastal resources, 29 percent stated to rehabilitate the degraded condition of coastal resources, and 12 percent stated to control or minimize illegal fishing methods. Seventy-four percent of those interviewed felt that they had some influence in project planning, and 62 percent felt they had an influence on changes made after the project began. The table clearly shows, however, that the influence of non-members waned after the project began. Attendance at CBCRMP trainings and meetings also seems to be concentrated among association members. As for attendance in meetings, about one-half of those who attended simply responded that they attended so many meetings that they could not remember how many. The others attended from 2 to 20 meetings, with an average of 9. CBCRMP trainings were attended by 41 percent of the respondents. About two-thirds (64%) of those who attended trainings, attended one or two. The other approximately one-third (36%) attended 3 to 5 trainings.

Table 1. Community participation in CBCRMP implementation.

	% Member	% Non-Member	% Total	X^2	p
Attend CBCRMP Meetings	94	29	62	15.07	0.000
Attend CBCRMP Training	71	12	41	12.14	0.000
Influence Planning	94	53	74	5.44	0.020
Influence Project Changes	100	24	62	21.05	0.000
Knowledge of Objectives	88	18	53	17.00	0.000

Context Variables

Supra-Community Context

Enabling Legislation. During the Calagcalag CBCRMP planning and implementation period, fisheries management was influenced by PD 704. The municipality of Ayungon had a basic fishery ordinance, Municipal Fishery Ordinance No. 14, which was approved by the *Sangguniang Bayan* of Ayungon on 1 August 1980 and later by the Secretary of Agriculture.

Due to changes brought about by passage of the LGC, on 9 June 1993 the Office of the *Sangguniang Bayan*, Municipality of Ayungon enacted Ordinance No. 5, The Municipal

Fisheries Code of 1993. This new ordinance superseded all sections of Municipal Fishery Ordinance No. 14. The guiding principles of the legislation, quoted below, clearly indicate an emphasis on resource conservation through community participation:

> Section 1. It is hereby declared the policy of the Municipality of Ayungon to accelerate and promote the development of its fishery resources to optimum productive condition through proper conservation and protection.
>
> Section 2. The municipal government shall encourage the organization of artisanal/ municipal fishermen, *Bantay Dagat*, and the like and provide assistance to integrate the activities of persons, associations, cooperatives and corporations engaged in the fishing industry so that the municipality may achieve the maximum economic utilization at the same time protecting its fishery resources.
>
> Section 3. The private sector's privilege to utilize the municipality's fishery resources shall be exercised or continue to be exercised only under the basic concept that the grantee, licensee or permitted thereof shall not only be a privileged beneficiary but also an active participant and partner of the municipal government in its conservation and development of the fishery resources of this municipality.

The Ayungon municipal legislation not only allows the formation of user groups, it also encourages their formation through preferential rights to exclusive fishing privileges, such as operating fish corrals, culturing aquatic organisms, and gathering fish fry (e.g., milkfish fry) for culture and propagation purposes. The municipal legislation, drawing on Section 149 of the LGC states:

> While the *Sangguniang Bayan* may require the conduct of a public bidding when granting fishery privileges, duly registered or accredited organizations, associations and cooperatives of marginal fishermen shall have the preferential rights to such fishing privileges without being required to undergo the bidding. However, in the absence of such organizations, associations and cooperatives, or in case they fail to exercise their preferential rights, other parties may participate in the said public bidding in conformity with Sec.149 of the Local Government Code of 1991.

User groups and/or families can also be granted licenses and responsibility for artificial reef areas. Section 7 of the legislation states that:

> The *Sangguniang Bayan* shall encourage and support the fishermen's associations to engage in the construction of the artificial reef which shall be managed and protected by the fishermen/*Bantay Dagat* themselves. A license may be issued to a family who constructed the artificial reef and established the area or to an association whichever is applicable, for better management and protection.

Although existing legislation is facilitating with respect to some aspects of the sustainability of the Calagcalag CBCRMP associated with the CVRP, there are some problems associated

with the application of the LGC. Tagarino, et al. (1995) conducted a well reasoned study on the interrelationships between the Local Government Code (R.A. 7160) and the Fisheries Decree (PD 704) and their application to fisheries development and management as promulgated by a Fishery Sector Program project in Calauag Bay. A summary of their findings is relevant to our interpretation of the efficacy of R. A. 7160 and PD 704 as enabling legislation for CBCRMP. They clearly make a number of important points:

First, there are inconsistencies between the two laws which could lead to conflict; e.g., PD 704 allows commercial fishing in waters deeper than seven fathoms which in many places overlaps with the definition of municipal waters of fifteen kilometers from the shore. Commercial fishers, when apprehended in municipal waters have used this as an argument in litigation. There are also inconsistencies with regard penalties. The penalties authorized for violations of fisheries laws are much lower and weaker under R. A. 7160–so low that they would not necessarily deter illegal activities. Finally, although the LGC gives local government territorial jurisdiction over coastal and marine resources, the Bureau of Fisheries and Aquatic Resources still has authority over some types of fishery resources and activities within the local area (see Tagarino, et al. 1995:13-14). A Memorandum of Agreement (MOA) between the Department of the Interior and Local Government and the Department of Agriculture was written in 1994 eliminating some, but not all of the overlapping jurisdictions, but there is question concerning the legal authority of such a MOA vis-a-vis P.D. 704. Tagarino, et al. (1995) citing, Bojos (1992) note that despite a MOA between the Department of Agriculture and CVRP-1 authorizing licensing of artificial reefs, municipal ordinances including these licensing powers have been rejected by BFAR. It should be noted that the Ayungon Municipal Fisheries Code of 1993 authorizes licensing of artificial reef areas.

The Ayungon Municipal Fisheries Code of 1993 (AMFC) also has other areas of potential conflict with PD 704 which may impede enforcement. PD 704 defines vessels of 3 gross tons as commercial, in contrast to municipal (3gt or less). The AMFC defines commercial fishing as:

> ...fishing for commercial or profit purposes in the municipal waters within fifteen (15) kilometers from the shoreline with or without the use of fishing vessels of any kind, make or size.

Municipal fishermen are defined as:

> ...all fishermen within the municipality including organization, associations,, cooperatives or corporation, marginal or small scale fisherfolks engage[d] in any fishing activity.

Hence, commercial fishermen seem to be a subset of municipal fishermen. Municipal and/or small-scale marginal fishing appears to refer to another subset of the category of municipal fishers which, incidentally, overlaps with commercial category. The AMFC defines municipal and/or small-scale marginal fishing as:

> ...fishing with or without fishing vessel of any kind by individuals, organizations, associations or cooperatives engage[d] in subsistence fishing which shall be limited to the sale, barter or exchange of marine products produced by himself and his immediate family, for domestic use or consumption, and whose annual gross income from such fishing activity does not exceed fifty thousand pesos (P50,000.00) or the poverty line established by NEDA for this particular region and locality, whichever is higher; Provided, that those using motorized fishing vessels of any kind or size is not included.

When questioned concerning conflicts with PD 704, the mayor stated that the definitions in the AMFC provide him with more flexibility for developing locally appropriate regulations. In conformance with PD 704, however, the AMFC prohibits fishing in municipal waters by vessels greater than 3 gross tons. Nevertheless, these changes in definition could result in litigation that impede effective enforcement.

Second, while the LGC devolves a great deal of responsibility and functions to the local governments, the legislation, as well as modifying MOAs, clearly lack budgetary provisions for carrying out expensive operations such as the socioeconomic and resource assessments necessary to develop and maintain effective, sustainable coastal resource management. Also lacking is sufficient support for surveillance and enforcement: local attempts to impose stiffer penalties (e.g., confiscation of gear) have been denied; equipment adequate for demands of surveillance and enforcement is too expensive for poor municipalities to purchase; vested interests among local officials results in conflicts in law enforcement; lack of close coordination of barangay fish wardens and police impedes apprehension of violators (Tagarino, et al. 1995). All these problems require administrative, technical and financial support, especially in disadvantage locations. Supporting these conclusions, the mayor of the Municipality of Ayungon noted that they have given him all the responsibility without the resources to be fully effective.

Summarizing facilitating aspects of formal legislation (both national and municipal) with regard to facilitating the Calagcalag CBCRMP, we find that:

1. The legislation not only permits, but encourages the formation of user groups.

2. The legislation authorizes (with qualifications) user groups to define boundaries for exclusive access.

3. The legislation facilitates security of tenure for user groups through preferential rights in obtaining exclusive fishing privileges and long-term renewable leases to mangrove areas.

4. The Local Government Code (RA 7160), in combination with The Fisheries Act of 1975 (PD 704) and subsequent PDs, Letters of Instruction (LOIs), and Fisheries Administrative Orders, provide general guidelines within which user groups can

devise and legally implement, through their local government, locally appropriate management rules.

5. Although not specifically mentioned in the LGC, provisions for user group participation in formulating municipal legislation, and the local administration's support of this type of participation, can (but not necessarily) result in recognition and formalization of traditional or informal management systems, where they exist, if they fall within the general guidelines referred to above.

6. It appears that the legislation is inadequate with respect to actually providing supportive structures for resource monitoring, surveillance, enforcement, conflict resolution, and information. Some aspects of the legislation can actually generate conflict.

7. The municipal legislation provides for participation of user groups in developing and implementing surveillance and enforcement methods through encouragement and support of the formation of *Bantay Dagat* (voluntary guards of the sea).

Supra-community Institutions. A number of government institutions and non-governmental organizations (NGO) outside of Calagcalag have influence on the management of local fisheries and/or coastal resources. Before CVRP-1 began, the Bureau of Forest Development (BFD) was the only government institution with active involvement in Calagcalag. The BFD implemented a mangrove reforestation project.

During implementation of CVRP-1, two government institutions were actively involved in Calagcalag, the Department of Natural Resources-Community Environment and Natural Resources Office (DENR-CENRO) and the Department of Agriculture-Bureau of Fisheries and Aquatic Resources (DA-BFAR). The DENR-CENRO is located in Tiguib (the barangay just south of Calagcalag). This office took over the mangrove reforestation project of BFD under the CVRP-1. It provides assistance in mangrove management, as well as the stewardship contracts. It is involved in encouraging alternative livelihood among fishers (e.g., it provided broiler chickens chicks through the fishers association). The DENR-CENRO is currently active.

The BFAR was involved in extension activities for fishers on fishing technology. The BFAR functions at the municipal and provincial levels. Current BFAR activities have been reduced and transferred to the municipal government as a result of administrative restructuring under the LGC.

A number of institutions and organizations, in addition to DENR-CENRO and BFAR, are currently active in Calagcalag. The Resource Management Division (RMD) of the Negros Oriental Provincial Planning and Development Office (PPDO), located in Dumaguete City, was established in 1993 and maintains many of the original activities of CVRP. RMD provides quarterly workshops, occasional seminars, advice, and community organizing activities. The

Population Program Office provides the community organizer for Calagcalag. RMD also facilitates acquisition of material for projects (e.g., tires used for the most recent artificial reef construction in Calagcalag).

The Center for the Establishment of Marine Reserves in Negros Oriental (CEMRINO) is an NGO established in 1994 with support of the European Commission to support some of the nearshore fisheries work of the RMD. CEMRINO is in the process of conducting a coral reef and associated fish stock survey of the coastline of Negros Oriental to be used in making recommendations concerning establishment of marine reserves. They are also establishing a fish catch monitoring program involving local fisher organizations. All this is directed at developing a management plan which will be made available to the RMD. A Memorandum of Agreement insures that all data collected by CEMRINO will be shared with the RMD.

A foreign NGO, the German Development Service (GDS), works in association with the RMD to continue CVRP-1 nearshore fisheries activities in Calagcalag. They assigned a marine biologist to the RMD office and provided funds for *Bantay Dagat* training, resource monitoring, the guard house for the Calagcalag marine sanctuary, a toilet, and alternative livelihood projects such as goats for improvement of livestock. They also provided assistance with regard to the preparation of sign boards. It is reported that the GDS visits the community on a monthly basis.

At the municipal level, the Ayungon Federation of Fishermen's Associations (AFFA) provides an apex organization for 7 fishers' associations located in the coastal barangays. The barangay associations are nested vertically in the AFFA. The AFFA is supposed to have monthly meetings which officers of member associations are required to attend. Additionally, the president of AFFA is supposed to attend the meetings of member associations to resolve conflicts and coordinate activities. Key informants from Calagcalag report that the AFFA is not active at the present time because the president is not performing required duties.

The municipal government also actively supports the efforts of these organizations in Calagcalag, as well as supporting the local fishers' association through favorable legislation. The municipality provided the assistance of a Department of Agriculture marine biologist to help the community with coastal activities, and it provides police assistance when requested. The municipal mayor reported that he assigned police officers to go with the Bantay Dagat to teach them procedures for apprehension, arrest and evidence.

Supra-community Markets. Most of the fish and shellfish harvested is consumed locally in Calagcalag and Ayungon, except for octopus and bangus fry. Octopus is sold in Bindoy, Bais City, Mabinay and Tanjay. Bangus fry is sold in Dumagete City and transhipped to Manila. This pattern of fish marketing has reportedly been the same since CVRP-1.

Throughout most of the month, shellfish is collected for home consumption only, usually by women. During the three days around the full and new moon (a total of six days) whole families collect shellfish, which are sold to buyers (*compradors*) who then sell the product in the Bindoy and Ayungon markets. Collectors usually earn 30 pesos per day.

Two fish buyers regularly come to a specific fish landing area between 9 and 10 AM daily and depart between 2 and 3 PM. Although they buy any type of fish, one focuses on octopus. Much of the octopus is reportedly exported to other parts of the Philippines and abroad. The other buyer focuses on fish which are sold by his wife in the Ayungon market. Larger amounts of fish may be assembled and sold in larger population centers such as Bais City, Mabinay and Tanjay.

It is reported that there is a much greater demand for fish today than in the past. The demand reportedly has increased over the last two to four years, and key informants attribute this increased demand to increasing population as well as increases in prices of other sources of animal protein. Along with this increase in demand, retail prices in Calagcalag have also increased over the past ten years by up to 300 percent for some fish species.

Post-project, Supra-community Shocks to the System. No new technologies, other than those introduced by the project (e.g., artificial reefs (ARs), fish aggregating devices (FADs), have been used in the area since project implementation. Fishers from neighboring barangays and municipalities have been fishing in Calagcalag waters, using nets, hook and line, spears, and compressors. Increases in spear fishers from inland barangays were especially noted. Three typhoons, accompanied by floods, occurred since 1992, destroying some of the FADS and ARs.

Community Context

Perception of Trends in the Resource. Key informants noted that at the time of CVRP implementation, stocks were decreasing due to destructive fishing and resource use such as the use of poisons, blast fishing, mangrove cutting, etc. A survey of 34 community members provided mixed opinions. Most of the respondents (71%) report that the resource was in good shape at the time the CBCRMP began. Most, however, said it was a little bit good in contrast to good or very good . When asked about the condition of the nearshore resources today in comparison to ten years ago, 53 percent of the respondents said the resources were better off today, 9 percent said they were about the same, and 38 percent said they were worse off. Two fish buyers who were interviewed said that fishers sold them more fish, by weight, five years ago–that the fish are the same size, but there are fewer of them. Aspects of this variation are discussed below in the section on individual and household level data.

Target Species Composition and Distribution. Interviews with 20 key informants representative of the major fishing types indicated that the following types of fish are considered most important in terms of income:

1. *danggit* (*Siganus sp.*)
2. *kitong* (a bigger type of *danggit; Siganus argenteus*)

3. *lapu-lapu* (*Epinephelus sp. Cephalopholis sp*)
4. *mulmol* (big dark parrotfish and/or wrasse)
5. *ulapay* (*Scarus sp.* especially green, blue, and yellow varieties)
6. *kugita* (octopus for spear fishers)

For home consumption the following were indicated:

1. *mulmol* (big dark parrotfish and/or wrasse)
2. *ulapay (Scarus sp.* especially green, blue, and yellow varieties)
3. *kinhason* (shellfish) (e.g., *saang* [brown with horns]; *baluso* [light yellow with darker yellow spots]; *ansuhan* [white, looks like shell inhabit by hermit crab]; *budyong* [like a conch, creamy white with brown spots]; other types not described: *balungkot, tikod, galit galit, tupong tupong, layagon, aninikog, tipay, bulan-bulan, sikad-sikad, litob, tuway, dalo-dalo, sihi', balisala, lumban, bungkawil, imbaw, bug-atan, buyogan, pulid.*
4. *kulabutan* (cuttlefish)
5. *nokus* (squid)

The two principal buyers in Calagcalag were also interviewed concerning the types they considered economically most important. As noted above, one of the buyers focused on octopus; hence it was first in his list. The important types for the two buyers are as follows:

Buyer #1

1. *kugita* (octopus)
2. *mulmol* (for buyers, refers to all parrots & many wrasses)
3. *sulid* (*Caesio sp.*)
4. *anduhaw* (round scad)
5. *nokus* (squid)

Buyer #2

1. *mulmol* (for buyers, refers to all parrots & many wrasses)
2. *danggit* (*Siganus sp.*)
3. *balo* (garfish)
4. *nokus* (squid)
5. *sulid* (*Caesio sp.*)

Information from the buyers largely substantiates information obtained from fishers except for the addition of *sulid* (*Caesio sp.*). Only a few boats focus on *sulid*. These vessels are a little

larger (5-6m versus 2.5-4m) than the average boat and are manned by larger crews (6-10 versus 1-2), and land larger quantities of fish; hence, are probably more salient to the buyers.

Fishers report that most of the fish harvested are captured in reef areas (*kabatuan*), either coral (*gusao* or *bulaklak sang bato* [= "flower stone"]) or rock (*bato*). Fishers report that during the past the most commonly caught fish were groupers, but when people began to use destructive fishing methods and destroy corals, groupers and snappers became less in number. There was a sudden increase in parrotfish and wrasses. The buyers report that, overall, they are handling fewer fish than 4 years ago--not smaller, just fewer.

Environmental Features Influencing Boundary Definition Fishers know the locations of reefs below the surface, and the coastline of Calagcalag is slightly irregular with several streams and other irregularities. Boundary definition would be of medium difficulty. For example, it was necessary to use marker buoys to define the boundary of the sanctuary, and stakes are placed in the water to define *bangus* fry collection areas.

Technologies used in Coastal Area Most fishing is conducted from relatively small outrigger boats, ranging in size from a little over 2 meters to about 6 meters. The majority of the vessels are unmotorized. The unmotorized vessels, for the most part, are powered by paddle. Only a few were observed using sail. There are 55 non-motorized and 5 motorized fishing boats in Calagcalag.

Among the commonly used technologies, the most frequently used is the net (*pukot*). The variety of nets used include bottom set gillnets (*patayad* and *palubog*); gillnets with the fish being frightened into the net by making disturbances in the water with oars or the fishers bodies (*lamba'*); dipnets (*sikpao* [2-3' dia, stretched taught, bait put on net and lifted] for small *palata'* (damselfish); and a smaller, dipnet, *sibot* which looks like a butterfly net that is used to catch small shrimp. The next most common technique is spearfishing (*pana*, using a home-made speargun with a barbed metal spear). Spear fishers use home-made goggles and fish from non-motorized, very small outriggers. Hook and line (*pasol*) is the least frequently used common technique. Most hook and line fishers use lines with multiple hooks and artificial lures made of frayed pieces of "rentex" (a synthetic cord) or silk. Less common gears in Calagcalag include two fish corrals (*bunsod*), beach seines (*sahid*, also deployed from a boat in shallow water away from the shore), push nets (*trawl*, used for *bangus* fry), a net with a bamboo purse area (*pahunas*, not observed), and a lift net (*sabinit*, which is deployed and lifted in the area between the outrigger and the vessel body--the boat using this technique is larger [5-6m] and has single bamboo rod extensions [approximately 5-6m each] at the prow and stern for tying the ends of the net. The net is used to capture a small, unidentified fish [*malobgas*] between May and July. There was no opportunity to observe the technique, but the vessels used were observed). Several fish traps (*bubo*) were observed beside houses along the beach. Shell gathering (*panginhas*) is done by hand.

Level of Community Development Level of community development is based on a checklist of items which are listed below. Items present in Calagcalag are presented in bold print. Those not present are normal print.

1. Hospital
2. **Medical clinic**
3. Resident doctor
4. Resident dentist
5. Secondary school
6. **Primary school**
7. Public water supply piped to homes
8. Sewage pipes or canal
9. Sewage treatment facility
10. **Septic or settling tanks**
11. **Electric service**
12. Telephone service
13. **Food market (*sari sari* store)**
14. Drug store
15. Hotel or inn
16. Restaurant
17. Gas station
18. **Public transportation**
19. **Hard top road access**
20. Banking services
21. **Television reception**
22. **Radio reception**

Degree of Integration into National Economy and Political System . The coastal products (fish) are collected by two middlemen and transported to both the municipal center and a municipality to the south (Bindoy) where they are further transshipped by other middlemen to the provincial capital (Dumaguete) and beyond. This is facilitated by good transportation links (e.g., frequent buses and other public transport vehicles) using the paved road which connects the coastal communities. Communication links, however, are poor. One has to travel 5 kilometers to Ayungon to find a telephone or other form of rapid communication (e.g., short-wave radio). There is television and radio reception in Calagcalag and some fishers own a television, radio or both. The governor of the province, however, shows a great deal of interest in rural areas and it is reported that he visits the area frequently (more than once a year). Except for communication links, the degree of integration into the national economy and political system can be classified as medium to high.

Tradition of Cooperation and Collective Action. Over the past ten years collective action, was initiated by the CVRP. At the beginning of the project a group called *Alayon* was formed which lasted less than 1 year. The group included fishers as well as others, and functioned to provide training as well as information dissemination related to the CVRP (e.g., mangrove

reforestation, artificial reefs). From 1984-86, there was a Mangrove Reforestation Association. In 1986 a Calagcalag Bangus Fry Catcher Association was formed and the Calagcalag-Bakhawan Fishermen's Association (CABAFA) started to form which soon incorporated the other two associations (*bakhawan* = mangrove). This association is still functioning as of late 1995. CABAFA functioned to facilitate all the CBCRMP activities described below. The Calagcalag Small Coconut Farmers Association was formed in 1991 and is still functioning to provide information and services associated with coconut farming.

Occupation Structure and Dependence on Coastal Resources. The only occupation dependent on coastal resources in Calagcalag is fishing. A little over 20 percent of the households (50 households) depend, at least in part, on fishing for a livelihood. Some 60 fishing boats (5 motorized, 55 unmotorized) were counted along the shore of Calagcalag, some of which are owned by spear fishers who live in inland barangays. The distribution of occupations in Calagcalag can be found in Table 2.

Table 2. Distribution of occupations.

Occupation	Percent
Farmers	40
Fishers/Farmers	12
Fishers	8
Unknown	6
Housekeepers	5
Pedicab drivers	4
Drivers	4
Carpenters	4
Laborers	4
Vendors	3
Teachers	3
Government Employees	2
Policemen	1
Pedicab owners	1
Farmers/Others	1
SB Members	*
Linemen	*
Land Surveyor	*
Welders	*
Coconut Gatherers	*
Security Guards	*
Army	*
Postmasters	*
Fishers/Others	*
Workers	*

* = <1%

Key informants identify farming and related services as most important to the local economy. Fishing is second most important. Based on the percent of households dependent on only

fishing or fishing and farming, we might estimate that the economy is about 15 percent dependent on coastal resources. As mangrove reforestation begins to produce productive stands of mangrove, this dependence on coastal resources may begin to grow, but it is doubtful if the exploitation of mangrove will provide more than a small amount to the overall economy of Calagcalag.

Degree of Socioeconomic and Cultural Homogeneity. An examination of barangay records concerning the principal occupation of the household head of 249 households in Calagcalag indicates that most households (60 percent) are either farmers, mixed farmer/fishers, or fishers. Very small percentages are represented by a diversity of other occupations, indicating a fair degree of occupational heterogeneity. With respect to ethnicity, a key informant estimated that 90 percent of the population consisted of locals, Boholano, and Cebuano (30% each) and the other 10 percent of the population were Ilongo and Leyteno (5% each), suggesting a fair degree of ethnic heterogeneity. In terms of religion there is also a fair amount of diversity: one-half are Catholic, 25% Protestant, 15 percent Aglipay (Catholic sect not recognized by the Catholic Church), and 10% Born Again Christians ("Four-Square"). Overall, the population of Calagcalag manifests a fair degree of socioeconomic and cultural heterogeneity.

Political Organization and Conflict Resolution. Calagcalag is a barangay in the municipality of Ayungon which forms part of the province of Negros Oriental. The barangay is headed by the barangay captain who is assisted by a barangay council. The municipality is headed by a mayor with the assistance of a municipal council.

These levels of government are important in terms of formal conflict resolution. When conflicts arise, there are informal attempts at resolution. Usually the elders in the involved families will attempt to resolve the conflict amicably. If this does not work, the conflict is brought to the attention of the barangay captain who attempts amicable settlement, with or without written agreement. If the barangay captain cannot resolve the conflict, it is brought to the attention of the *Lupong Tagapamayapa (a committee of the barangay council)*. If the case cannot be settled by the *Lupong Tagapamayapa,* it is sent to the municipal trial court for filing of a case and adjudication at the municipal level.

Population and Population Changes

Coastal Resource Use Rights, Formal and Informal. No informal systems of coastal resource use rights were uncovered during the research period. The Ayungon Municipal Fisheries Code of 1993 (AMFC) redefines the categories municipal and commercial, as described above, but still prohibits vessels greater than 3 GT from fishing in municipal waters; hence, continuing the use rights associated with PD 704. The AMFC, however, does not mention the 7 fathom restriction.

The Municipality of Ayungon also has formal legislation prohibiting fishing in a sanctuary located off the shore of Calagcalag. In 1989 the Municipality of Ayungon passed a resolution endorsing establishment of a sanctuary with the support of the Calagcalag Fishermen's Association, but attempts to prohibit fishing in the designated area were unsuccessful despite efforts of municipal, barangay, and Bantay Dagat authorities. Hence, in 1991 an ordinance was passed establishing the sanctuary, prohibiting all forms of fishing and shell gathering, as well as boat anchoring, within or within 50 meters of the sanctuary boundary which was to be marked by marker buoys. Snorkeling, scuba diving "and other related marine activities" are also strictly prohibited within the sanctuary. The AMFC of 1993 supports the ordinances regarding sanctuaries, but extends the no fishing boundary to 200 meters beyond the boundary of the sanctuary (Section 8c). The sanctuary ordinance is a restriction on use rights.

In 1990, the national government introduced a 25-year, renewable lease instrument (Mangrove Stewardship Agreement) which is used to grant traditional small-scale mangrove users secure tenure over mangrove areas (Alcala and VandeVusse 1994). The Department of Environment and Natural Resources has granted these stewardship contracts to individuals participating in mangrove reforestation projects in Calagcalag.

There is specific assignment of and restrictions concerning coastal resource use rights in Calagcalag. These use rights and restrictions apply to designated areas (e.g., the municipal waters, exclusive fishery privilege zones, etc.), species (e.g., bangus fry), and gears (e.g., fish corals, vessels >3GT, etc.); furthermore, specific classes of individuals receive preferential rights. Boundaries are defined by law, as noted above, and are relatively distinct (e.g., marker buoys around the sanctuary, marker stakes around *bangus* fry harvesting areas, etc.). This system has been in its present form since the publication of the AMFC of June 1993, which made additions and changes to other legislation cited above.

Continuing with use rights, the AMFC makes no mention of transferring use rights associated with either Section 7 (artificial reefs) or Section 8 (exclusive fishing privileges). The privilege is only granted for one year, suggesting that this may not be an issue. It is conceivable, however, that an individual or group not meeting the "preferential rights" criteria in Section 8b might request transfer of rights from a group granted the right under the preferential rights criteria. Key informants from the fishermen's association reported that access rights can be transferred to nearest kin, and that they are not allowed to sell to others. The nearest kin must be interested and agree to follow the rules and regulations of the association.

Concerning coastal resource management measures other than use rights, the AMFC sections 20 through 30 parallel much of PD 704 and subsequent PDs, Letters of Instructions (LOIs), and Fisheries Administrative Orders. Specifically prohibited in municipal waters is fishing from vessels greater than 3 gross tons, using destructive fishing methods (e.g., explosives, toxic, obnoxious, and poisonous substances, electricity), discharging or dumping toxic, noxious, and poisonous substances into municipal waters, fishing with a net less than 3

centimeters stretched mesh unless target is smaller than that size when mature, gathering or destruction of corals or mangroves, use of *muro-ami* or *kayakas* fishing techniques, fishing with the use of air compressor or similar devices (unless clearance obtained from appropriate government agencies like the Department of Health, Bureau of Fisheries and Aquatic Resources, Philippine Sports Commission, and the Department of Environment and Natural Resources), and

> the taking, catching, gathering and selling of the frys of the siganid family like *ngisi-ngisi*, big bolinao like *sihag-sihag*, and shrimps like *oyap* and *hipon*, both inland and sea water species...

Following implementation of the Local Government Code, surveillance and enforcement of use rights and other coastal resource management measures was assigned to the local level--the municipality and the barangay. Members of the fisher community are involved through the institution of the *Bantay Dagat*, voluntary guards of the sea. Private community members can also inform the head of the fisher's association about violations. Early on, the mayor of Ayungon assigned police officers to go with the *Bantay Dagat* to teach them procedures for apprehension, arrest, and evidence. Members of *Bantay Dagat*, however, complain of lack of resources and time to make the numerous trips to the municipal center if an offender contests the violation and it cannot be settled locally. They also complain that the mayor sometimes seemingly arbitrarily drops a charge.[1]

A guard house is supposed to be manned within view of the sanctuary, but during the research no one was visible inside. Another guard house was built on pilings over Mantalip Reef (an area frequented by spear fishers from Calagcalag and nearby barangays) to monitor for illegal fishing. In the beginning it was reportedly manned 24 hours a day by Philippine National Police until the LGC and associated devolution of power transferred the duties to the municipal level. Lacking sufficient resources, the guard house is now unmanned, and stands as a cement monument to the early efforts at resource management. Reportedly a Composite Law Enforcement Team (CLET) has been established with participation of the Departments of Agriculture (BFAR), Environment and Natural Resources, as well as municipal police and association members, to deal with these enforcement issues.

Penalties for non-compliance are published as a part of the AMFC and include fines and/or jail sentences. As noted above, PD 704 and subsequent PDs, Letters of Instructions (LOIs), and Fisheries Administrative Orders also indicate fines and/or jail sentences for non-compliance. According to key informants, the municipal ordinance restricting fishing activities to an area 200 meters from the sanctuary, ARs, etc. is known by some fishers, but ignored by most, who

[1] An example provided was a man from the mountainous portion of Calagcalag who was apprehended fishing in the sanctuary. The *Bantay Dagat* wanted to press charges. The "mountain man" said he did not know about the sanctuary since he lived in the hills. The mayor said to give him another chance, an action which reportedly discouraged the *Bantay Dagat*.

still honor the 50 meter limit. Other than this institutionalized evasion of a rule, key informants state that the rate of compliance is high.

Individual and Household Level Contextual Variables

Table 3. Characteristics of sample.

Variable	Member	Non-Member	Total	t-value	p
Age	57.8	45.6	51.7	3.33	<.01
Education	06.2	05.9	06.0	0.27	>.05
Years residing in the area	41.0	28.0	34.5	1.91	>.05
Household size	05.3	05.2	05.3	0.07	>.05
N	17	17	34		

A random sample of 34 households were selected from a population of households identified as depending to some degree on the nearshore fishery of Calagcalag. The sample consists of 17 households belonging to the Calagcalag-Bakhawan Fishermen's Association (CABAFA) and 17 non-member households. All of the households are involved in some aspect of coastal resource exploitation either for income or subsistence. Two were recently involved, but changed occupation prior to the survey. Some general background characteristics of the sample can be found in Table 3. As can be seen in the table, CABAFA members and non-members are not significantly different with respect to household size, years in the community, and years of formal education. CABAFA members are, however, significantly older than non-members.

Income is extremely difficult to measure in a reliable manner, especially among fishers due to extreme day-to-day variations in income and a lack of record keeping. This difficulty is magnified in a rural area characterized by a high degree of occupational multiplicity like Calagcalag. Given the limited amount of time available for this assessment, it was decided that the most reliable indicators of relative income could be based on an evaluation of assets. The indicators involved an ordinal assessment of house structure and furnishings and ownership of productive equipment. House structure was evaluated as either minimal (made up of light materials, e.g., bamboo, cogon/nipa), low (made up of light materials with a little wood/lumber), medium (made up of combined lumber and concrete with nipa roofing), or high (made up of concrete and well-finished structure with galvanized metal roof). Likewise, household furnishings were evaluated as minimal (no chairs and tables, only bench is present), low (presence of few chairs and tables), medium (presence of a least living room furniture set and transistor radio), or high (presence of adequate furnitures and fixtures). Number of boats owned is the indicator for productive equipment.

Table 4. Percent distribution of assets.

	% Member	% Non-Member	% Total
House structure			
Minimal	24	53	38
Low	35	18	26
Medium	29	29	29
High	12	00	06
House furnishings			
Minimal	12	29	21
Low	35	59	47
Medium	47	12	29
High	06	00	03
Productive equipment			
Boat ownership	41	47	44
N	17	17	34

The results of the survey of assets are in Table 4. The distribution of house structure types in Table 4 suggests that fewer CABAFA members than non-members are characterized by a minimal level of housing (24 versus 53 percent, respectively), but given the sample size, the results are not statistically significant ($X^2 = 3.11$, $p > 0.05$). Nevertheless, the household furnishings of CABAFA members are more likely to be categorized as medium or high than those of non-members (53 versus 12 percent; Yates corrected $X^2 = 4.83$, $p < 0.05$) There is no significant difference in terms of boat ownership. As a supplement to information concerning boat ownership, it should be noted that one CABAFA member uses an association owned boat, one rents a boat, and another owns two boats. Among the non-members, one owns 3 boats, of which one boat is motorized. None of the member owned boats included in the sample are motorized.

Occupational Multiplicity and Dependence on Coastal Resources. When requested to provide their occupation, 91 percent of the sample identified themselves as practicing a fishery related occupation (this includes two individuals who identified themselves as fish vendors and one fish fry collector). They reported being involved in this fishery related occupation for a mean of 24 years (maximum 58, minimum 2, Sd = 14.3). Twenty-nine percent said they are farmers, and one or two individuals each identified themselves as small merchant (*sari-sari* store operator), *tuba* collector (palm sap which is converted to an alcoholic drink), coconut collector, mechanic, or laborer. Approximately one-third (32%) of the respondents reported that they practiced more than one occupation. Such occupational multiplicity is common in rural coastal areas.

In terms of sources of income, 88 percent of the respondents ranked fishing as first or second in importance. Almost one-half the sample (44%) derived more than half their income from

fishing. In contrast, only 29 percent said they obtain more than half their income from farming. The remaining 27 percent said they obtained more than half their income from *tuba* or coconut collecting, mechanic work, or labor. Fully 82 percent of the households had non-coastal related sources of income. One half obtained remittances from outside the household (overseas workers and relatives in other areas). Fishing is also an important source of food. All list a coastal related activity as either a first, second, or third most important food source, and 38 percent of the sample report that more than one-half their food comes from fishing. Other sources of food are farm products, including poultry and livestock raising, income from other jobs, and gifts from parents.

Collective Action. Two indicators of collective action were examined as a part of the survey: association membership and attitudes toward cooperation (cultural values). It must be kept in mind that the sample was stratified on the basis of CABAFA membership, and the population from which the sample was drawn included only households identified as participating in the nearshore fishery. With those qualifications in mind, 24 percent of the CABAFA members also belong to another association, and 24 percent of the non-CABAFA members belong to an association. Fourteen percent of the sample belong to an alternative livelihood association, in this case the Coconut Growers Association, and 9 percent belong to a mutual aid society. CABAFA members perceived the purpose of their association as being to improve the welfare of the fishers, protect and improve the coastal resources, rehabilitate the mangroves, and establish sanctuaries, artificial reefs, and fish aggregating devices. Among the non-CABAFA members, 6 of the 17 (35%) belonged to CABAFA or one of its predecessor organizations in the past, but quit for various reasons including lack of understanding of the organization's purpose or regulations, old age, no wages, lack of time, and perceived lack of impact on the resources. One respondent quit the alternative livelihood association because of missing too many meetings.

In terms of cultural attitudes toward collective action, almost two-thirds of the sample believe that the people of the community can work together to solve community problems. There is no significant difference between the CABAFA members and non-members (71 versus 59 percent respectively; Yates corrected $X^2 = 0.13$, $p > 0.05$). Seventy-nine percent of the sample believe that fishers could work together to solve a problem such as illegal fishing--94 percent of the CABAFA members and 65 percent of the non-members. Once again this difference is not statistically significant (Yates corrected $X^2 = 2.88$, $p > 0.05$). Finally, 79 percent of the sample agree that government and the fishers should work together to solve a problem in the fishery, with no significant difference between CABAFA members and non-members (82 versus 76 percent, respectively; Yates corrected X^2 less than 0.01, $p > 0.05$). Overall, the sample has an optimistic attitude with respect to collective action.

Job Satisfaction. There is a general impression among development workers that fishers are the poorest of the poor and in an occupation of last resort. Since there were fishers prior to pressure on land for agriculture, and since in many parts of the world, many fishers seem to stay in the occupation despite the availability of alternative occupations, job satisfaction

among fishers needs careful examination. This is especially true where alternative employment is selected as the solution to pressure on the fishery resource. When asked if they would still become a fisher if they had their lives to live over, fully 88 percent of the sample said yes. The most frequent reasons given were that they had no other source of income or occupation (21%) or that they were used to the occupation (21%). Fifteen percent of the reasons for choosing fishing were related to subsistence (e.g., desire to eat fish caught by self, dependent on it for subsistence, and no need to buy fish). Positive economic reasons were provided by 26 percent of the sample. These reasons stressed the fact that income is daily and easily obtained, and that when capital is available there is a better chance in fishing. Nine percent of the sample liked the fact that there is no boss or employer, a reason provided by fishers in many parts of the world. For those few who would not become a fisher again, the reasons cited include age, tired of fishing, and not enough income.

In response to a question concerning if the respondent would change from fishing to other employment if they could make the same income, more than half the sample (56 percent) of the sample said no. The most common reasons for not changing were either economic (direct and sure source of food and income, job is permanent, no need to buy fish) or inertial (used to fishing, all I've ever done). These responses made up 47 and 37 percent, respectively, of the reasons for not switching from fishing to another occupation. About one-third of those who said they would change from fishing qualified their response by stating that the new job must be permanent with good results. Other responses, each with very low response rates, involved unpredictable weather, dangers of fishing, desire to experience other work, becoming too old to fish, and income. When asked what they like about fishing in comparison with other jobs, the most common responses were related to income and food for home consumption. Fully 82 percent of the 39 responses (multiple responses were allowed, and five respondents provided two each) indicated either income or food. One-third specified income, one-third food, and the other 15 percent of the responses combined food and income in a single statement. Half of the respondents noted that these benefits could be obtained more easily by fishing. Low frequency responses noted proximity to home, tradition, and no boss or temporal constraints. Overall, it does not seem that fishing is perceived as either the employment of last resort or economically unrewarding for the fishers of Calagcalag.

Ecological Knowledge. Fishers were requested to identify the characteristics of the sea that have a positive influence on the status of the resource. Ninety-four percent said the presence of seaweeds or sea grasses, 35 percent said corals, 12 percent said algae in the mangroves, 23 percent said mangroves, 6 percent said the abundance of plankton, and 6 percent said clean water. Multiple answers were permitted; hence, percentages can sum to more than 100. When asked about the condition of the nearshore resources today in comparison to ten years ago, half the respondents said the resources were better off today, 9 percent said they were about the same, and 38 percent said they were worse off. CABAFA members were more likely than non-members to report that the resource has improved over the past ten years (76 versus 29 percent, respectively; $X^2 = 8.46$, $p < 0.014$). Thirty-eight percent of the negative responses attributed the change to the use of unspecified chemicals which decrease fish abundance, and 31 percent attributed the negative changes to use of poisons in fishing.

Low frequency negative responses (one person each) include decrease in specific types, increasing number of fishers, typhoons, and declining coral populations. Almost half (42%) of the positive responses related the improvement of the resource to a reduction in illegal fishing methods, and almost one-third (32%) suggest that it is due to coral reef management, including establishment of the fish sanctuary, and protection of other coastal resources. About one-fifth (21%) of the responses simple noted that fish and/or crab catches increased. Most of the respondents (71%) report that the resource was in good shape at the time the CBCRMP began. Most, however, said it was a little bit good in contrast to good or very good . It is interesting to note that CABAFA members were more likely to be positive about the resource than non-members (94 versus 47 percent respectively; Yates corrected X^2 = 6.94, $p < 0.01$). Overall, there is a fair amount of variation with respect to perceptions of the status of the resource, with CABAFA members being more positive than non-members. Implications of this variation will be discussed along with discussion of project impacts.

Impact Variables

Achievement of Intermediate Objectives

Material Aspects. As noted above, the project was adaptive--it responded to perceived needs on the part of beneficiaries and could change objectives during implementation--hence, intermediate objectives could change during the course of the project. Seven distinct intermediate objectives, which can be evaluated in terms of material aspects, formed part of the project. Project reports (CVRP 1992) and interviews with ex-project staff, involved agencies, and Calagcalag fishers, as well as direct observations were used to evaluate the current status of the intermediate objectives.

Artificial reefs. The project report (CVRP 1992:127) notes construction of 40 clusters of artificial reefs (ARs) completed. Local key informants state that 15 clusters of bamboo ARs were installed first. These proved to be inadequate for local conditions and deteriorated rapidly. Six clusters of concrete ARs were then installed. After three typhoons, the informants were not sure, but think there are portions of three clusters remaining, with about 25m by 50m total AR area. After the completion of the CVRP-1, the GDS and RMD (PPDO) assisted with the installation of four clusters of rubber tire ARs. The informants think they have been destroyed by recent storms. The fishers also claim that the ARs are not effective--that the fish prefer the natural reefs. RMD staff report that when last observed, the rubber tire reefs were attracting fish and manifested some coral growth. The researchers tried to find existing artificial reefs by diving in identified areas, but the water was not clear enough to permit observation, and the ARs were apparently too deep for unassisted dives.

Coral reef management with fish sanctuary. The project report notes that 15 percent of Calagcalag's coral reef area of 200 ha has been designated as a sanctuary (CVRP 1992:127). The municipal ordinances cited above indicate that a sanctuary had been

established, and observation indicates that it is marked with four white marker buoys, one at each corner. GDS funds have provided a guard house for housing a guard to observe activities in and around the sanctuary.

Fish attracting devices. The project report notes that 2 fish aggregating devices (FADs) were installed, but were destroyed by storms. Subsequently 3 more units (CVRP 1992:127) were installed (2 from CVRP one from GDS), all of which were destroyed. None exist at the present time, but fishers are awaiting funds for materials to build new FADs for the upcoming season when they are appropriate (e.g., when pelagics are migrating through the channel between Cebu and Negros).

Mangrove reforestation. Twelve ha of mangrove were planted and 27 Certificates of Stewardship were distributed to the planters (CVRP 1992:127). The local DENR office has 26 Certificates on record. The plantings exist, but they are reported to be growing at an unacceptably slow rate--at the present time most are approximately one meter high. The slow growth rate, according to RMD staff, is due to selection of an improper species for the local soils.

Livestock. Introduction of livestock was to serve as an alternative livelihood project. The CVRP introduced 8 goats (CVRP 1992:127). A local informant said that he did not think that many were introduced, and that as of a month previous to the present evaluation, only one remained alive. In October 1994 the GDS continued this aspect of the project by donating 11 goats (one buck and 10 does) to 10 beneficiaries. Only 4 kids have been produced over the past year. Although the goats are nubians, which are usually good dairy goats, informants laughed when asked if the goats would be used to produce milk.

Sea farming. The project report (CVRP 1992:127) notes that oyster and seaweed culture projects were implemented in a .44 ha area. RMD staff reported that the oyster project failed due to the fact that the species introduced was inappropriate for the local conditions. They also note that weather only allows growing of seaweed during 6 months of the year. The GDS project is continuing the seaweed aspect of sea farming and local informants note that monthly harvests of 60 kilograms are sold in the market at Ayungon.

Fishing gear. The project report indicates that the Department of Agriculture provided 2 fish traps (*bubo*) and one fish net. Current status of these gears could not be determined.

Institutional and Organizational Aspects. CVRP implementation depended on the establishment of fishers associations in project communities. The CABAFA is the organization developed by the project. CVRP's intermediate objectives, discussed above, were to be associated with institutional changes which would grant exclusive rights for cooperators (e.g., association members) use of interventions such as ARs, FADs, and sea farming areas. It was assumed that obtaining rights, along with associated training, would

stimulate conservation practices, including monitoring, among the cooperators--activities which would benefit the community as well as the resource.

Organization. The project conducted trainings and community organizing which resulted in the Calagcalag-Bakhawan Fishermen's Association. In 1985, CABAFA had 35 members, by 1986 this number climbed to 56. Today, the association has 28 active members (those who regularly attend meetings and pay dues) and an estimated 40-plus inactive. As noted above in the discussion of municipal fishery ordinances, the organization is recognized by legislation granting precedence with regard to specific exclusive access rights. Discussions with key informants from the association clearly indicate that members have pride in the organization and the skills they have learned. One key informant said that before the project, no one knew how to organize or run meetings. Now they know how to organize and use the organization to better their living conditions.

As part of the household survey, seventeen CABAFA members were asked what they perceive as the benefits of belonging to the organization. Out of 39 benefits mentioned (respondents could provide more than one response), 23 percent referred to access rights to either mangrove plantings, FADs, or ARs. Another 23 percent involved access to alternative livelihood livestock or broiler chickens, and fifteen percent mention future income from mangrove reforestation. A relatively small number of responses (one or two each) involved learning new techniques, obtaining new gear (fish traps), and increases in catch and income. One-fourth of the respondents report that there are no benefits from belonging to the association.

Use rights and management efforts. Specific family and association member use rights associated with project interventions and activities directed at resource conservation as well as monitoring, enforcement and compliance are described in the community context section. The reader is referred to that section for details. To briefly summarize, the activities of the CVRP, in combination with the LGC and legislation associated with Mangrove Stewardship Contracts, influenced the development of legislation resulting in granting project cooperators exclusive access to project intervention improved (e.g., ARs, mangrove plantings) coastal and nearshore resources, as well as the development of specific management practices such as designating marine resource sanctuaries and reserves. Project inputs also facilitated development of community-based monitoring and enforcement of fishery ordinances (including those regarding access rights) through use of the fisher's association to organize and support the *Bantay Dagat*, with qualifications described above. As noted, key informants report relatively high compliance, once again with qualifications described above.

It is important to note that the results of the survey suggest that the fisher community both understands the reasons for and has a generally positive perception of the ordinances. Respondents were asked if they knew the reasons for the sanctuary, exclusive fishing rights, and the mangrove stewardship contracts. With respect to the sanctuary, a little more than three-fourths of the respondents (76%) said that the reason for the rule was that it provided

protection to a fish habitat and breeding area, restored the coral reef, or improved productivity and the corals. The other 26 percent provided less specific responses (e.g., ensures protection of the area; allows fish to grow big and healthy). CABAFA members are more likely than non-members to provide a specific response (94 versus 59 percent, respectively; Yates corrected $X^2 = 4.09$, $p < 0.05$). This difference probably reflects the training received by association members. Nevertheless, all respondents realize that the sanctuary ordinance is directed at improvement of the resource. When asked what they thought about the ordinance, more than half (56%) said it was good for some aspect of the resource. Thirty-eight percent of the respondents noted it helped everybody or all fishers. There was no significant difference between CABAFA members and non-members. Only two respondents (both non-members) failed to provide an answer.

With respect to both of the exclusive access regulation types (AR/FAD or mangrove), there were no significant differences between CABAFA members and non-members. Both provided responses indicating that those who make the improvements deserve exclusive access, that it encourages association members, and that it insures that the intervention and the resource is properly maintained.

Perceived Impacts on the Coastal Ecosystem

Methods. As a means of determining perceived impacts on the coastal ecosystem, respondents were requested to provide evaluations of a number of aspects of this ecosystem for pre-project, present, and future time periods. The technique used involved a visual, self-anchoring, ladder like scale which allowed for making relatively fine ordinal judgments, placed little demand on informant memory, and could be rapidly administered. Using this technique, the respondent was shown a ladder-like diagram with 15 steps. The respondent was told that the first step represents the worst possible situation. For example, with respect to coastal resources, the subject was informed that the first step (1) indicates an area with no fish or other resources, that the water is so foul nothing could live in it. The highest step (15) could be described as a rich, clean water, filled with fish and other wildlife. The subject was then asked where on the ladder the local area is today (the self-anchoring aspect of the scale). The subject was then be asked to indicate where it was pre-CBCRMP and where he/she believes it will be 5 years in the future. This was done for the following eleven impact indicators:

1. *Overall well-being of individual household (household).*
2. *Overall well being of the resource (resource).*
3. *Local income (income).*
4. *Access to resources (access).*
5. *Control over resources (control).*
6. *Ability to participate in community affairs (participate).*
7. *Ability to influence community affairs (influence).*

8. *Self-esteem (self-esteem).*
9. *Community conflict (conflict).*
10. *Community compliance with resource management (compliance).*
11. *Amount of traditionally harvested resource in the water (harvest).*

The term in parentheses following each indicator is the abbreviated form which will be used in the tables and discussion in the analysis portion of this section of the report.

Analysis

As a first step in the analysis, mean values for each indicator for today and the pre-project time periods were calculated, and a paired comparison t-test was calculated to determine if differences between means are statistically significant. The results of this analysis are in Table 5. The results show an increase in perceived levels of all indicators except access, which is perceived as lower today than in the past. This reflects the lack of access to the area enclosed by the sanctuary, which is relatively large and visible, just off-shore the central part of Calagcalag. The difference, however, is not statistically significant ($p > 0.05$). The difference in perceived values for the harvest indicator is also not statistically significant. All other differences are statistically significant.

Table 5. Perceived pre-project to post-project changes in indicators.

	MEMBER				NON-MEMBER				ALL			
	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p
Access	7.94	8.11	-0.18	>.10	10.17	7.35	-0.82	>.10	7.64	9.14	-1.50	>.10
Compliance	10.82	5.47	5.35	<.01	9.88	4.82	5.06	<.01	10.35	5.15	5.21	<.01
Conflict	10.76	5.76	5.00	<.01	11.29	6.06	5.24	<.01	11.03	5.91	5.12	<.01
Control	10.17	5.76	4.41	<.01	8.52	5.82	2.71	<.10	9.35	5.79	3.56	<.01
Harvest	9.70	5.88	3.82	<.01	7.70	7.64	0.06	>.10	8.70	6.76	1.94	<.10
Household	8.18	5.53	2.65	<.01	6.59	5.53	1.06	>.10	7.38	5.53	1.85	<.01
Income	9.88	6.18	3.71	<.01	7.94	6.52	1.41	>.10	8.91	6.35	2.56	<.01
Influence	10.17	4.35	5.82	<.01	8.11	5.70	2.41	<.01	9.14	5.02	4.12	<.01
Participate	10.29	5.05	5.24	<.01	8.76	7.29	1.47	>.10	9.52	6.17	3.35	<.01
Resource	9.82	5.18	4.65	<.01	6.65	6.94	0.29	>.10	8.38	5.91	2.47	<.01
Self esteem	9.82	4.76	5.06	<.01	7.29	5.29	2.00	<.10	8.55	5.02	3.53	<.01
N=34												

The next step in the analysis was to determine if project cooperators (CABAFA members) differed from non-cooperators with respect to perceptions of changes in the indicators. This was accomplished by subtracting the pre-project evaluation from the today evaluation for

each indicator and calculating a two-sample t-test for the difference of mean values between the CABAFA and non-CABAFA samples. The results of this analysis can be found in Table 6. The results of the analysis show that project cooperators are more positive on all indicators except conflict (the difference with respect to conflict is minimal and not statistically significant). The only differences that are statistically significant ($p < 0.05$) are influence, participate, self-esteem, and resource.

Table **6. Differences between CABAFA members and non-members with respect to perceived changes.**

	T2-T1 Member	T2-T1 Non-member	t-value	p
Access	-0.2	-2.8	1.26	0.219
Compliance	5.4	5.1	0.18	0.858
Conflict	5.0	5.2	0.15	0.881
Control	4.4	2.7	0.79	0.433
Harvest	3.8	0.1	1.78	0.085
Household	2.6	1.1	1.38	0.176
Income	3.7	1.4	1.35	0.186
Influence	5.8	2.4	2.30	0.028
Participate	5.2	1.5	2.57	0.015
Resource	4.6	0.3	2.75	0.010
Self esteem	5.1	2.0	2.16	0.039
N	17	17		

As a next step in the analysis, relationships between perceived changes in the indicators and other individual and household level variables, which socio-cultural research and theory suggest may be important, are examined. Relationships with individual and household level variables such as age, education, years residence in the community, number of household members, and ecological knowledge are found in Table 7. Most of these variables are self-explanatory except for ecological knowledge. There are two ecological knowledge variables: eco-knowledge and taxa-knowledge. The first (eco-knowledge) is a measure based on the number of distinct factors mentioned in a question concerning factors that influence the health of the coastal resources. Taxa-knowledge is a measure based on the number of sub-types of a locally important fish type the respondent could name. In Calagcalag, respondents were asked the name of different types of *mulmol* (a folk category which lumps parrotfish and some wrasses). The only statistically significant relationships ($p < 0.05$) are between age and perceived change in the resource and education and perceived change in amount of traditionally harvested resources.

Table 7. Correlations between indicators and selected household/individual level variables.

	Age	Educ.	House Member	Resid.	Eco-Know.	Taxa. Know.
Access	.01	-.06	-.12	-.06	-.13	-.29
Compliance	-.03	.05	.17	-.09	.02	-.05
Conflict	.09	.03	-.07	.17	.30	-.11
Control	.21	.11	.01	.19	.13	-.03
Harvest	-.05	.36**	.34	-.19	.25	-.03
Household	.08	.19	-.18	.03	.29	.03
Income	.19	.24	.13	.10	.13	-.01
Influence	.05	.34	.13	.08	.09	.30
Participate	.18	.06	.02	.23	.25	.25
Resource	.35**	.03	.10	.28	.02	.01
Self esteem	-.02	.33	.23	-.04	.11	.05

N=34 **=p<.05

Relationships between occupation and economic related variables and perceived changes in the indicators are found in Table 8. These variables include important economic indicators such as ownership of productive equipment (boat ownership), sources of income (e.g., sources other than fishing, income from outside the household--e.g. remittances from family members in the city or abroad, and fishing identified as the primary source of income), and occupation related indicators (willingness to change from fishing to another occupation with comparable income and membership in a producer association--CABAFA). Table 9 indicates that individuals from households where fishing is the primary source of income tend to perceive a smaller (or more negative) change in control, harvest, and household status. Those who say they would switch from fishing to another occupation perceive a smaller (or more negative) change in influence and a larger (or more positive) change in access. Finally, CABAFA members perceive a larger increase in influence, participation, self-esteem, and resource status. These relationships will be more thoroughly examined in the discussion section below.

Table **8. Correlations between indicators and selected occupational and economic level variables.**

	Boat Owner	Nonfish Income	Outside Income	Fish Primary	Leave Fishing	CABAFA Member
Access	.03	.04	.30	.12	.41**	.22
Compliance	.02	.22	.15	-.25	-.13	.03
Conflict	.12	.07	.08	-.33	-.21	-.03
Control	.10	.32	.06	-.53**	-.03	.14
Harvest	-.10	.06	.16	-.35**	.21	.30
Household	-.12	.10	.08	-.41**	.11	.24
Income	-.05	.29	.27	-.10	.21	.23
Influence	.08	.25	.23	-.17	-.35**	.38**
Participate	.00	.10	.19	-.26	-.24	.41**
Resource	.07	.18	.32	-.08	.14	.44**
Self esteem	-.08	.17	.19	-.26	-.12	.36**

N=34 **=p<.05

The eleven indicators were submitted to a principal component (with varimax rotation) analysis to determine if relationships between the indicators were such that they could be reduced to fewer, composite indicators for further analysis. Results of the principal component analysis are in Table 9. Number of components were selected on the basis of the scree-test. The two rotated components explain 62 percent of the variance in the set of indicators. Component one is composed of status of the resource, harvest, income, household, influence, self-esteem and participation. The similarity in loadings for participation on both components indicates that it can be considered as shared between components one and two. Component two also includes conflict, compliance, control, and access. It is important to note that access has a strong negative loading on this component; it is related to the component, but negatively.

Table 9. Principal component analysis of impact indicators.

	Component	
	One	Two
Harvest	.90	.13
Self esteem	.89	.22
Income	.83	-.16
Influence	.76	.15
Resource	.71	.26
Household	.53	.24
z	.51	.53
Conflict	.13	.83
Compliance	.33	.69
Control	.43	.68
Access	.19	-.63
Variance	39%	23%

Factor scores were created for each individual for each component. Step-wise multiple regression was used to determine the set of independent variables that explained most of the variance in each of the two components. The step-wise technique first enters the variable that explains the most variance in the dependent variable. Then, controlling for variance explained by the first entered variable, it selects from remaining independent variables the one that explains most of the remaining variance in the dependent variable (e.g., the one with the largest partial correlation). This procedure is continued until either all variables have been entered or until some criterion is reached. In this analysis the criteria 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 multicolinearity. Where there is reason to suspect multicolinearity (which can result in unstable regression coefficients), the offending variable is not used in the regression analysis. The results of the analysis are in Table 10.

Three variables were entered into the regression equation for Impact Component One: education, outside income, and CABAFA membership. The adjusted multiple correlation of 0.302 indicates that about one-third of the variance in Impact Component One can be accounted for with these three variables. Only two independent variables were entered into the regression equation for Impact Component Two (willingness to leave fishing for an occupation with comparable income and fishing as the primary source of income), and the probability associated with their regression coefficients is marginal ($p<0.10$). It is important to note that the regression coefficients are negative, indicating that those who are willing to leave fishing and those whose primary source of income is from fishing tend to score low on this component. The zero-order correlations between these two variables and Impact Component Two are -0.37 and -0.34, respectively ($p=0.03$ and 0.05 respectively). Nevertheless the multiple regression is statistically significant ($p < 0.05$).

Table 10. Regression analyses of impact components.

Dependent Variable: Impact Component One

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Education	0.388	2.52	0.018
Outside income	0.325	2.02	0.053
CABAFA member	0.330	2.15	0.040

$R = 0.604$; $R^2 = 0.365$; Adjusted $R^2 = 0.302$
$N = 34$; $F = 5.748$; $p = 0.003$

Dependent Variable: Impact Component Two

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Leave fishing	-0.278	-1.71	0.096
Fishing income	-0.317	-1.95	0.060

$R = 0.457$; $R^2 = 0.209$; Adjusted $R^2 = 0.158$
$N = 34$; $F = 4.098$; $p = 0.026$

DISCUSSION

The Calagcalag nearshore fisheries component of the CVRP was apparently a success. From the perspective of the fisher households interviewed, they perceived improvement in all impacts assessed, except for access, which was related to removal of fishing area by the sanctuary. In compensation for loss of access, however, they noted that the sanctuary has had and will continue to have a positive effect on the nearshore resources.

It is important to note that this overall perception of positive change exists despite partial or complete failure (or destruction by natural events) of some project sub-objectives (e.g., shellfish culture, ARs, FADs, etc.). The involvement, from the beginning, of fishers in implementation of these sub-objectives probably gave them a better understanding of the difficulties involved in the introduction of new technologies. Additionally, the adaptive nature of the project, the willingness of project staff to listen to beneficiary complaints and institute changes in implementation procedures (e.g., changes in material and construction for ARs) result in participants feeling that they, in part, influence project success. Hence, they are less likely to be over critical and reject the project as a whole, the good along with the bad.

Achievement of some project sub-objectives was facilitated by changes in the national context. For example, many facets of community-based resource management (e.g.,

community influence on management and access regulations) were facilitated by implementation of the LGC, legislation which, for the most part, provided a framework which enabled development of locally appropriate management measures. Supportive actions taken by the municipal government further facilitated Calagcalag's community- based management initiatives. Nevertheless, insufficient support was provided to the municipal and barangay levels for monitoring, surveillance, and enforcement; factors, which in the long term, could result in lowered levels of compliance. Compliance at the present time, however, is perceived as good and improving, mostly because of local initiatives stimulated by the project. It might even be fair to ask if the CVRP-1 had any influence on development of the LGC.

It is important, and significant, to note that perceived improvements were noted by both cooperator and non-cooperator fisher households. This is a desirable impact of a project--if benefits accrue only to cooperators, new social strata will be created in the beneficiary community, potentially resulting in conflict and weakening the ability of the community to work together for the common good. There were, however, some clearly positive impacts that accrued to the cooperators, that could have a long-term positive impact on the community and its resources.

The cooperators, overall, perceived a larger increase in their ability to participate in and influence community affairs and in their self-esteem. This is the result of the role their organization (CABAFA) played in community organizing, implementation of project improvements such as the ARs, mangrove reforestation, and FADs, as well as the management-related regulatory changes (e.g., the sanctuary, exclusive access, etc.) and associated surveillance and enforcement activities (e.g., the CABAFA related *Bantay Dagat*). Improved self-esteem is doubtless related to their perceptions of empowerment based on increased influence and participation. The fact that they perceived a greater increase in the overall health of the resource might be related to either greater knowledge and closer observation or self-deception associated with their activities and subsequent vested interest in the resource. Whatever, the sample as a whole perceived a positive change, and these perceptions, the stronger they are, in combination with a core group of empowered peers (the CABAFA members) will facilitate sustaining activities related to resource conservation.

None of the other individual or household level variables, except fishing as a primary source of income, were significantly related to more than one or two perceived changes. This correlate of perceived change deserves closer inspection. It is noted in the analysis section that individuals from households where fishing is the primary source of income perceive less positive change than others with respect to control over the resource (mean change 0.3 versus 6.8 respectively, $t=3.55$, $p=0.001$), household well being (mean change 0.5 versus 3.2 respectively, $t=2.57$, $p=0.015$), and amount of traditionally harvested resource in the sea (-0.2 versus 4.11 respectively, $t=2.09$, $p=0.045$). Clearly, those whose primary source of income is fishing perceive little or slightly negative change with respect to these project impacts. CABAFA members differ little from non-members with respect to proportion of households depending primarily on fishing for income (47 versus 53 percent, respectively). These findings

suggest that occupational multiplicity is an important adaptive strategy in rural coastal areas, and that resource management projects that include an alternative employment component may result in a better overall quality of life. The examination of job satisfaction presented above, however, suggests that alternative employment might best be promoted as supplemental employment which would be more in keeping with the occupational multiplicity traditionally practiced.

As noted above, more than half (56 percent) of the sample said that they would not leave fishing if a job with comparable income were available. Various reasons were provided for the preference for fishing as an occupation, and a great deal of research has related lack of job satisfaction to a host of social, psychological, and health problems (cf. Pollnac and Poggie 1988). Hence, while it may be desirable to reduce pressure on fishery resources through provision of alternative employment, perhaps it would be better to build on the already existing tradition of occupational multiplicity in rural coastal areas and develop supplemental income generating activities. These supplemental activities could be spread over a larger number of fishers, reducing, rather than eliminating their fishing activity, and probably having as great or greater effect than trying to attract (or force) fishers to some alternative form of employment. The interventions are also more likely to be sustainable since they would fit into what is already identified as a successful adaptive strategy--occupational multiplicity.

Reviewing the experience of CVRP-1 in Calagcalag, several features of the project process can be generalized for use at other sites: 1) participation of beneficiaries during the project planning and implementation phases; 2) presence of an association; 3) training of project beneficiaries; 4) communication of project objectives; and 5) deployment of a part-time organizer in the barangay.

In terms of preconditions for co-management, the Calagcalag project met 7 of 9 preconditions, namely: 1) existence of use rights, 2) boundary delineation, 3) appropriateness of rules with regards to local conditions, 4) provisions for user participation in rule making, monitoring and enforcement, 5) access to local conflict resolution mechanisms, 6) nesting of user organizations, and 7) organizational scale. The two unmet preconditions are degree of multiplicity of user organization functions and socioeconomic homogeneity with organization members. The CABAFA is a member of the Ayungon Federation of Fishermen's Associations.

It is important to stress that the first sentence of this discussion section stated that the Calagcalag CBCRMP was "...apparently a success." We say apparent because the evaluation was conducted without a control, and evaluations of natural resource conservation projects need a control, especially when evaluations of the resource are involved.

Despite these qualifications (but keeping them in mind), it is the considered opinion of the investigators that the project did have a positive impact. Despite some critical remarks, interviews with key informants and survey respondents conveyed a real feeling that

something positive occurred. CABAFA membership has been declining, but the organization is still active, and members proudly state that they now know how to run a meeting and get something accomplished. Coastal resource conservation oriented ordinances are now in effect for Calagcalag and are, for the most part, observed. The fisher community through the *Bantay Dagat*, with almost no support, surveille and enforce the ordinances to the best of their ability. Further, and finally, the Government of Negros Oriental, through the Resource Management Division of the PPDO, and the assistance of organizations like CEMRINO and the GDS are continuing the efforts begun by the CVRP-1 --` true testimony to its perceived success and future potential.

3.2.1.2 Tiguib, Ayungon, Negros Oriental

Site Description

Tiguib is a coastal barangay of the municipality of Ayungon, Negros Oriental in the Central Visayas region. Tiguib is located 8 km from Ayungon town proper. It is bounded on the east by Calagcalag, Ayungon and on the west by Tinaogan, Bindoy. Tiguib is composed of five sitios, namely: barangay proper, Lamacan, Kansalanga, Cantomampon, and Pisao. Coastal residents of Tiguib are concentrated in the barangay proper and in sitio Lamacan, both of which are near the national highway. A number of fishers live in the upland areas of the barangay. Approximately half of the land area of the barangay is hilly.

The fishers of Tiguib fish waters enriched by both coral reefs and mangroves. A narrow shelf, with coral reefs at the drop off, stretches along the shores of the barangay. Old and new mangrove plants stand just at the rear of the coastal dwellers' residences with three open areas for landing and passage. The beach is composed of small to large pebbles with muddy soil near the mangrove areas. A number of boats can be seen anchored or pulled up on the narrow beach, but most are secured near the fishers house. There is a 16.5 ha fish pond in Tiguib which was previously used to culture shrimp and milkfish, but which is now under new ownership and is culturing shrimp. This aquaculture facility was in operation before CVRP-1 began.

The principal fishery is for small pelagic species. Fishers usually land their fish from 5-7 AM and from 3-5 PM. Gleaners, primarily women and children, are seen collecting shellfish and other coastal products during low tide. The coastal waters are still considered productive by the fishers, although they see serious threats to productivity unless illegal fishing methods, such as poisons and explosives, are eliminated. The use of pesticides in upland farms, particularly for mango fruit production, is said to be a severe threat to the coastal waters.

Site Project Variables

Barangay Tiguib is considered a less successful beneficiary community in the Ayungon-Bindoy watershed area. The underlying reason is that the local fishers' organization organized under the CVRP-1, the Tiguib Fishermen's Association, became inactive before the project finished, although it was reactivated in 1991. In addition, not all planned activities were implemented and most of the activities that were implemented did not meet the expected target, e.g., coral reef management with fish sanctuary and certificate of stewardship contract for mangrove reforestation.

Project activities in Tiguib began at the same time as Calagcalag in July 1984. In a similar fashion to Calagcalag, the project concept was introduced to the residents of Tiguib through a community assembly. A part-time community organizer, who lived in Bindoy, worked with the barangay officials and residents. A similar implementation strategy as that described above for Calagcalag was followed in Tiguib. Project implementation was participatory.

Capability-building efforts involved the technical preparation of association members, largely through training on topics such as leadership, human resource development, community organizing, construction and installation of artificial reefs, mangrove reforestation, coral reef management with fish sanctuary, livestock integration, fish attracting devices, and mariculture.

The CVRP-1 interventions in Tiguib included: artificial reefs (11 clusters), mangrove reforestation (7 ha), fish attracting devices (3 units), and livestock dispersal (2 goats). It should be noted that the livestock dispersal was carried out under the upland component, not the nearshore component. CVRP-1 phased out from Tiguib in 1992. Unlike in Calagcalag, no project intervention or coordination of participating groups has been maintained in Tiguib except on limited remaining mangrove plantings.

A survey of community members was conducted to determine their degree of participation in CBCRMP planning and implementation as well as knowledge of project objectives (Table 11). Overall, the results indicate that the project cooperators (association members) had the greatest amount of participation as well as knowledge concerning project objectives. Seventeen association members and 15 non-members were interviewed. Eighty-two percent of the association members expressed knowledge about the project objectives and 73 percent of non-members expressed similar knowledge. These differences are not statistically significant (X^2=0.379, $p>0.05$). The stated project objectives (multiple responses possible) were to improve the coastal resources and community welfare (38%), to increase/improve fish production (19%), to rehabilitate the degraded condition of coastal resources (16%), to protect coastal resources (13%), to reforest mangrove (13%), and to control/minimize illegal fishing practices (13%). Overall, 88 percent of association members compared to 73 percent of non-members felt that they influenced the planning of the project. These differences, however, are not statistically significant (X^2=1.162, $p>0.05$). In contrast, 82 percent of the association members versus 67 percent of non-members felt that they had influence on changes in the project after the project began. These differences are not statistically significant (X^2=1.046, $p>0.05$). Attendance at CBCRMP training sessions and meetings also seems to be concentrated among association members. As for attendance in meetings where the project was discussed, 94 percent of association members attended and only 40 percent of non-members. Members attended an average of 7 meetings and non-members attended an average of 5 meetings. Seventy-six percent of association members attended training sessions and only 20 percent of non-members attended trainings. Association members attended an average total length of training of 6 days and non-members an average of 5 days.

Table 11. Community participation in CBCRMP implementation.

	% Member	% Non-Member	% Total	X^2	p
Influence Planning	88	73	81	1.16	0.281
Influence Project Changes	82	67	75	1.05	0.306
Attend CBCRMP Meetings	94	40	69	10.86	0.001
Attend CBCRMP Trainings	76	20	50	10.17	0.001
Knowledge of Objectives	82	73	78	0.38	0.538

Context Variables

Supra-community Context

Enabling Legislation. The enabling legislation described above for Calagcalag is the same for Tiguib as they are both in the municipality of Ayungon.

Supra-community Institutions. A number of government institutions and non-government organizations (NGOs) outside of Tiguib have an influence on management of local fisheries and/or coastal resources. Prior to implementation of CVRP-1, there was only one government institution actively involved in Tiguib, that was the Bureau of Forest Development (BFD). BFD implemented a mangrove protection program.

During CVRP-1 implementation the Department of Environment and Natural Resources-Community Environment and Natural Resources Office (DENR-CENRO) continued the BFD mangrove project through provision of mangrove propagules. In addition to DENR-CENRO, Silliman University in Dumaguete tried without success to implement a giant clam farming project.

After CVRP-1 implementation, several institutions and organizations continued active involvement in Tiguib. Similar to Calagcalag, these included DENR-CENRO, Resource Management Division (RMD) of Provincial Planning and Development Office (PPDO), and the municipality of Ayungon. The Philippine Coconut Authority is actively involved in coconut replanting and production enhancement. There are no NGOs active in Tiguib. The Tiguib Fishermen's Association is a member of the Ayungon Federation of Fishermen's Associations (AFFA).

Supra-community Markets. Approximately 70 percent of the fish and shellfish harvested in Tiguib is consumed locally. About 20 percent of the harvest is sold in local markets in Bindoy and Ayungon, and 10 percent is sold in Bais City. The Tiguib Fishermen's Association (TFA) assembles and transports *bangus* fry for sale in Dumaguete and Bacolod. Except for the activities of TFA, the fish distribution system remains essentially unchanged over the last ten years. Similar to Calagcalag, women harvest shellfish for home consumption and for sale to local buyers.

In 1984 there were 4 fish traders working in Tiguib, in 1995 there were 10. None specialize in any particular fish species or product. The Tiguib Fishermen's Association acts as a conduit for its members and non-members in the sale of *bangus* fry.

It is reported that the demand of fish has increased in the last 2 to 4 years as a result of increasing population and increases in the prices of other sources of animal protein. The fish traders report that there is no change in the size of fish but that there are fewer fish available. Along with the increase in demand, retail prices of fish in Tiguib have also reportedly increased in the last five years by as much as 300 percent.

Post-project, Supra-community "Shocks" to the System. New technologies introduced in Tiguib were those introduced by the project (e.g., artificial reefs, fish traps, fish aggregating devices) and have been used in the area since project implementation. Three typhoons, accompanied by floods, occurred since 1992, destroying the project FADs and ARs, and crops. The New People's Army insurgency is a problem in the upland areas of Tiguib but less so in the coastal areas.

Community Context

Perception of Trends in the Resource. Key informants noted that at the time of CVRP-1 implementation, fish stocks were decreasing due to destructive fishing and illegal practices such as use of poisons and blast fishing prior to project implementation. A survey of 32 community members provided mixed opinions. Most of the respondents (63%) report that the resource was in good shape at the time the CBCRMP began. When asked about the condition of the nearshore resources today in comparison to ten years ago, 56 percent said the resource was worse off today, 38 percent said it was better off, and only 6 percent said it was the same. Fifty-three percent of the association members said it was better off while 66 percent of the non-members said it was worse off. These differences are not statistically significant. Aspects of this variation are discussed below in the section on individual and household data.

Target Species Composition and Distribution. Interviews with key informants representative of the major fishing gear types indicated that the following types of fish are considered most important in terms of both income and home consumption:

1. *bolinao* (anchovy)
2. *malalangsi* (sardine)
3. *sulid* (caesio)
4. *andohaw* (round scad)
5. *danggit* (siganid)
6. *balanak* (mullet)
7. *mulmol* (parrot fish)
8. *kugita* (octopus)

Fishers report that most of the fish harvested are captured in reef areas, either coral or rock. Fishers report that during the past the most commonly caught fish were predator species (groupers, snappers, emperors), but when people began to use destructive fishing methods and destroy corals, groupers and snappers became less abundant in number. Other fish species which have disappeared include *palata*, *labayan*, *palangan* and *bunog*. Overall, the fishers report a decline in fish catch over the last ten years.

Environmental Features Influencing Boundary Definition. Fishers are aware of the location of reefs below the water surface. The coastline of Tiguib open with a narrow beach area and a large mangrove area. Two creeks mark the boundaries with neighboring barangays. Boundary definition would be of medium difficulty. For example, marker buoys would be needed to define the boundary of a marine sanctuary as there are no natural boundary markers.

Technologies Used in Coastal Area. Most fishing is conducted from relatively small outrigger boats, ranging in size from a little over 2 meters to about 6 meters. The majority of vessels are small and unmotorized. The unmotorized vessels, for the most part, are powered by paddle. Only a few were observed using sail. There are 70 non-motorized and 4 motorized fishing boats in Tiguib.

Among the commonly used fishing technologies, the most frequently used is the net. The variety of nets used include bottom set gillnets, top set gillnets, shallow water, bottom set gillnets, and scoop nets. The next most common fishing gear is hook and line and beach seine. Less common fishing gears in Tiguib are spear fishing, fish trap, fish corral, and push nets for bangus fry. Compressors are used for spear fishing.

Level of Community Development. Level of community development is based on a checklist of items which are listed below. Items present in Tiguib are presented in bold print. Those not present are normal print.

1. Hospital
2. **Medical Clinic (Health Center)**
3. Resident Doctor
4. Resident Dentist
5. Secondary School
6. **Primary School**
7. Public Water Supply Piped to Homes
8. Sewage Pipes or Canal
9. Sewage Treatment Facility
10. **Septic or Settling Tanks**
11. **Electric Service**
12. Telephone Service
13. **Food Market (*sari sari* store/public market)**
14. Drug Store
15. Hotel or Inn

16. Restaurant
17. Gas Station
18. **Public transportation**
19. **Hard Top road Access**
20. Banking Service
21. **Television Reception**
22. **Radio Reception**

Degree of Integration into National Economy and Political System. The coastal products (fish) are collected by ten middlemen and transported to both the municipal center and two municipalities to the south (Bindoy and Bais City) where they are further transshipped by other middlemen to the provincial capital, Dumaguete, and to Manila. This is facilitated by good transportation links (e.g., frequent buses and other public transport vehicles) using the paved road which connects the coastal communities. Communication links, however, are poor. One has to go to the municipal hall in the municipal center of Ayungon or to the municipal hall of Bindoy (which is closer to Tiguib) to find a telephone or other form of rapid communication. Television and radio reception is possible and a number of homes have television. The governor of the province shows a great interest in the rural areas of the province which is evident by his frequent trips to the area (more than once a year). Except for communication links, the degree of integration into the national economy and political system can be classified as medium to high.

Tradition of Cooperation and Collective Action. Over the past ten years, collective action was initiated by the CVRP-1. In 1980 the *Samahang Nayon* was established under a national program as a barangay association for community development activities. It is no longer in existence. The Tiguib Water Association (TWA) was established in 1987 to develop a water distribution system in Tiguib. A communal water system was constructed consisting of a water tank in the uplands, pipes and a faucet in the community. In addition, an artesian well was constructed. The TWA stopped functioning after two years although the water system continues to function. In 1990, the Tiguib Small Coconut Farmers' Association (TSCFA) was established by the Philippine Coconut Authority-Department of Agriculture. The TSCFA provided farmers with coconut seedlings, information, and production inputs such as fertilizer. It is still in existence. In 1985, the Tiguib Fishermen's Association (TFA) was established under CVRP-1. It was active until 1990. In 1991 the TFA was reactivated in order to obtain a municipal concession for the collection of bangus fry. The TFA is still functioning. In 1995, the TFA was involved in the Coastal Environment Program of DENR-CENRO.

Occupation Structure and Dependence on Coastal Resources. The only occupation dependent on coastal resources in Tiguib is fishing. Approximately 20 percent of the households depend, at least in part, on fishing for a livelihood. Some 74 fishing boats were counted along the shore of Tiguib, some of which are owned by fishers who live in the upland areas of the barangay. The distribution of occupations in Tiguib can be found in Table 12.

Table 12. Distribution of occupations.

Occupation	Percent
Fishers, Fish Vendors	20
Farmers	70
Others (carpenters, sari-sari store operators, drivers, businessmen, employees, etc.)	10

Key informants identify farming and related services as the most important economic livelihood in Tiguib. Fishing and fish vending are next most important. Based on the percent of households dependent on only fishing or fishing and farming, we might estimate that the economy is about 20 percent dependent on coastal resources. This may decrease over time as fishing pressure on the resource continues to increase and as mangroves are exploited. At present, DENR-CENRO is implementing the Coastal Environment Program in Tiguib.

Degree of Socioeconomic and Cultural Homogeneity. A discussion with key informants indicates that approximately 80 percent of the households in Tiguib are either farming, mixed farming/fishing, or fishing. Very small percentages of the households are represented by other occupations, indicating a fair degree of occupational homogeneity. With respect to ethnicity, the key informants estimated that 95 percent of the households consisted of locals, approximately 2 percent were from Cebu, 2 percent from Bohol and 1 percent from Mindanao, suggesting a high degree of ethnic homogeneity. In terms of religion, there is a fair amount of diversity: one-half are Catholic, 15 percent are Aglipay (Catholic sect not recognized by the Catholic Church), 15 percent are from the United Church of Christ in the Philippines, 10 percent are Jehovah's Witness, and 10 percent are Born Again Christians ("Foursquare"). Overall, the population of Tiguib manifests a fair degree of socioeconomic and cultural homogeneity.

Political Organization and Conflict Resolution. Tiguib is a barangay in the municipality of Ayungon which forms part of the province of Negros Oriental. The barangay political organization and conflict resolution is similar to that described for Calagcalag.

Population and Population Changes. In 1980 the Population of Tiguib was 1,584 or 273 households. This increased to 1,876 or 363 households in 1992. The population of Tiguib was 2,111 in 1995.

Coastal Resource Use Rights, Formal and Informal. No informal systems of coastal resource use rights and rules were uncovered during the research period. The barangay captain stated that they continue the practice started under PD 704 of restricting the capture of mother *bangus* (milkfish), immature fish and turtles. In a similar manner as described above for Calagcalag, the fishers in Tiguib are guided by the Ayungon Municipal Fisheries Code

(AMFC) of 1993. There are no fish sanctuary and mangrove stewardship contracts in Tiguib. It is stated by key informants that the rate of rule compliance in Tiguib has improved.

Individual and Household Level Context

Characteristics of Sample Fisher Households. A random sample of 32 households were selected from a population of households identified as depending to some degree on the nearshore fishery of Tiguib. The sample consisted of 17 households belonging to the Tiguib Fishermen's Association (TFA) and 15 non-member households. All of the households are involved in some aspect of coastal resource exploitation either for income or subsistence. Some general background characteristics of the sample can be found in Table 13. As can be seen in the table, TFA members are slightly older, have lived longer in the community, have slightly more education, and have worked longer in marine resource related type of work than have non-members. Non-members have a slightly larger household size.

Table 13. Characteristics of sample.

Variable	Member	Non-Member	Total	t-value	p
Age	46.12	42.67	44.50	0.80	>.10
Education	5.88	5.20	5.56	0.77	>.10
Years resident	33.71	28.93	31.47	0.83	>.10
Household size	5.12	6.00	5.53	-1.31	>.10
N	17	15	32		

In a similar manner to that described above for Calagcalag, relative income was evaluated based on assets including house structure, furnishings, and ownership of productive equipment. The results of the survey of assets are shown in Table 14. The distribution of house structure types in Table 14 suggests that fewer TFA members than non-members are characterized by a minimal or low level of housing (53% versus 67%, respectively), but given the sample size, the differences are not statistically significant (X^2=0.62, p>0.05). The house furnishings of TFA members are more likely to be characterized as medium to high than those of non-members (59% versus 40%; X^2=1.129, p>0.05). The difference is not statistically significant. TFA members own a slightly higher percentage of boats than non-members (88% versus 73%; X^2=1.162, p>0.05).

Table 14. Percent distribution of assets.

	% Member	% Non-Member	% Total
House structure			
Minimal	35	40	38
Low	18	27	22
Medium	47	27	38
High	00	07	03
House furnishings			
Minimal	06	00	03
Low	35	60	47
Medium	47	33	41
High	12	07	09
Productive equipment			
Boat ownership	88	73	81
N	17	15	32

Occupational Multiplicity and Dependence on Coastal Resources. When requested to provide their current occupation, 100 percent of the sample identified themselves as practicing a fishery related occupation. They reported being involved in this occupation for a mean of 19 years. Eighty-four percent said that they are also farmers, and one or two individuals identified themselves as laborer, small merchant, carpenter or driver. Approximately 91 percent of the respondents practiced more than one occupation. Forty-one percent of the respondents have done other types of work besides fishing such as farming, driver or laborer. Such occupational multiplicity is common in rural areas as a survival strategy.

In terms of income, 69 percent of the respondents ranked fishing as the most important source. In contrast, only 22 percent said that they obtain more than half of their income from farming. The remaining 9 percent said that they obtained more than half of their income from working as laborers and drivers or operating a small business. Ninety-one percent of the households had non-coastal resource related sources of income, primarily from farming activities. Only 25 percent of the households received remittances from outside the household (overseas workers and relatives working elsewhere). Fishing is also an important source of food for the household. Fishing is the most important activity in terms of food for two-thirds of the households. Fishing provides more than half the food for 82 percent of the TFA members but for only 40 percent of the non-members. Non-members derive more than half of their food from farming activities.

Collective Action. Two indicators of collective action were examined as a part of the survey: association membership and attitudes towards cooperation (cultural values). It must be noted that the sample was stratified on the basis of TFA membership, and the population from which the sample was drawn included only households identified as participating in the nearshore fishery. With these qualifications in mind, only 6 percent of the TFA members also belonged to

another association, and none of the non-members belonged to an association. The TFA members belonged to a coconut growers alternative livelihood association. TFA members perceived the purpose of their association to be to improve the fishery resources, improve the welfare of fishers, and to protect the coastal resources from illegal activities. The benefits of belonging to the TFA include income from mangrove reforestation, exclusive use of ARs and FADs built by the association, payment for planting mangroves, unity of fishers for resource management, and harvest of mangrove in the future. Among the non-TFA members, 6 of 15 (40%) belonged to an association in the past. Five belonged to a coastal resource user association and one belonged to an alternative livelihood association. The reasons given for quitting the coastal resource user association included the lack of understanding of the purpose and/or regulations of the association, non-performance of one's duties as a member, and inability to attend meetings. The reason for leaving the alternative livelihood association is linked to pre-occupation with other activities.

In terms of cultural attitudes toward collective action, 41 percent of the sample believe that the people of the community can work together to solve community problems. There is no significant difference between TFA members and non-members (41 and 40%, respectively).

Forty-seven percent of the sample believe that fishers could work together to solve a problem such as illegal fishing (47% each for TFA members and non-members). Eighty-eight percent of the sample agree that government and the fishers should work together to solve a problem in the fishery, with no statistically significant difference between TFA members and non-members (88% and 87%, respectively). Overall, the sample does not have an optimistic attitude toward collective action.

Job Satisfaction. When asked if they would become a fisher if they had their lives to live over, fully 97 percent of the respondents said yes. The most frequent reasons are dependence fishing for subsistence (29%) easy source of food and income if there is surplus catch (18%) absence of an alternative income or occupation (12%), good earnings, (12%), and being used to the occupation (12%). These reasons stressed the fact that income is daily and easily obtained. For the individual who would not become a fisher again, the reason is dislike for the work.

In response to a question on switching from fishing to another employment which offers the same income, 91 percent of the sample opted to stay in fishing. The most common reasons given for not changing were either economic (direct and sure source of food and income, low capital requirements) or inertial (being used to fishing). These responses made up 60 and 31 percent, respectively. The few respondents who would change from fishing to another occupation expressed that the new job must be permanent with good results.

When asked what they like about fishing in comparison to other jobs, the most common responses were related to income and food for home consumption. Seventy-eight percent of the 37 responses (multiple responses were allowed) indicated either food or income. Over half of the respondents indicated that these benefits could be obtained more easily by fishing. Low

frequency responses are related to the absence of a boss, temporal constraints, ease of work, tradition, and low capital requirements.

Overall, it seems that fishing is rewarding, both economically and psychologically, to the fishers of Tiguib.

Ecological Knowledge. Fishers were requested to identify the characteristics of the sea that have a positive influence on the status of the resource. Eighty-four percent said the presence of seaweeds and seagrasses, 34 percent said the presence of corals , 34 percent said algae in the mangrove, and 28 percent said abundance of plankton. Six percent each said abundance of mangrove trees, leaves of mangrove trees, mud and sand, and rotten wood. Multiple answers were permitted; hence, percentages can sum to more than 100. When asked about the condition of the nearshore resources today in comparison to ten years ago, 56 percent of the respondents said worse off, 6 percent said the same, and 38 percent said better off. Non-TFA members were more likely to say that the resource was worse off than TFA members (67 versus 47%, respectively). TFA members were more likely to say the resource was better off than non-members (53 and 20%, respectively, Yates corrected $X^2=2.418$, $p>0.05$). However, the differences are not statistically significant. Twenty-two percent of the negative responses attributed the change to the use of unspecified chemicals which decrease fish abundance, and 19 percent attributed the negative changes to the use of poisonous substance in fishing. Low frequency negative responses (one or two respondents) include increasing number of fishers, collecting corals, and typhoon. Improvements in the status of the resource are attributed to reduction of illegal fishing methods, improvement in mangrove areas, and protection of the resource. Most of the respondents (63%) reported that the resource was in good shape at the time the CVRP began. TFA member were more likely to report that the resource was in good condition at the time the CVRP began than non-members (71% versus 53%, respectively). While there is a great deal of variation with respect to the status of the resource, TFA members seem more positive than non-members. Implications of this variation will be discussed along with the discussion of project impacts.

Impact Variables

Achievement of Intermediate Objectives

Material Aspects. Five distinct intermediate objectives, which can be evaluated in terms of material aspects, formed part of the project. Project reports and interviews with ex-project staff, involved agencies, and Tiguib fishers, as well as direct observations were used to evaluate the current status of the intermediate objectives.

Artificial Reefs. The project report notes the construction of 11 clusters of artificial reefs (ARs). Similar problems occurred in Tiguib as described for Calagcalag with the rapid deterioration of the bamboo ARs. Unlike Calagcalag, the ARs in Tiguib were not replaced when they deteriorated. No ARs currently exist in Tiguib.

Coral Reef Management with Fish Sanctuary. An area of 150 ha was planned for coral reef area management in Tiguib. It is reported that the fish sanctuary was not implemented due to lack of local support.

Fish Attracting Device. The project report notes that 3 fish aggregating devices (FADs) were installed, but they only lasted a little over a year due to deterioration and destruction by storms. No new FADs were installed. None exist at the present time.

Mangrove Reforestation. Seven hectares of mangrove were planted. No Certificates of Stewardship were recorded by the local DENR office. It is reported that the survival rate among the plants was only 10 percent.

Livestock Dispersal. Livestock was introduced to serve as an alternative livelihood project. The CVRP-1 introduced 2 goats. The goat dispersal was conducted under the upland component of CVRP-1, not the nearshore component, since the beneficiaries requested assistance under the upland component.

Institutional and Organizational Aspects. CVRP-1 implementation depended on the establishment of fishers' associations in project communities. The Tiguib Fishermen's Association (TFA) is the organization developed by the project. CVRP-1 intermediate objectives are similar to those discussed for Calagcalag.

Organization. The project conducted training and community organizing which resulted in the development of Tiguib Fishermen's Association (TFA). In 1985 TFA had 17 members. With destruction and deterioration of the ARs and FADs, TFA members lost interest in the association and membership decreased. In 1991 interest in TFA was revived when fishers obtained a municipal concession for *bangus* fry collection. In 1993 the Coastal Environment Program (CEP) of DENR utilized the TFA for a new mangrove replanting initiative. DENR-CENRO conducted training on mangrove planting in 1995. Few members of TFA participated in the mangrove replanting activity, however, because it was a communal project. No private stewardship contracts were awarded. In 1995 there were 30 members of the TFA.

As part of the household survey, seventeen TFA members were asked what they perceive as the benefits of belonging to the association. Out of 13 benefits mentioned (respondents could provide more than one response), 35 percent said they received payment for planting mangrove, 23 percent said they derived income from mangrove reforestation, 23 percent referred to access rights to FADs and ARs. Seventeen percent stated unity of fishers for resource management, 12 percent referred to increased income and catch, and 12 percent stated that they could harvest mangrove in the future. A relatively small number of responses (one each) involved obtaining new fishing gear, receiving salary from the association, or attending trainings.

Use Rights and Management Efforts. Specific association use fishing rights were provided as part of project interventions and activities. TFA members were given exclusive fishing rights to

FADs and ARs. Unlike Calagcalag, no mangrove stewardship contracts were given out in Tiguib by DENR.

Respondents were asked if they knew the reasons for creating rules and managing FADs and ARs and, although not provided, mangrove stewardship contracts. With respect to rules for managing FADs and ARs, 24 percent of TFA members stated the reason was to monitor the status of fish stocks near the FAD and AR, 18 percent said to provide exclusive fishing rights to members, 12 percent mentioned to regulate the use of the FAD and AR, and 12 percent said for self-management. Eighteen percent of the TFA members did not know why there were rules to manage the FADs and ARs. Among non-members, 40 percent did not know the rationale for the rules. Twenty percent of non-members stated it was to give exclusive rights to association members and 20 percent said it was to compensate the effort of members. It would appear that TFA members have a better understanding of why rules were created than non-members. This difference probably reflects the training received by TFA members. When asked about mangrove stewardship contracts, TFA members, again, seemed more knowledgeable about the reasons for creating the contracts, despite the fact that no contracts were provided in Tiguib. Twenty-four percent of TFA members responded that it was to compensate the people involved, 12 percent said it was to provide incentives to participants, 12 percent said it was to encourage participants to maintain their mangrove trees, and 12 percent said it was to provide exclusive rights to participants/ members. Eighteen percent stated that they did not know the reason for creating mangrove stewardship contracts. Among non-members, 40 percent did not know the reason for creating mangrove stewardship contracts. Twenty percent of the non-members stated it was to encourage members to maintain their mangrove trees and 13 percent said it was to avoid overlapping claims.

It can be concluded that overall, the fisher community both understands the reasons for and has a generally positive perception of use rights and management rules. Although it should be noted that TFA members have a greater understanding than non-members. Both provided responses indicating that those who make the improvements deserve exclusive rights, that it encourages association members to participate, and that it insures that the intervention and the resource is properly maintained.

Perceived Impacts on the Coastal Ecosystem

Methods. To determine perceived impacts on the coastal ecosystem, respondents were requested to provide evaluations of a number of aspects of this ecosystem for pre-project, present, and future time periods. A self-anchoring, ladder-like diagram with 15 steps was used, where step 1 represents the worst possible situation and step 15 the best possible situation. The respondent was asked to indicate the step which best describes the situation for 10 impact indicators, namely: 1) overall well-being of the household, 2) overall well-being of the resource, 3) income, 4) access to resources, 5) control over resources, 6) ability to participate in community affairs, 7) ability to influence community affairs, 8) community conflict, 9) community compliance with resource management, and 10) amount of traditionally harvested resource in the water. The reader should refer to the section on perceived impacts

on the Coastal ecosystem in the Calagcalag section for a more complete discussion of the analysis.

Analysis. As a first step in the analysis mean values for each indicator for today and the pre-project time periods were calculated, and a paired comparison t-test was calculated to determine if differences between means are statistically significant. The results of this analysis are in Table 15. The results show an increase in perceived levels of all indicators. The difference in perceived values for the access to resources, control over resources and amount of traditionally harvested resource in the water are not statistically significant. All other differences are statistically significant.

Table 15. Perceived pre-project to post-project changes in indicators.

	MEMBER				NON-MEMBER				ALL			
	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p
Access	9.94	8.38	1.56	>.10	6.87	8.07	-1.20	>.10	8.45	8.23	0.23	>.10
Compliance	9.06	7.06	2.00	<.05	8.60	4.80	3.8	<.01	8.84	5.97	2.87	<.01
Conflict	9.81	7.69	2.12	<.10	7.07	5.13	1.93	<.05	8.40	6.45	2.03	<.01
Control	8.00	6.19	1.81	>.10	4.47	4.27	0.20	>.10	6.29	5.26	1.03	>.10
Harvest	7.94	6.62	1.31	>.10	6.20	5.60	0.60	>.10	7.10	6.13	0.97	>.10
Household	8.31	6.38	1.94	<.10	5.93	3.93	2.00	<.01	7.16	5.19	1.97	<.01
Income	9.38	6.19	3.19	<.01	7.40	6.40	1.00	>.10	8.42	6.29	2.13	<.05
Influence	9.81	6.38	3.44	<.01	7.27	4.13	3.13	<.01	8.58	5.29	3.29	<.01
Participate	8.88	6.56	2.31	<.10	8.40	4.67	3.37	<.01	8.65	5.65	3.00	<.01
Resource	8.88	5.75	3.12	<.05	6.87	5.33	1.53	>.10	7.90	5.55	2.35	<.05
N=31												

The next step in the analysis was to determine if project cooperators (TFA) differed from non-cooperators with respect to perceptions of changes in the indicators. This was accomplished by subtracting the preproject evaluation from the today evaluation for each indicator and calculating a two-sample t-test for the difference of mean values between the TFA and non-TFA samples. The results of this analysis can be found in Table 16. The results of the analysis show that project cooperators are more positive on all indicators except overall well-being of the household, ability to participate in community affairs, and community compliance with resource management. None of the differences are statistically significant ($p>0.05$).

Table 16. Differences between members and non-members with respect to perceived changes.

	T2-T1 Member	T2-T1 Non-member	t-value	p
Access	1.6	-1.2	1.60	0.122
Compliance	2.0	3.8	-1.23	0.229
Conflict	2.1	1.9	0.15	0.881
Control	1.8	0.2	1.17	0.251
Harvest	1.3	0.6	0.57	0.571
Household	1.9	2.0	-0.05	0.961
Income	3.2	1.0	1.42	0.168
Influence	3.4	3.1	0.20	0.847
Participate	2.3	3.7	-0.87	0.392
Resource	3.1	1.5	0.86	0.398
N	16	15		

As a next step in the analysis, relationships between perceived changes in the indicators and other individual and household level variables, which socio-cultural research and theory suggest may be important, are examined. Relationships with individual and household level variables such as age, education, years of residence in the community, number of household members, and ecological knowledge are found in Table 17. Ecological knowledge is a measure based on the number of distinct factors mentioned in a question concerning factors that influence the health of the coastal resources. The statistically significant relationships ($p<0.10$) are between age and ability to influence community affairs, education and three variables (overall well-being of the household, control over resources, and community compliance with resource management), residence and ability to influence community affairs, and ecological knowledge and overall well-being of the household and income.

Table 17. Correlations between indicators and selected household/individual level variables.

	Age	Educ.	House Member	Resid.	Eco-Know.
Access	.20	-.07	.25	-.24	-.09
Compliance	-.20	.34*	-.10	-.19	.11
Conflict	.22	.29	-.14	.07	-.18
Control	-.16	.40**	-.24	-.03	-.02
Harvest	.21	-.02	-.08	.05	-.11
Household	.25	.34*	-.09	.05	-.35*
Income	.30	.20	.12	.01	-.44**
Influence	.31*	.24	-.13	.33*	-.09
Participate	.28	.23	-.004	.16	-.16
Resource	.20	-.08	.02	.29	-.06

N=31 **=p<.05
*=p<.10

Relationships between occupation and economic related variables and perceived changes in the indicators are found in Table 18. These variables include important economic indicators such as ownership of productive equipment (boat ownership), sources of income (e.g., sources other than fishing, income from outside the household--e.g. remittances from family members in the city or abroad, and fishing identified as the primary source of income), and occupation related indicators (willingness to change from fishing to another occupation with comparable income and membership in a producer association--TFA). Table 18 indicates that individuals with non-fishing sources of income tend to perceive a smaller (or more negative) change in household, resource, influence, compliance and harvest. Those with income from outside the household perceive an increase in control. Those with fishing as the primary source of income perceive an increase in conflict. Those who say they would switch from fishing to another occupation perceive an increase or positive change in control over resources.

Table 18. Correlations between indicators and selected occupational and economic level variables.

	Boat Owner	Nonfish Income	Outside Income	Fish Primary	Leave Fishing	Member
Access	-.21	-.05	-.07	.19	-.24	.28
Compliance	.02	-.31*	.02	.15	.06	-.22
Conflict	.20	.10	-.14	.31*	.16	.03
Control	.09	-.29	.40**	-.18	.31*	.21
Harvest	.17	-.36**	-.18	.16	.30	.11
Household	.12	-.32*	-.04	.18	.07	-.01
Income	.13	-.27	.00	.25	.09	.25
Influence	.23	.37**	-.15	.29	.03	.04
Participate	.11	-.17	-.05	.12	.12	-.16
Resource	-.13	-.54***	-.13	.14	-.04	.16

N=31 **=p<.05
***=p<.01 *=p<.10

The ten indicators were submitted to a principal component (with varimax rotation) analysis to determine if relationships between the indicators were such that they could be reduced to fewer, composite indicators for further analysis. Results of the principal component analysis are in Table 19. The components were selected on the basis of the scree-test. The three rotated components explain 68 percent of the variance in the set of indicators. Component one is composed of household, income, participation, influence and conflict. Component two is composed of control, compliance and harvest. Component three is composed of access, income and resource. The three components have only one indicator in common, income in component one and three.

Table 19. Principal component analysis of impact indicators.

	Component		
	One	**Two**	**Three**
Participate	.87**	.22	.01
Influence	.85**	.33	.12
Household	.82**	-.10	.16
Conflict	.78**	.07	-.14
Income	.72**	-.01	.55**
Control	-.04	.72**	.06
Harvest	.20	.66**	.31
Compliance	.49	.56**	-.06
Access	-.01	.07	.84**
Resource	.06	-.49	.64**
Variance	41%	17%	10%

Factor scores were created for each individual for each component. Step-wise multiple regression was used to determine the set of independent variables that explained most of the variance in each of the two components. The procedure followed in this analysis is described in the section on Calagcalag. The results of the analysis are in Table 20.

Five variables were entered into the regression equation for Impact Component One: education, age, ecological knowledge, fishing as primary source of income and association member. The adjusted multiple correlation of 0.339 indicates that about one-third of the variance in Impact Component One can be accounted for with these five variables. Two regression coefficients are negative (ecological knowledge and association membership) indicating a tendency to score low on this component. Only two independent variables were entered into the regression equation for Impact Component Two (nonfishing income source and willingness to change from fishing to another occupation), and the probability associated with their regression coefficients is statistically significant ($p<0.10$). It is important to note that the regression coefficient for non-fishing income source is negative indicating that those with non-fishing sources of income tend to score low on this component.

Table 20. Regression analyses of impact components.

Dependent Variable: Impact Component One

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Education	0.427	2.78	0.010
Age	0.359	2.29	0.030
Ecological knowledge	-0.370	-2.41	0.024
Fishing income primary	0.377	2.33	0.028
Member	-0.318	-1.98	0.059

$R = 0.670$; $R^2 = 0.449$; Adjusted $R^2 = 0.339$
$N = 31$; $F = 4.080$; $p = 0.008$

Dependent Variable: Impact Component Two

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Non-fishing income	-0.457	-2.86	0.008
Leave fishing	0.343	2.15	0.041

$R = 0.541$; $R^2 = 0.293$; Adjusted $R^2 = 0.293$
$N = 31$; $F = 5.807$; $p = 0.008$

Dependent Variable: Impact Component Three

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Household income	0.394	2.36	0.026
Member	0.462	2.77	0.010

$R = 0.522$; $R^2 = 0.273$; Adjusted $R^2 = 0.221$
$N = 31$; $F = 5.252$; $p = 0.012$

Discussion

The Tiguib nearshore fisheries component of the CVRP-1 was considered to be less than successful by project staff. From the perspective of the fisher households interviewed, however, they perceived statistically significant improvements in seven of ten impact indicators. Three other impact indicators were perceived as improving (access to resource, control over resource and amount of traditionally harvested resource in the water) but were not statistically significant. It is important to note that this overall perception of positive change exists despite partial or complete failure of some project interventions. The Tiguib Fishermen's Association, organized under the project, became inactive before the completion of the

project. In addition, not all of the project interventions were implemented (e.g., the fish sanctuary), and most of the interventions implemented did not meet expected targets (artificial reefs, fish aggregating device, mangrove reforestation). On a positive note, the fishermen's association was reactivated by the fishers in 1991 as a means of obtaining a milkfish fry collection concession. The reactivation of the association was brought about by the presence of a perceived economic opportunity which would benefit association members.

Comparing members with non-members of the beneficiary association during the pre-project and present periods, the members perceived statistically significant improvements in 7 of 10 impact indicators, while non-members perceived gains in 5 of 10 indicators. It is important to note that perceived improvements were noted by both members and non-members, a desirable impact of the project in order not to create new social strata in the community. There were, however, more positive impacts that accrued to project cooperators and this could have a long-term positive impact on the community and its resources.

Both the members and non-members reported a high level of knowledge of project objectives and a high level of participation in project planning and changes in the project. More association members (project cooperators) reported higher knowledge of objectives and participation than non-members, although the difference was not statistically significant. The participatory and adaptive nature of the project resulted in fishers, both members and non-members, feeling that they were active participants of the project, despite its reported overall lack of success at meeting project objectives.

A discrepancy in the results was noted. Fishers perceptions as measured by the impact indicators (the self-anchoring 15 step ladder scale), is that the overall well-being of the resource has improved. Association members perceive a statistically significant increase in the overall well-being of the resource, while no significant difference was perceived by non-members. However, when directly asked about the condition of the resource at present compared to ten years ago the majority of respondents stated that it was worse off (56%). Only 38 percent said it was better off. The differences in responses may be attributed to the fishers interpretation of the question. In the case of the 15 step scale, they were asked about coastal resources in general, while in the case of the direct question they were asked about the fishery resource. Additionally, those who perceived positive change could have indicated more scale steps than those with negative perceptions, weighing the overall result towards the positive. Whatever the reason for the discrepancy, association members perceived a positive change in overall well-being of the resource which may be attributed to their perceptions of empowerment and greater knowledge about resource management as a result of the project.

Fishers who perceived declines in the resource attributed the changes to continued use of illegal and destructive fishing methods. It appears that it has not been possible to reduce or eliminate these practices. This inability of the fishers to deal with the problem of illegal fishing practices may be attributed to their low optimism towards collective action. The membership of respondents in organizations and associations was low. Only 45 percent of the fishers believe that they could work together to solve a problem like illegal fishing and only 41 percent believe that the people of the community can work together to solve community problems. However,

88 percent of the respondents do feel that they could solve a problem in the fishery if they worked together with the government. Greater cooperation with both municipal and provincial governments may be needed to increase the level of collective action in Tiguib. Despite the respondents low optimism toward collective action, when faced with an economic opportunity, such as obtaining a milkfish fry collection concession, they are willing to organize. Thus, it would appear that if an incentive exists the residents of Tiguib can work together for their common good.

Both age and length of residency in the community were found to be positively correlated with perceptions of increases in ability to influence community affairs. Older, long term residents usually command some respect, and project activities directed at people's participation might be facilitated by targeting these individuals and utilizing their inherent status. This suggests that stimulating the involvement of older and more settled individuals in project activities may have a positive impact on aspects of project objectives which depend on community participation. In addition, education has a positive relationship with perceived increases in control over resources and community compliance with resource management. More educated individuals are probably more likely to become actively involved in meetings and other activities involving resource management; hence increasing perceptions of control as well as willingness to comply with regulations they have been actively involved in either discussing or formulating. Their own willingness to comply is then generalized (or projected) to the community in their response to the impact evaluation question. This suggests that improvements in education of local residents may lead to improved resource management.

Those respondents with non-fishing sources of income tended to see a negative change in the overall well-being of the resource, overall well-being of the household, amount of traditionally harvested resource in the water, and community compliance with resource management. This overall negative perception about the condition of the resource may be responsible for the fishers engaging in multiple occupations as a household economic survival strategy.

As noted above, 97 percent of the respondents said that they would again become a fisher if they had their life to live over and 91 percent said they would not change from fishing even if other employment existed in which they could make the same income. Various reasons were given for the preference of fishing as an occupation but it is important to note this high level of job satisfaction. It suggests that development projects directed at providing alternative, rather than supplemental employment for fishers may meet resistance and ultimate failure if the alternatives cannot supply some of the same satisfactions as the occupation of fishing.

Reviewing the experience of CVRP-1 in Tiguib, several features can be extracted from the project process: 1) participation of beneficiaries during the project planning and implementation phases; 2) presence of an association; 3) training of project beneficiaries; 4) communication of project objectives; and 5) deployment of a part-time organizer in the barangay.

In terms of the preconditions for co-management, the Tiguib experience met 6 of 9 preconditions, namely: 1) existence of use rights (at least at the time of project implementation) and a good understanding of rules and use rights; 2) provision for user participation in rule making, monitoring and enforcement; 3) access to local conflict resolution mechanisms; 4) socioeconomic homogeneity; 5) nesting of associations; and 6) organizational scale. The three unmet preconditions are appropriateness of rules to local conditions, boundary delineation and multiplicity of association functions. The Tiguib Fishermen's Association was a village-based organization with affiliation to a municipal association, the Ayungon Federation of Fishermen's Associations. While it became inactive, TFA was reactivated and increased its membership from the time of CVRP-1.

From the perspective of the CVRP-1, Tiguib was not a success. Unlike Calagcalag, in Tiguib neither the association nor the interventions have been maintained. Yet from the perspective of the respondents in Tiguib the project was successful as all ten impact indicators showed an improvement. So despite the lack of material and organizational success of the project, something positive did occur in Tiguib. This something may be a sense of empowerment and increased knowledge as a result of the project. While the original association failed, a new association was formed to take advantage of an economic opportunity. Thus, despite the low level of cultural attitudes towards collective action in Tiguib, a major difference from Calagcalag where attitudes towards collective action were high, when the right situation exists the residents of Tiguib showed that they can work together. This is an important lesson; that is ensuring that the incentive for collective action exists within the community. Project objectives and interventions need to be in tune with the objectives and needs of the project beneficiaries. The low level of cultural attitudes towards collective action may also suggest that additional training and education are needed to enhance the confidence of the community for collective action. In addition, the residents of Tiguib may require more assistance from government to undertake collective action.

3.2.1.3 Zaragosa, Badian, Cebu

Site Description

Zaragosa is a village in the municipality of Badian, which lies on the southwestern coast of Cebu Province. Located 98.5 kilometers from Cebu City, the island barangay of Zaragosa is a 3-hour bus ride on a good road network to Badian Poblacion and a 30-minute motorboat ride from the Poblacion to the island itself.

The small, 162-hectare barangay of Zaragosa is 1.5 kms away from the Badian town proper. It is bounded by Tañon Strait on the west, Badian Bay on the east, Moalboal Municipality on the north, and Barangay Lambug on the south. Lining the edges of Zaragosa's shallow shoreline are thin clusters of old and young mangrove plants with varying heights and canopies. The mangrove stand is found in front of the houses on the sandy beach, with several open areas for passage and landing. The coastal scenery is typical, where boats are either anchored on the beach or secured near the houses of the fishers. During low tide, women often gather shells and other marine products for two to three hours.

The terrain of Zaragosa is generally rocky, marked by stones of coral origin scattered randomly on the island. The soil is poor. For most residents, the primary means of subsistence are fishing and raising swine, chickens, and goats. Corn, coconut and rootcrops are also grown in the barangay.

The fishing grounds now yield small pelagic species. Over time, demersal species became increasingly scarce due to degradation of fishing habitats.

Zaragosa is heavily dependent on Badian mainland for its water requirements, having no fresh water source of its own. Carrying water-filled containers on one's shoulders from the landing to the house comprises a daily struggle. The only exception is the 5-star Badian Beach Resort whose underwater pipes are directly connected to the mainland. From time to time, the resort shares its water with nearby households. For most residents, however, water is a common problem and a common bond.

Site Project Variables

Zaragosa is a showcase of a beneficiary community in Badian, Cebu. It has not only maintained its marine sanctuary and mangrove area but has also demonstrated an internally-driven initiative for livelihood projects after the completion of the CVRP-1 in December 1992. At the forefront of these efforts is the CVRP-nurtured beneficiary organization.

Zaragosa was not an original site of the CVRP-1. Thus, project activities began only in 1986, or two years after the project started in the pilot sites. Unlike other sites (e.g., Malhiao, Badian) where the field personnel simultaneously addressed the social preparation of the beneficiaries and the implementation of technical interventions, social preparation was given more focus in Zaragosa at the outset.

When the CVRP-1 personnel entered the area, the delivery of services from both government and non-government sectors was virtually nil. Barangay residents were skeptical, if not wary, of government intervention, having been disenchanted in the past with unfulfilled government promises and long-term neglect.

To counteract the negative impressions at that time, the part-time community organizer (CO) spent long hours at the site to win the trust of the residents. She stayed in the barangay for 3-4 days a week, often working until 10 o'clock in the evening. House-to-house visits and friendly dialogues were conducted. Due to the presence of faction-torn local leaders in the beginning, the CO quietly befriended the spouse and children of influential local leaders, fostered harmony, and consciously worked on bringing about concrete project achievements at the site. As shown by the project experience, the dedication and strong sense of commitment of the CO hastened project acceptance and helped strengthen the foundation for the social preparation of the community.

A turning point in gaining project acceptance occurred after the CO helped resolve the conflict between the project beneficiaries and the Badian Beach Resort, also known as Eurasia. The resort uprooted the young mangroves planted by the beneficiaries along its shoreline, particularly in front of its cottages. CVRP defended its decision to plant mangroves in the area by producing documents which attested to the timberland classification of Zaragosa. Subsequently, the CO arranged meetings at the Bureau of Forest Development (BFD) in Argao, where public hearings took place. Attended by CVRP personnel, Eurasia, BFD and the Bureau of Fisheries and Aquatic Resources (BFAR), the hearings later upheld the decision of CVRP-1. The results served as a springboard for improving understanding and collaboration at the site. Based on the account of the CO, Eurasia eventually offered its facilities to the beneficiaries for CVRP seminars and workshops.

Training activities hastened the community organizing process. These included both social and technical training such as leadership training, value formation, policy-making within the association, cooperative management, bookkeeping, mangrove reforestation and management, artificial reef construction and installation, fish catch monitoring, fish cage management, and coral reef management with fish sanctuary.

A survey of 32 households in Zaragosa indicated that 66 percent of the respondents attended various training sessions held by the CVRP-1, inclusive of members and non-members of the Zaragosa-Badian Small Fishermen's Association (Table 21). A much higher percentage of association members, however, attended the training activities (93% versus 41%; $X^2 = 9.610$, $p < 0.05$). Training sessions attended by most members and non-members were basically technology-related (e.g., mangrove reforestation, artificial reefs, etc.).

Table 21. Community participation in CBCRMP implementation.

	% Member	% Non-Member	% Total	X^2	p
Attend CBCRMP Meetings	87	65	75	2.05	0.152
Attend CBCRMP Training	93	41	66	9.61	0.002
Knowledge of Objectives	100	94	97	0.99	0.340
Influence Planning	100	82	91	2.92	0.087
Influence Project Changes	87	82	84	0.11	0.737

Through the community organizing efforts of CVRP-1, the Zaragosa-Badian Small Fishermen's Association (ZSFA) was established in 1987 with 17 original members. Membership continued to grow to 70 members in the remaining project life.

Project implementation was participatory. Based on the household survey of 32 respondents, the residents of Zaragosa indicated that they were able to influence the project in terms of planning (91%) and initiating project changes after the project began (84%). Association members, however, felt a stronger influence on project planning than non-members (100% versus 82%), as shown in Table 21. This difference, nonetheless, is not statistically significant ($X^2 = 2.92$, $p>0.05$).

Attendance at meetings where CVRP-1 objectives were discussed was also slightly higher for members than for non-members (87% versus 65%; $X^2=2.05$, $p>0.05$). The knowledge of project objectives showed that all members were aware of these objectives, particularly in the context of coastal resource rehabilitation and improvement as well as community welfare improvement.

Project interventions included mangrove reforestation and management (1.4 ha), bamboo artificial reefs (6 clusters), fish sanctuary (9.5 ha), and a fish cage (8 x 8 m) for culturing grouper and snapper. Fifty-eight (58) certificates of stewardship contract (CSCs) were issued by the Department of Environment and Natural Resources (DENR) to the mangrove planters.

The members of the beneficiary association were actively involved in the implementation of project interventions. They also joined CVRP-1 personnel in seeking the passage of an ordinance declaring the sanctuary as a protected area, which received the support of the Municipal Government of Badian in 1989.

Context Variables

Supra-community Context

Enabling Legislation. During the implementation of the CVRP-1 in Badian, Cebu, PD 704 governed fisheries management at the project site of Zaragosa. The researchers were unable to find a Municipal Fisheries Code for Badian.

Supra-community Institutions. Several external institutions have influenced coastal resource management in Zaragosa during and after CVRP-1 implementation. The Department of Agriculture (DA) in Badian assisted the barangay in artificial reef preparation and installation during project implementation. The Department of Environment and Natural Resources (DENR), through its CENRO in Argao, extended technical services on mangrove reforestation and provided lectures on clam culture.

After the completion of the CVRP-1, more institutions were engaged in service delivery. The Municipal Government of Badian was instrumental in sustaining the fish sanctuary by deploying a fish warden to guard the sanctuary. The DENR continued to visit the barangay and started a new mangrove replanting effort through the Coastal Environment Program. The German Development Service (GDS), a non-government organization, offered a grant to the Zaragosa-Badian Multi-Purpose Cooperative to help finance the construction of three cottages for local tourists, which were envisaged to augment the earnings of the cooperative. Other agencies such as the DA and the Department of Social Welfare and Development (DSWD) of Cebu Province also assisted Zaragosa after the CVRP-1 phased out. However, they addressed non-coastal activities such as livestock dispersal, upland development, and small livelihood loans for vending.

Supra-community Markets. The marketing of fresh fish in Zaragosa is externally-oriented. The bulk of fresh fish (95%) harvested in Zaragosa is sold in Badian Poblacion where various buyers converge. Very little trading takes place within the barangay, which absorbs a mere 1 percent of the total fish catch. The rest of the harvest goes to Dumanjug and Carcar, particularly for anchovy (*bolinao*). In addition to fresh fish, Zaragosa sells a popular product called *guinamos* (fish paste) to neighboring towns such as Moalboal, Ginatilan, Alcantara, Alegria, and Ronda as well as to the adjacent province of Negros. Over the past 10 years, the fish distribution system has remained unchanged.

There is a pronounced uptrend in the number of fish traders in Zaragosa, or from 8 traders in 1985 to more than 20 traders in 1995. Key informants have reported that the demand for fish also increased, largely due to a growing population and to the rise of tourism in Badian. The retail prices of fish also increased remarkably over the past 10 years, ranging from 50 percent to 400 percent. *Danggit* (rabbit fish), *bolinao* (anchovy), *kitong* (spadefish), *tulingan* (frigate mackerel), *banak* (mullet) and *lapu-lapu* (grouper) registered hefty price increases of at least 300 percent. The prices of squid and octopus grew more slowly by 167% while those of *maya-maya* (snapper) posted a mere 50 percent price increase. Similarly, the price of *guinamos* (fish paste) rose by about 150 percent.

Supra-community Shocks to the System. Super typhoon Ruping caused extensive damage to fishing gears and other property in November 1990. No new technologies, other than those introduced by CVRP-1 (e.g., artificial reefs and fish cage culture) have been used in the area since the project started.

Community Context

Perception of Trends in the Resource. A survey of 32 barangay residents in Zaragosa indicated that, at the time of project implementation, the fishery resource was generally in a good shape. Only a minority perceived the situation as bad (3%). The rest (19%) did not feel any change.

Comparing the condition of the nearshore fisheries today to the situation 10 years ago, half of the respondents expressed that the resource is better off today. Only 3 percent felt that the situation remained the same. The rest (47%) said that the resource was worse off. Between association members and non-members, there is no statistically significant difference in perceiving that the resource is better off today (X^2=0.126, p>0.05). Details on the underlying reasons are discussed in the section on individual and household data.

Target Species Composition and Distribution. Interviews with key informants representative of the major fishing gear types revealed that the following types of fish are considered most important in terms of income:

1. *bolinao* (anchovy)
2. *tulingan* (frigate mackerel)
3. *andohaw* (round scad)
4. *burot-burot* (unidentified)
5. *tamarong* (round scad)
6. *malobgas* (unidentified)

In terms of consumption, *danggit* (rabbit fish) and *tambod* are important, along with all the fish types listed above. Fishers observed that the fish catch, which comes from either coral or rock areas, declined by 50 percent from 1986 to 1995. Moreover, mother milkfish and *mantija* have disappeared. *Pampano* (trevally), though, has appeared in the last 10 years.

Environmental Features Influencing Boundary Definition. The coastline of Zaragosa is marked by a narrow beach area, with thin clusters of mangrove trees in various locations. The presence of highly visible marker buoys in the marine sanctuary defines the extent of the protected area. Boundary delineation would be of medium difficulty in the absence of natural boundaries in the sea.

Technologies Used in Coastal Area. Fishing is generally done from outrigger boats. Most boats in Zaragosa are unmotorized, powered only by a paddle. Overall, there are 215 boats in the site, of which 15 are motorized.

Among the common fishing technologies, the gill net is the most frequently used. The bottom set gill net is deployed during low tide for about 15 days a month. The top set gill net is used at night, particularly during the peak months of April to July. The fishers also deploy hook and line. The reported peak fishing season for using hook and line is from May to June. This fishing gear is used in reef areas from 8 p.m. to 5 a.m. The less common fishing gear in Zaragosa is spear. It is used during low tide without the aid of any breathing equipment (e.g., compressor or scuba tanks), primarily in shallow reef areas.

Level of Community Development. The level of community development is based on a checklist of items given below. The facilities which are in place are marked by bold print while those which are absent are presented in normal print.

1. Hospital
2. Medical Clinic/**Health Center**
3. Resident Doctor
4. Resident Dentist
5. Secondary School
6. **Primary School**
7. Public Water Supply Piped to Homes
8. Sewage Pipes or Canal
9. Sewage Treatment Facility
10. Septic or Settling Tanks
11. **Electric Service**
12. **Telephone Service (c/o Badian Beach Resort only)**
13. **Food Market (Sari-Sari Stores)**
14. Drug Store
15. **Hotel or Inn (c/o Badian Beach Resort only)**
16. **Restaurant (c/o Badian Beach Resort only)**
17. Gas Station
18. Public Transportation
19. Hard Top Road Access
20. Banking Service
21. **Television Reception**
22. **Radio Reception**

Degree of Integration into National Economy and Political System. Zaragosa traders bring their fish and fish products by boat to the Badian town proper, to seven neighboring towns in Cebu, and to the nearby province of Negros. On the mainland, frequent trips by buses and other vehicles on a paved road network provide a good market link to other areas, both within and outside Cebu. Communication links exist but the telephone facility is confined to the Badian Beach Resort. Political links may be regarded as low due to the absence of visits from the Governor or Mayor. Overall, the degree of integration of Zaragosa into the economic and political system may be classified as low to medium.

Tradition of Cooperation and Collective Action. The longest surviving organization is the Zaragosa-Badian Small Fishermen's Association, which existed for approximately seven years before it was converted into the Zaragosa-Badian Multi-Purpose Cooperative in 1993. Its existence dates back to 1987 when the CVRP-1 organized the fishers in the barangay for coastal resource management activities. Another organization in Zaragosa is the *Nagkahiusang Mag-uuma sa Zaragosa* (NAMAZAR) Coconut Association, which has been active for about 4 years now. It procures farm inputs for its farmer-members and helps improve coconut farming practices in the barangay. Other organizations include the Mutual Aid Association, which extends assistance to members in times of death or illness, and the Parents and Teachers Association of the Zaragosa Elementary School, which focuses on school-related concerns.

Occupation Structure and Dependence on Coastal Resources. The only coastal-dependent occupations in Zaragosa are fishing and beach resort operation. The Badian Beach Resort or Eurasia, whose operations date back to the early 1980s, employs around 20 regular workers and 15 seasonal workers from Zaragosa. Its facilities include 50 rooms and 17 cottages. Equipment for scuba diving, surfing, and other water sports are available at the resort.

The majority of barangay households (80%) are dependent on fishing for economic survival, often supplemented by farming and livestock raising (Table 22). Other occupations include trading, tuba (coconut sap) gathering, tailoring and working as employees.

Table 22. Distribution of major occupations.

Occupation	Percent
Fishers	80
Farmers/Livestock raisers	10
Traders/Vendors	5
Tuba (coconut sap) gatherers	1
Others (resort employees, teachers, tailors, etc.)	4

Degree of Socio-Economic and Cultural Homogeneity. The residents of Zaragosa are homogeneous in many ways. The heavy dependence of its residents on coastal resources, the predominance of native Cebuano residents, and the preponderance of Catholics in the barangay attest to this homogeneity. Ninety-nine percent (99%) of the residents were born in Zaragosa of Cebuano parents. A very small minority came from neighboring barangays and towns. In terms of religion, 97 percent are Roman Catholics while the rest are Protestants and members of the Philippine Benevolent Missionary Association (PBMA).

Political Organization and Conflict Resolution. A Barangay Captain heads the Barangay Council, whose members consist of seven councilors, a secretary and a treasurer. A local committee, called the *Katarungang Pambarangay*, is the primary mechanism for resolving conflicts which are not settled amicably at the level of the barangay captain. So far, conflicts have revolved around marital problems and slight physical injuries. A resource use conflict

was related to the use of a very bright light under the water surface to attract anchovies. All these cases, however, never reached the *Katarungang Pambarangay* since they were settled amicably upon the intervention of the barangay captain.

Population and Population Changes. The population of Zaragosa grew from 671 persons in 1975 to 831 persons in 1985, and then to 1,259 persons in 1995, representing an annual average growth rate of 4.4% over 20 years. Annual population growth tended to be more rapid during the 1985-1995 period (5.1%) than in the preceding decade (2.4%). In 1995, there were 218 households in Zaragosa.

Coastal Resource Use Rights, Formal and Informal. Informal use rights are non-existent in Zaragosa. Use rights are governed by national and municipal legislation as well as by mangrove stewardship agreements. The national legislation, P.D. 704, restricts certain practices, including the capture of mother milkfish, sea turtles, and immature fish and regulates the use of chemicals in fishing.

At the local level, formal use rights and rules are guided by municipal ordinances enacted by the Office of the *Sangguniang Bayan*. Ordinance No. 1-89 dated January 27, 1989 declared the fish sanctuary established by the CVRP-1 as a protected area and defined permissible and non-permissible activities. Anchoring of boats, shell gathering and fishing are prohibited within the sanctuary and within the 25-meter zone from the boundaries of the marker buoys. Penalties are also imposed on violators in terms of fine, imprisonment or both. Relative to other offenses, fishing carries a heavier penalty. It involves a fine of P150, an imprisonment of 10 days, or a combination of fine and imprisonment at the discretion of the court.

Snorkeling and scuba diving are allowed within the sanctuary, upon prior permission from the municipal mayor or his duly authorized representative. For purposes of managing, maintaining and protecting the fish sanctuary, all officers and selected members of the Zaragosa-Badian Small Fishermen's Association are mandated to perform these tasks.

Ordinance No. 11-93 was enacted on March 3, 1993. It regulates the use of fine-meshed nets in fishing within the municipal waters of Badian and imposes a penalty based on the Fisheries and Administrative Order 1986 of the Ministry of Agriculture and Food. Fine-meshed nets refer to all nets, whether natural or synthetic, with a mesh size of less than 3 centimeters between the opposite knots of a full mesh when stretched.

The ordinance, nonetheless, specifies that the prohibition shall not apply to catching the following: 1) padas (Siganidae); 2) milkfish fry (Chanos-chanos); 3) prawn fry (Penaedae); 4) mullet fry (Mugilidae); 5) glass eel and alvers (Anguilidae); 6) shrimp (Gobiidae); 7) marine aquarium/ ornamental fishers; and 8) other species which are naturally small but already mature such as *alamang* (shrimp fry), anchovy, snails, *malobgas* and *guno* (silverside fish).

Ordinance No. 12-95 was also approved on March 3, 1993. It banned *handok*, a destructive fishing method similar to *muro-ami* which uses heavy objects to drive out the fish from the coral reefs towards a fine-meshed net and which destroys marine habitats in the process.

Violators are subject to a fine of P500-P1,000 or an imprisonment of 3-6 months and confiscation of fishing paraphernalia, or both.

The Municipality of Badian, moreover, banned in its municipal waters the use of compressors with a spear (*pana*) through Ordinance No. 13-93. The only exception applies to scuba divers on tourist-related activities and taking shots of the underwater environment. Penalties include a fine of P500-P1,000, an imprisonment of 3-6 months plus confiscation of the equipment, or both.

Other existing formal systems apply to mangrove, where use rights are clearly defined by mangrove stewardship agreements. The planter is allowed to cut mangroves, provided he replants the trees. The rights, however, cannot be sold and are transferable only to the nearest kin.

Women. The women of Zaragosa are actively engaged in both fishery- and non-fishery based activities. Based on a household survey of 32 respondents, a very high percentage (96%) are engaged in fish vending, gleaning shellfish and other marine products, and fish paste production. To a certain extent, some women in Zaragosa also fish (4%). The length of time spent for these coastal-dependent activities varies from a mean of 5 hours for fishing, to 3 hours for fish vending, and 2 hours for gleaning. The supplemental household income derived from these activities is approximately P1,628 per month.

About 80 percent of the women are also engaged in non-fishery based activities. These include raising livestock and poultry (56%), farming (32%), and mat-weaving (12%). Operating a *sari-sari* store and vegetable gardening are minor activities.

In terms of the participation of women in the CVRP-1, 52 percent of the women attended project-related seminars and training sessions while 48 percent did not join any activity at all. The most frequently attended training activities were mangrove reforestation (32%), artificial reef construction and installation (12%) and fish processing. (12%). Other seminars attended included human resource development, peanut butter making, and cooperative management (4% each). The benefits derived by the women respondents from project participation included gaining knowledge on livelihood enhancement (33%) and on cooperative management (8%), learning how to prepare food products such as sardines and peanut butter (16%), and using mangrove products at home (8%).

Among those who did not participate in CVRP-1 activities, the reasons were primarily due to the lack of time (32%) and dislike for the organization (4%). Between member- and non-member households, the difference in women's participation is not statistically significant ($X^2 = 3.279$, $p > 0.05$).

Individual and Household Level Context

Characteristics of Sample Fisher Households. A random sample of 32 households were drawn from a population of households which are dependent on coastal resources. The sample comprised 15 members of the Zaragosa-Badian Small Fishermen's Association and 17 non-members. Table 23 shows that both members and non-members are similar in terms of mean age, length of residence in the barangay, household size, number of years in marine-related work, and previous engagement in marine-related occupations. The only significant difference lies in educational attainment which is statistically significant at 1 percent (t-value = 4.08). Members have generally reached high school while non-members barely completed their primary schooling.

Table 23. Characteristics of sample.

Variable	Member	Non-Member	Total	t-value	p
Age	42.27	42.29	42.28	0.80	>.10
Education	9.20	5.71	7.34	4.08	<.01
Years residing in the area	38.33	37.88	38.09	0.08	>.10
Household size	5.73	6.94	6.38	-1.21	>.10
Years doing marine-related work	24.33	26.29	25.38	-0.36	>.10
Years doing previous marine-related work	0.80	0.59	0.69	0.25	>.10
N	15	17	32		

Similar to other sites, relative income was evaluated based on assets --- house structure, furnishings, and ownership of productive equipment. In Table 24, it can be seen that more members have medium to high quality house structures (60%) than non-members (47%). Medium quality structures refer to houses made of a combination of lumber/cement and native roofing materials (e.g., *nipa*) while high quality structures refer to those made of concrete materials. The difference, however, is not statistically significant (X^2=0.54, p>0.05). The house furnishings of members are likely to be characterized as low to minimal relative to non-members (54 versus 59%: X^2=0.12, p>0. 05). In terms of boat ownership, there is no difference between members and non-members.

Table 24. Percent distribution of assets.

	% Member	% Non-Member	% Total	X^2	p
House structure				0.536	0.464
Minimal	00	12	06		
Low	40	41	40		
Medium	60	41	50		
High	00	06	03		
House furnishings				0.125	0.939
Minimal	07	06	06		
Low	47	53	50		
Medium	47	41	44		
High	00	00	00		
Productive equipment				-	-
Boat ownership	100	100	100		
N	15	17	32		

Occupational Multiplicity and Dependence on Coastal Resources. All respondents, regardless of members or non-members, indicated that they are dependent on fishing. Occupational multiplicity as a survival strategy in Zaragosa is evident in the pursuit of other activities. In addition to fishing, 50 percent of all respondents are engaged in farming and 25 percent in livestock raising. In the past, 62 percent of the respondents also pursued other jobs such as laborers, fishing aides, operators of small-scale business, and service workers.

In terms of income, 94 percent of all respondents ranked fishing as the most important source, providing more than half of their household earnings. Secondary income is derived from non-coastal dependent sources such as farming and livestock raising. Only 22 percent of the respondents received remittances from relatives working outside the barangay. In this regard, the difference between members and non-members is not statistically significant (20% versus 24%; $X^2 = 0.058$, $p > 0.05$).

In terms of food, fishing also provides more than half of the food requirements for 97 percent of the households. Members, however, have a total dependence on fishing as a source of food relative to non-members (100% versus 94%; $X^2=0.911$, $p>0.05$).

Collective Action. Two indicators of collective action were examined as a part of the survey: association membership and attitudes towards cooperation (cultural values). It must be noted that the sample was stratified based on membership in the coastal resource user association in Zaragosa and that the population from which the sample was drawn included only those dependent on the nearshore fishery. Based on the survey results, the members of the Zaragosa-Badian Small Fishermen's Association (ZSFA) also belong to other organizations at present. These are the NAMAZAR Coconut Association, Mutual Aid Association and Parents and Teachers Association (46%). Non-members of the ZSFA, on the other hand, have a

lower percentage of affiliation at present even in other community organizations. The mean number of current affiliations is 0.5 for non-members and 1.5 for members. The difference between members and non-members in this regard is statistically significant at 1 percent (t-value = 4.88). The members of the ZSFA perceive that the purpose of their association is to address the welfare of the fishers as well as to improve fishery resources.

According to the household survey, the difference between members and non-members is statistically significant in terms of past membership in organizations (t-value=-1.72, $p<0.10$). The mean number of associations that members joined in the past was lower than that of non-members (0.07 versus 0.29). Approximately 12 percent of all barangay respondents used to be members of the ZSFA and the coconut association. For the individual who left the ZSFA, the absence of wages and the inability to perform one's duties served as the underlying reasons. For the person who left the coconut association, internal conflict was the compelling reason.

Cultural attitudes toward collective action favored a collaborative effort between the government and fishers in solving fishery problems (97%). Fifty percent (50%) of the respondents felt that fishers could work together to fight illegal fishing. Thirty-seven percent (37%) believed that people in the community could cooperate in solving community problems. For each of these aspects, however, the difference is not statistically significant between the members and non-members.

Job Satisfaction. Given the chance to live their lives over, 94 percent of the respondents would still choose to become fishers. Between members and non-members, the difference is not statistically significant ($X^2=0.008$, $p>0.05$). Having been used to this type of work emerged as the top reason (31%). Others cited that they had no other source of income (19%) while some felt that the absence of a boss made fishing attractive as an occupation (16%). In addition, fishers no longer have to buy fish for consumption (12%). For the individual who would not like to be a fisher again, the reason is linked to insufficient income in meeting household needs.

Given the same income in another occupation, most respondents (91%) still would not switch from fishing to another occupation. This is primarily due to the absence of a boss and the existence of free time (34%). Other main considerations are linked to the free food that goes with fishing (19%), familiarity with fishing (12%), and opportunity to earn more income (12%). Overall, the fishers of Zaragosa are highly satisfied with their chosen occupation. Rewards from fishing are not only psychological but also economic.

Ecological Knowledge. Among the characteristics of the sea that have a positive influence on the status of the resource, the respondents cited the abundance of mangrove trees (56%), presence of seaweeds/sea grasses (50%), and clean water (28%). Also mentioned were the presence of algae (25%), existence of corals and associated sea grasses (22%), and abundance of plankton (6%). Multiple responses were allowed.

For the respondents (50%) who perceived the marine resource as better off today than 10 years ago, the improvement is attributed to the establishment of the fish sanctuary (19%), fish crab increases (16%), mangrove reforestation (9%), coral reef management and protection (6%), reduction of illegal fishing (6%), and rehabilitation/conservation efforts (6%).

For those who perceived that the resource is worse off today (47%), the key reasons included fish catch declines due to chemicals (16%) and incomplete rehabilitation of mangroves (6%). Low frequency responses (3% each) are related to the increasing number of fishers, decline in coral population, scanty mangrove areas, illegal fishing, complacency of the people, and entry of commercial fishing.

In terms of the specific status of the resource, more members than non-members viewed the resource as better off today (40% versus 29%; $X^2=0.396$, $p>0.05$) and much better off today (13% versus 6%; $X^2=0.521$, $p>0.05$).

Impact Variables

Material Aspects. To evaluate the present status of the project's intermediate objectives in terms of material interventions that aim at improving the resource base and upgrading the skills of the residents for coastal resource management, the research team used a combination of project reports, interviews with ex-project staff, interactions with Zaragosa fishers, and direct observations.

Artificial Reefs. Six clusters of bamboo artificial reefs were constructed and installed in Zaragosa through CVRP-1. These lasted for only six months due to rotting but were replaced with two clusters of rubber tires afterwards. The rubber tires still exist up to this time in the sanctuary area.

Coral Reef Management with Fish Sanctuary. An area of 100 hectares was covered under coral reef management, of which 9.5 hectares were allocated to the fish sanctuary. The sanctuary has been sustained with the support of the Municipal Government of Badian, which has shouldered the salary of the fish warden in Zaragosa. To date, the marker buoys are still intact. The association members, out of concern for maintaining the sanctuary, replaced some anchor ropes with the assistance of the Department of Agriculture in Badian.

Fish Cage Culture. A fish cage measuring 8 x 8 meters was provided by CVRP-1 for the grow-out of groupers and snappers. Fish cage operations, however, ceased after a year due to the lack of marketing assistance, high cost of feed, and competition from nearby fish cage operators. No attempt to revive the fish cage took place after the completion of the CVRP-1 due to financial constraints on the part of the fishers. According to the fishers, a similar fish cage would cost almost P180,000 per unit by now.

Mangrove Reforestation. The residents of Zaragosa planted 1.4 hectares to mangroves but the survival rate was only 40 percent due to tidal movements, destruction of young plants by barnacles, and trampling in certain passage areas. The continuing interest of the members of

the Zaragosa-Badian Multi-Purpose Cooperative in mangrove rehabilitation, nonetheless, is manifested in new mangrove plantings along the shoreline and initial dialogues with DENR-Argao on participating in the Coastal Environment Program (CEP).

Institutional and Organizational Aspects. CVRP-1 implementation and sustainability hinged heavily on the establishment and strengthening of fishers' associations at the project sites, which were envisaged to fulfill the role of day-to-day resource managers.

A year after project completion, a very encouraging development was the evolution of the Zaragosa-Badian Small Fishermen's Association into the Zaragosa-Badian Multi-Purpose Cooperative in 1993. In a span of barely three years, the cooperative exhibited a growth rate of 43 percent in terms of membership --- from 70 members at the end of CVRP-1 to more than 100 members at present. The primary mechanisms for attracting new members included a patronage refund which allows annual discounts on the total amount of purchases from the cooperative, a 60 percent interest on capital, and transparency in financial operations via monthly meetings with shareholders. Cooperative members, moreover, are entitled to a credit line of 50 percent of their total shareholdings, payable within three months at an interest rate of 3 percent per month.

The cooperative's total assets have grown from P6,000 in 1993 to approximately P200,000 in early 1996. This was achieved through a combination of internal fund generation, accessing external funds, and sound management. Members were asked to contribute a membership fee of P25 each and a paid-up capital of P50 per share. The cooperative officers, moreover, were able to secure a grant of P15,000 from the German Development Service (GDS) for partly financing three beach cottages as well as donations of P1,000-P2,000 per visit from visiting delegations, both from the government and non-government sectors.

At present, total assets include cash, store building, inventory of goods, and beach cottages (still unfinished). Net sales reached P59,170 in Year 1 and P74,946 in Year 2. The items sold by the cooperative include fishing supplies, grains, basic food items, and other assorted goods. Peak sales in the past 2.5 years coincided with barangay fiestas and elections.

Looking back, the project beneficiaries openly acknowledge the earlier efforts of CVRP-1. Though the cooperative had its own share of internal problems, it could not have achieved its present status without CVRP-1 intervention, according to the present Chairman of the cooperative. Based on the household survey in Zaragosa, the members perceive the benefits of belonging to the association as follows: 1) patronage refund (93%); 2) dividend and interest on capital (80%); 3) availment of low-priced products (13%); and 4) credit line availability (13%). Multiple responses were allowed. The survey shows that even non-members were aware of these benefits also. Only 18 percent of the non-members were unable to cite any benefit.

Use Rights and Management Efforts. As part of project implementation, project personnel explained use rights and restrictions to Zaragosa residents. The research findings reveal that, in the case of the fish sanctuary, respondents perceived that restrictions were imposed to

protect the breeding place and habitat of fishes (72%), improve fish productivity (19%), and allow the fish to grow big and healthy (6%). Only 6% of the survey respondents, all of whom are non-members, did not know the reason for the rules. In the case of artificial reefs (ARs), fishing access rights near the reefs are not applicable to Zaragosa since the ARs are found inside the protected sanctuary area where fishing is prohibited.

The reasons for creating mangrove stewardship contracts, as pointed out by the respondents, included the need to encourage the planters to maintain their mangrove trees (25%), to compensate the people involved (22%), and provide incentives to the planters (13%). Others cited the need to provide exclusive rights to the participants (9%), allow the mangroves to grow normally before they are harvested (9%), and avoid overlapping of claimants (3%).

Between members and non-members, only non-members gave a "don't know" response to the reasons behind the mangrove stewardship contracts (12%). Non-members, moreover, tended to view the rationale behind the contracts primarily in terms of compensating the people involved (29% for non-members versus 13% for members; $X^2=1.205$, $p>0.05$) rather than in terms of providing tenurial security (6% for non-members versus 20% for members; $X^2=1.452$, $p>0.05$).

In the case of the rules governing the creation and operation of the cooperative, Zaragosa respondents viewed the rules largely in terms of encouraging other people to join the organization (37%), followed by providing incentives to the members (19%) and encouraging the members to get involved in the activities of the cooperative (12%). Only the non-members indicated a "don't know" response of 29 percent.

Overall, it may be noted that all members have an understanding of the rules governing use rights and management efforts. In the context of the bigger community, the majority appear to have a fairly good grasp of said rules, particularly on the sanctuary and the mangrove stewardship contracts, as reflected by the low percentage of don't know responses. The findings also suggest that both members and non-members share the concept of rewarding those who are responsible for the improvements, as in the case of mangrove rehabilitation, and protecting the sanctuary as a fish habitat. This understanding of use rights and management efforts is crucial to safeguarding coastal resources and reinforcing the concern for sustaining CVRP-1 initiatives.

Perceived Impacts on the Coastal Ecosystem

Method. To determine perceived impacts on the coastal ecosystem, the respondents were asked to provide comparative evaluations of a number of aspects of this ecosystem for the pre-project and present time periods. A self-anchoring, ladder-like diagram with 15 steps was used, where step 1 represents the worst possible situation and step 15 the best possible situation. The respondent was asked to indicate the step which best describes the situation for 10 impact indicators, namely: 1) overall well-being of the household; 2) overall well-being of the resource; 3) income; 4) access to resources; 5) control over resources; 6) ability to

participate in community affairs; 7) ability to influence community affairs; 8) community conflict management; 9) community compliance with resource management; and 10) amount of traditionally harvested resource in the water.

Analysis. As an initial step in analyzing the results, a paired comparison t-test was computed to test if differences between means are statistically significant for the pre-project and present periods. Table 25 shows a significant increase for the total sample in the perceived levels of all indicators at a confidence level of one percent except harvest and access. Access is perceived as lower today than before the project. This reflects the lack of access to the protected fish sanctuary area of 9.5 hectares. The difference is statistically significant at 5 percent (t-value = -2.47).

Table 25. Perceived pre-project to post-project changes in indicators.

	MEMBER				NON-MEMBER				ALL			
	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p
Access	7.53	11.07	-3.54	<.05	9.24	10.76	-1.52	>.10	8.70	10.90	-2.20	<.05
Compliance	10.87	5.47	5.40	<.01	10.06	5.06	5.00	<.01	10.40	5.25	5.15	<.01
Conflict	9.53	6.87	2.66	<.05	9.35	6.94	2.41	<.05	9.40	6.10	3.30	<.01
Control	10.80	3.87	6.93	<.01	8.12	5.47	2.65	<.05	9.38	4.72	4.68	<.01
Harvest	7.27	6.47	0.80	>.10	8.29	7.88	0.41	>.10	7.81	7.22	0.59	>.10
Household	9.07	5.27	3.80	<.01	7.47	5.94	1.53	<.10	8.22	5.60	2.63	<.01
Income	8.53	6.20	2.33	<.01	6.94	5.76	1.18	<.10	7.69	5.97	1.72	<.01
Influence	9.67	5.07	4.60	<.01	8.65	5.47	3.18	<.01	9.10	5.28	3.80	<.01
Participate	11.67	6.20	5.46	<.01	9.35	6.82	2.53	<.01	10.40	6.50	3.90	<.01
Resource	8.73	6.07	2.67	<.01	7.29	5.41	1.88	<.01	7.97	5.70	2.27	<.01
N=32												

The second step in the analysis was to validate if association members differed significantly from non-members on perceived changes in the indicators. Table 26 indicates that members tended to experience greater gains in most impact indicators than non-members, except resource access. The only statistically significant difference between the two groups lies in control over resources ($p < 0.05$).

Table 26. Differences between members and non-members with respect to perceived changes.

	T2-T1 Member	T2-T1 Non-member	t-value	p
Access	-3.5	-1.5	-0.94	0.354
Compliance	5.4	5.0	0.25	0.801
Conflict	2.7	2.4	0.17	0.866
Control	6.9	2.7	2.60	0.014
Harvest	0.8	0.4	0.20	0.846
Household	3.8	1.5	1.91	0.065
Income	2.3	1.2	1.21	0.238
Influence	4.6	3.2	0.90	0.379
Participate	5.5	2.5	1.76	0.089
Resource	2.7	1.9	0.87	0.390
N	15	17		

The third step in the analysis was to examine the relationships between perceived changes in the indicators and other individual and household level variables. The results in Table 27 show that perceived changes in participation are positively correlated with educational attainment. The higher the educational attainment, the greater is the perceived increase in participation. Perceived changes in resource access and control over resources, however, are negatively correlated with household size. Lastly, the perceived change in the overall well-being of the resource is positively linked to taxonomic knowledge. Taxonomic knowledge is a measure that is based on the number of types of locally important fishes that the respondent could name.

Table 27. Correlations between indicators and selected household/individual level variables.

	Age	Educ.	House Member	Resid.	Eco-Know.	Taxa. Know.
Access	-.17	.17	-.30*	-.25	-.14	.01
Compliance	-.07	-.05	.11	.00	-.15	-.05
Conflict	.00	.12	.21	.06	-.04	-.16
Control	-.24	.24	-.31*	-.16	.29	.21
Harvest	-.09	.01	-.26	-.11	.13	-.15
Household	.07	.17	-.20	.13	.21	-.16
Income	.18	.16	.01	.23	.18	-.01
Influence	.01	.23	.18	.10	-.10	-.12
Participate	-.02	.33*	-.16	.03	-.18	.06
Resource	.17	.17	-.17	.19	.28	.30*

N=32 *=p<.10

The relationships between occupation and economic variables and perceived changes in the indicators are presented in Table 28. These variables include important economic indicators such as boat ownership, income sources (e.g., non-fishing income, outside income or remittances from family members, and fishing as a primary income source) as well as occupation-related indicators (e.g., willingness to leave fishing and membership in a coastal user association). For households with an outside source of income, the findings show a positive correlation with the perceived overall well-being of the resource ($p<0.05$) and income ($p<0.10$). This implies that external remittances tend to lead to perceived increases in local income and contribute to a favorable perception of the marine resource.

Households which are dependent on fishing as a primary source of income perceive a smaller (or negative) increase in the well-being of the resource and income ($p<0.01$). The same fishing households perceive a smaller (or negative) change in control over resources, participation, influence, conflict management and compliance with resource management practices. Except for participation ($p<0.05$), these findings are statistically significant at 10 percent.

Table 28. Correlations between indicators and selected occupational and economic level variables.

	Nonfish Income	Outside Income	Fish Primary	Leave Fishing	Member
Access	-.01	.08	.22	.12	-.17
Compliance	-.25	.05	-.32*	.21	.04
Conflict	-.07	.25	-.32*	.12	.03
Control	-.14	.01	-.30*	-.06	.43***
Harvest	.17	.28	-.16	.14	.04
Household	.29	-.01	-.26	-.07	.33*
Income	.11	.36*	-.46***	.15	.21
Influence	.07	.04	-.31*	.13	.16
Participate	-.10	.17	-.41**	.21	.31*
Resource	-.10	.40**	-.44***	.18	.16

N=32 ***=p<.01
**=p<.05 *=p<.10

Association members perceive an improvement in resource control ($p<0.01$), as well as in the overall well-being of the household and in the ability to participate in community affairs ($p<0.10$). This suggests that membership in the CVRP-nurtured association is linked to perceptions of gains in control over resources, and to a lesser extent, in the household's well-being and participation in community affairs.

The 10 indicators were subjected to a principal component analysis with varimax rotation. This analysis is a powerful tool for reducing the observed variables into fewer indicators that account for most of the variance in the data set. In interpreting the rotated factor pattern, an item was said to load on a given component if the factor loading was greater than or equal to 0.50 for that component.

Table 29 indicates that the three rotated components explain 58 percent of the variance in the set of indicators. Component 1 consists of influence, compliance with resource management practices, participation in community affairs, conflict management, well-being of the resource, income and well-being of the household. Component 2 consists of the amount harvest and control over resources.

Table 29. Principal component analysis of impact indicators.

	Component	
	One	**Two**
Influence	.91**	-.09
Compliance	.81**	.02
Participate	.76**	.11
Conflict	.76**	-.14
Resource	.67**	.48
Income	.62**	.49
Household	.62**	.26
Harvest	-.12	.83**
Control	.45	.59**
Access	-.01	.40
Variance	43%	15%

Factor scores were created for each component. To determine the set of independent variables that explained most of the variance in each component, step-wise multiple regression was used. The procedure adopted was similar to that of Calagcalag. The criterion for entry in the regression equation was alpha <0.05.

For Impact Component 1, the coefficient of determination (R^2 = 0.135) indicates that approximately 14 percent of the variance in the impact component is explained by fishing as a primary income source. However, it has a negative influence on the impact component (Table 30). The multiple regression equation is statistically significant ($p < 0.05$).

For Impact Component 2, the explanatory variable is household size, which accounted for 20 percent of the variance in the impact component (R^2 = 0.198). The multiple regression equation for Impact Component 2 is statistically significant ($p < 0.01$).

Table 30. Regression analyses of impact components.

Dependent Variable: Impact Component One

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Fishing income primary	-0.405	-2.38	0.024

$R = 0.405$; $R^2 = 0.164$; Adjusted $R^2 = 0.135$
$N = 32$; $F = 5.676$; $p = 0.024$

Dependent Variable: Impact Component Two

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Household size	-0.474	-2.90	0.007

$R = 0.474$; $R^2 = 0.224$; Adjusted $R^2 = 0.198$
$N = 32$; $F = 8.393$; $p = 0.007$

Discussion

The experience of the Central Visayas Regional Project I (CVRP-1) in Zaragosa may be considered a success from the perspective of fisher households interviewed, as reflected in statistically significant perceptions of improvements in 8 out of 10 impact indicators over time (e.g., before the project and at present). These include perceptions of positive changes in the overall well-being of the resource, overall well-being of the household, local income, control over resources, participation in community affairs, influence over community affairs, community conflict, and community compliance with resource management. Though perceptions of the amount of the harvest also increased, the amount of perceived change was not statistically significant. Only one impact indicator, resource access, was perceived to have declined due to the presence of the protected 9.5-hectare fish sanctuary where fishing is not allowed.

A comparison of the members and non-members of the beneficiary association showed that a perceived improvement in resource control was a distinctive and significant difference between the two groups. This finding is encouraging since resource control is at the core of empowering project beneficiaries for coastal resource management. The perception of resource control is important in initiating and sustaining action to arrest further resource degradation. A perception of helplessness, in contrast, is unlikely to compel positive action on resource management.

Notwithstanding the short-lived nature of CVRP-1 interventions (except the fish sanctuary and mangrove reforestation), project beneficiaries perceived positive changes in both material and non-material aspects. The participatory and interactive approach of the project, hand in hand with its capability-building activities, helped provide a springboard for other initiatives. The beneficiary association, which evolved into a cooperative in 1993 and now known as the Zaragosa-Badian Multi-Purpose Cooperative, has diversified its activities. At present, the association still maintains the mangrove area and the fish sanctuary but it also manages a community store that caters to the basic needs and fishing supplies of the barangay residents. It also plans to go into tourism-related activities such as renting out cottages, which are now being constructed along the beach, to tourists and other visitors. The cooperative has not only expanded its membership from 70 to more than 100 members but has also built up its capital after the completion of the project. From a starting capital of P6,000 in 1993, it increased its total assets to almost P200,000 in early 1996 through sound management and generation of internal and external funds.

Cultural values associated with environmental management and collective efforts were high, primarily in terms of joint efforts between the fishers and government in solving fishery problems (97%). The survey respondents, however, tended to be less confident on collaborative efforts at the level of fishers in fighting illegal fishing (50%) and at the level of the people in the community in solving community problems (37%). These may be partly attributed to the limited financial resources of the households in the poor barangay of Zaragosa and to the perceived need for government intervention in fighting illegal fishing and enforcing fishery-related legislation.

In the context of the relationship between individual or household variables and perceived changes in impact indicators, educational attainment is positively correlated with perceived increases in participation. In Zaragosa, the average length of education is 7 years, equivalent to first year high school. Based on the household survey results, Zaragosa residents who have a relative higher education perceived a higher participation in community affairs.

The finding that taxonomic knowledge is associated with perceived gains in the well-being of the resource suggests that those with more knowledge about the resource have different perceptions of changes than those with less knowledge. Perhaps those with wider knowledge, as indicated by greater taxonomic knowledge, evaluate a broader range of attributes of the coastal environment and are less likely to generalize changes in abundance of one or two species to the entire ecosystem.

Outside income or remittances from family members working outside the barangay is another variable positively related to perceived improvements in the marine resource. In contrast, those who depend on fishing as a primary income source have less positive perceptions of changes in condition of the resource. Perhaps those with supplementary income are less influenced by the short-term drops in production which characterize a capture fishery. This factor may also explain the negative correlation between fishing as a primary source of income and amount of perceived improvements in income. The supplementary income

decreases the impacts of brief economic downturns because there are other sources of income to turn to in times of need. This provides one with the luxury to evaluate long term, overall trends in resource well-being, rather than reacting negatively to a short-term loss of income from the fishery. Fishing as a primary source of income is also negatively related to the amount of perceived improvements in control over the resource, participation and influence in community affairs, community conflict, and compliance with resource management regulations. In this community, it seems that primary dependence on fishing, with its unpredictable variations in income, which have been intensified by the status of the resource, tends to make fisher households more critical of improvements which are seen in a more positive light by those with primary income from more predictable sources.

The negative relationship between household size and amount of perceived improvement in access to the resources and control over resources are probably related. Members of larger households need more resources, hence decreases in availability, such as those associated with creation of a sanctuary, would probably be viewed as more threatening than they would be by households using fewer resources. Creation of the sanctuary, despite their reservations, would also result in perceptions of loss of control over resources. This is probably more salient in Zaragosa where rapid population growth has occurred in the past 10 years with an average growth rate of 5.1 percent per year. This is more than double the 2.4 percent annual growth rate experienced in the previous decade.

Membership in the beneficiary association was positively related to perceptions of amount of increase in participation in community affairs, resource control and well-being of the household. This finding attests to the ability of the CVRP to influence the members' perception of positive changes within the household as well as outside the household. The social and technical preparation of the project beneficiaries paid off, laying the foundation for greater involvement of members in community affairs and generating perceived improvements in resource control and household well-being even after project completion. The CVRP-1 experience in Zaragosa highlights the need to carefully look into the process and strategies associated with community organizing and capability-building. The process may have been painstaking but the rewards lasted beyond the life of the project. Sustaining certain project initiatives and venturing into other meaningful activities in the community is a hallmark of the project experience in this case.

The fishers of Zaragosa have expressed satisfaction with their chosen occupation. Even if an alternative job with an equal income were available, they have indicated that they would not switch from fishing. Thus, projects on coastal resource management will have to build on the existing occupation structure through the introduction of complementary activities and environment-friendly technologies. Requiring the fishers to completely give up fishing will likely be an uphill battle. A major challenge to present and future development efforts lies in the joint formulation and implementation of a workable fishery management plan that offers a range of options to the fishers and provides various support services, including much-needed marketing assistance.

Looking back to the experience of CVRP-1 in Zaragosa, several important elements can be drawn out of the project process which contributed to achievement of project objectives and project sustainability. These include the following: 1) participation of the beneficiaries at the outset of project implementation; 2) continuous beneficiary participation during project life; 3) presence of a core group trained for leadership in resource management; 4) training/capability-building; 5) inter-agency coordination; 6) project adaptability/flexibility; and 7) communication of defined project objectives. Though the project did not deploy a full-time, resident community organizer (CO) in Zaragosa, the CO spent long hours in the site, usually until evening, and was driven by a commitment to bring about concrete changes/achievements in the community.

The Zaragosa experience met 6 out of 9 preconditions for co-management, namely: 1) existence of use rights and shared understanding in the community of the rules governing use rights and management efforts; 2) appropriateness of the rules to local conditions; 3) provisions for user participation in rule making, monitoring and enforcement, particularly in the case of the fish sanctuary, mangrove reforestation and cooperative management; 4) access to local conflict resolution mechanisms; 5) degree of multiplicity of the functions of the user organization; and 6) socio-economic and cultural homogeneity. The three preconditions which were not met are distinct boundary delineation, nesting of user organization and regional scope of membership (e.g., organizational scale). At present, the Zaragosa-Badian Multi-Purpose Cooperative is basically a village-based organization which has no national and regional affiliation/federation. Its membership and scope of operations are confined to the island barangay of Zaragosa.

As a showcase of CVRP-1, the Zaragosa experience offers meaningful insights that could guide expansion of coastal resource management projects in the Philippines. Though not all project interventions were sustained, new, internally-driven initiatives emerged after project completion through the CVRP-nurtured beneficiary association. The experiential learning provided by the project opened a range of possibilities for taking positive steps to address resource management on a collective front. In the process, it prepared the beneficiaries for assuming bigger responsibilities in the future and more importantly, for directing their own development.

3.2.1.4 Malhiao, Badian, Cebu

Site Description

Malhiao is a coastal barangay on the southwestern portion of Cebu Province. It forms part of the municipality of Badian. Approximately 97 kilometers from Cebu City, Malhiao is a 3-hour bus ride on a paved road network to Badian.

The barangay of Malhiao is located 2 kms away from the Badian Poblacion. It is bounded by barangay Manduyong on the north, Badian Poblacion on the south, barangay Sohoton on the east, and Badian Bay on the west. Standing on the edges of Malhiao's 2-km shoreline are 10-year old mangrove trees established by the CVRP-1 in the mid-1980s and young mangrove seedlings planted with the assistance of the fairly recent Coastal Environment Program (CEP). Unlike Zaragosa, the proximity of the mangrove area to the residential houses is not as pronounced.

The beach is very muddy and slippery, with designated areas for passage and landing. A stair-like stone structure on the coast of Malhiao marks the main passage of passengers alighting from small boats. The almost 1-km dirt road from the coastal area leads to the paved highway of the barangay that links Malhiao to other parts of Cebu Province.

The coastal scenery is representative of most coastal sites, where boats are normally anchored on the beach. Fishers whose houses are quite far from the coastline usually carry their boats on their shoulders before and after a fishing trip. During low tide, women and children may be seen gleaning sea urchins, shellfish and other marine products for home consumption.

The 466-hectare barangay of Malhiao has a flat to gently rolling topography (70%). The coastal plains comprise 21 percent of the total land area while the rest (9%) consists of rolling to steep terrain. For most residents, subsistence is dependent on farming, fishing and raising livestock. Nipa, bananas and upland crops thrive in the barangay.

The fishing grounds, which teemed with demersal species in earlier decades, now yield small pelagic species. Blast fishing and rampant illegal fishing in earlier decades led to the increasing deterioration of marine habitats.

Site Project Variables

Malhiao represents a less successful beneficiary community in Badian, Cebu. Except for the mangrove area, the community has not sustained the artificial reefs and the cage culture. Moreover, the members of the Malhiao Fishermen's Association have not met since the completion of the CVRP-1 in 1992.

Malhiao was one of the earlier pilot sites of the CVRP-1 in Cebu. Thus, project activities began as early as July 1984. Full-time personnel were deployed in the barangay in the first

year of project implementation. Unlike Zaragosa, the main implementing strategy adopted in Malhiao at that time was the simultaneous pursuit of social preparation and technical interventions. This was prompted by the need on the part of the project staff to report physical accomplishments vis-a-vis project targets. As a result of the project experience, the field personnel later realized that more time should have been devoted to enhancing the social readiness of the community for collective efforts. This learning guided project implementation in the expansion site of Zaragosa two years later.

When the CVRP-1 began in Malhiao, project personnel had to deal with indifferent and unreceptive residents who were more preoccupied with farming than with fishing. Gaining the interest of Malhiao residents and breaking new ground on community-based coastal resource management did not come easily for the CVRP-1.

To counteract the apathy of Malhiao residents, the full-time project personnel touched base with barangay officials, conducted house-to-house visits, and developed friendly relationships with the residents. In September 1984, super typhoon Nitang wrought extensive damage to crops and property. The field personnel of CVRP-1 took advantage of the situation by helping the residents repair their houses and gather shellfish for food. The experience, which marked the beginning of a closer tie with barangay residents, helped reduce the community's indifference to the project to a certain extent.

Seminars and technical capability-building efforts were pursued to capacitate the project beneficiaries for new technologies and new practices, e.g., artificial reef construction and installation, mangrove reforestation, fish cage management, leadership training, and other related areas. A core group was established in the barangay whose members were drawn from the Malhiao Fishermen's Association. Those who were more dependent on fishing were given priority as core group members.

A survey of 32 households in Malhiao indicated that 38 percent of the respondents attended CVRP-sponsored training activities, but attendance was limited to the members of the Malhiao Fishermen's Association (Table 31). Non-members claimed that they did not participate in any CVRP-1 training. For most members (86%), the training sessions attended were related to mangrove reforestation, human resource development, and artificial reef construction and installation. Only 71 percent of the members, however, completed the training.

Table 31. Community participation in CBCRMP implementation.

	% Member	% Non-Member	% Total	X^2	p
Attend CBCRMP Meetings	79	0	34	21.55	0.000
Attend CBCRMP Trainings	86	0	38	24.68	0.000
Knowledge of Objectives	100	67	81	5.74	0.166
Influence Planning	86	72	78	0.84	0.360
Influence Project Changes	86	72	78	0.84	0.360

For the members, project implementation was participatory. The Malhiao beneficiaries felt that they were able to influence the project in terms of planning (86%) and initiating project changes after the project began (86%). Some non-members, who never attended the meetings and the training activities, also claimed that they were able to influence the project. This could be explained by informal venues for interaction in the barangay such as conversations and dialogues.

Attendance at meetings where CVRP-1 objectives were discussed was likewise confined to association members (Table 31). A review of the knowledge of project objectives, however, reveals that even non-members were aware of what CVRP-1 intended to achieve. Only 33 percent of non-members were not familiar with project objectives. This finding could be probably linked to verbal information exchanges between members and non-members in a small barangay where people generally know each other. The project objectives were expressed in terms of improving coastal resources and community welfare, rehabilitating degraded resources, and educating the people on coastal rehabilitation strategies.

Project interventions in Malhiao included mangrove reforestation and management (36 hectares with less than 50 percent survival rate), bamboo artificial reefs (20 clusters), and a cage culture for grow-out of grouper and snapper (4 x 4 m). Forty-seven (47) certificates of stewardship contract (CSCs) were issued by the DENR to the mangrove planters.

According to key informants, CVRP-1 implementation was participatory. The technologies, moreover, were flexible and easy to learn. A family-based approach marked the construction and installation of artificial reefs, basically involving the members of the Arances family on a voluntary, no-compensation arrangement.

Context Variables

Supra-community Context

Enabling Legislation. During the implementation of the CVRP-1 in Badian, Cebu, PD 704 governed fisheries management in the project site of Malhiao. The researchers were unable to find a Municipal Fisheries Code which resembled that of Ayungon, Negros Oriental.

Supra-community Institutions. Several external institutions have influenced coastal resource management (CRM) in Malhiao. CRM-related service delivery, however, was more limited before CVRP-1 than after project completion. The only CRM-related activity before CVRP-1 was a meeting on coastal protection held by the Bureau of Fisheries and Aquatic Resources (BFAR). However, no tangible interventions followed. Other government agencies extended assistance to the barangay such as the Provincial Office of the Department of Agriculture (DA), the Bureau of Forest Development (BFD) in Argao, and the Department of Agrarian Reform. Their services focused on lowland agriculture and livestock dispersal, upland development, and land distribution, respectively, rather than on coastal resource management.

During the implementation of the CVRP-1, the Department of Environment and Natural Resources (DENR), through its Community Environment and Natural Resources Office (CENRO) in Argao, extended technical services on mangrove reforestation. The Provincial Government of Cebu also entered the area to mobilize residents for the *Bantay Dagat* Program, which aimed to reduce illegal fishing. The DA continued its animal dispersal and animal vaccination programs while the Philippine Coconut Authority (PCA) provided fertilizer to coconut farmers.

After the completion of the CVRP-1, more institutions were engaged in service delivery. The DA Provincial Office introduced a new fish cage aquacultural project in Malhiao and reorganized the existing local organizations under the umbrella of the Fishermen's and Farmers' Association, aside from continuing its cattle dispersal program. The DENR-CENRO in Argao sustained the mangrove rehabilitation effort in the area through its new Coastal Environment Program (CEP) and held lectures on sea grasses. The Provincial Office of the Department of Social Welfare and Community Development (DSWD) offered small loans of P500-P1,000 per household for fish trading and P3,000-P7,000 for *sari-sari* store operations while the Municipal Government of Badian initiated a water system project. The PCA, on the other hand, continued its fertilizer assistance to coconut farmers.

Supra-community Markets. Fresh fish caught in Malhiao is brought by traders to the town proper and to the neighboring municipalities of Dumanjug, Moalboal, Alcantara, Ronda, Ginatilan, Alegria, Barili, Malabuyoc and Carcar. The bulk (95 %) is sold outside Badian while the balance of 5 percent is traded at the Badian Public Market in the town proper. Very little trading takes place within the barangay. In addition to fresh fish, Malhiao sells a popular product called *guinamos* (fish paste) to Dumanjug, Cebu City and the province of Negros Oriental. Over the past 10 years, the fish distribution system has remained unchanged.

There is a visible uptrend in the number of fish traders in Malhiao which has more than tripled from 3 traders in 1985 to 10 traders in 1995. Key informants have reported an increase in demand for fish and fish products, largely due to a growing population and increases in the prices of substitute protein products. The retail prices of marine products also increased remarkably over the past 10 years, ranging from 50 percent for squid to at least 400 percent for anchovy (*bolinao*). *Danggit* (rabbit fish) and *tamarong* (round scad) posted mid-range price increases of 100 to 300 percent.

Supra-community Shocks to the System. Super typhoon Nitang severely damaged crops and property in 1984. After six years, it was followed by Ruping, another howler which caused extensive damage in Cebu. No new technologies, other than those introduced by the CVRP-1 (e.g., artificial reefs and cage culture), have been used in the area since the project started.

Community Context

Perception of Trends in the Resource. A survey of 32 households in Malhiao indicated that, at the time of project implementation, the resource was in a good condition (72%). Only a minority perceived the situation as bad (16%). The rest did not feel any change (12%).

Comparing the condition of the resource today to the situation 10 years ago, more than half of the respondents expressed that the resource is worse off today (53%). Only 3 percent felt that the situation remained unchanged. The rest (44%) said that the resource was better off. Between association members and non-members, more members were inclined to think that the resource is worse off today (57% versus 42%) but the difference is not statistically significant ($X^2 = 0.508$, $p > 0.05$). Further details on the underlying reasons are discussed in the section on individual and household data.

Target Species Composition and Distribution. Interviews with key informants representative of the major fishing gear types indicated that the following types of fish are considered most important in terms of income:

1. *bolinao* (anchovy)
2. *danggit* (rabbit fish)
3. *andohao* (round scad)
4. *balansicol* (runner fish)

In terms of consumption, *danggit*, *bolinao* and *katambak* (Emperor bream) are the most important. Fishers observed that their fish catch declined by 40-50 percent since 1984, largely due to the existence of many fishers and the use of gill net with a small # 24 mesh size. Reef fishes are now rare.

Environmental Features Influencing Boundary Definition. The shoreline is marked by a muddy beach area and by a thick cluster of mangrove trees in the northern portion of the coast. A creek also runs between Malhiao and the Poblacion. Coastal water boundary delineation would be of medium difficulty due to the absence of distinctive natural features in the sea of Malhiao.

Technologies Used in Coastal Area. Fishing is generally done from outrigger boats with a size of 2 to 10 meters. All boats in Malhiao are unmotorized, powered only by a paddle. Overall, there are about 40 boats in the barangay.

Among the existing fishing technologies, spear fishing is the most frequently used (44%), followed by gill net (41%), and hook and line (38%). Multiple responses were allowed. Spear fishing (*pana*) involves the use at night of home-made spearguns with a metal bar spear at night, particularly during the first and last quarter of the moon. Spearfishers fish from unmmotorized boats with the aid of a lamp (petromax). For the nets, bottom set gill net (*palundag*) and top set gill net (*palutaw*) are common. The hook and line (*pasol*) is used for different types of fish in Malhiao. Fishers normally bring a set of hook and line with varying sizes and number of hooks during their fishing trips. Less common fishing gears in Malhiao include fish corrals (*bunsod*) and bag net (*basnig*).

Level of Community Development. The level of community development is based on a checklist of items given below. The facilities which are in place are marked by bold print while those which are absent are presented in normal print.

1. Hospital
2. **Medical Clinic**
3. Resident Doctor
4. Resident Dentist
5. Secondary School
6. **Primary School**
7. **Public Water Supply Piped to Homes**
8. Sewage Pipes or Canal
9. Sewage Treatment Facility
10. **Septic or Settling Tanks**
11. **Electric Service**
12. Telephone Service
13. **Food Market (Sari-Sari Stores)**
14. Drug Store
15. Hotel or Inn
16. Restaurant
17. Gas Station
18. **Public Transportation**
19. **Hard Top Road Access**
20. Banking Service
21. **Television Reception**
22. **Radio Reception**

Degree of Integration into National Economy and Political System. Malhiao traders bring their fish and fish products by bus or jeepneys to the Badian town proper and nine neighboring towns in Cebu. Fish paste (or *guinamos*) is transported to Negros Oriental by boat. Regular trips through public transportation facilities provide good market links to other areas, both within and outside Cebu.

Communication links are poor since Malhiao has no telephone. The nearest telephone facility is in the Badian town proper, approximately 2 kms away from the barangay. Political links

may also be regarded as low due to the reported absence of visits from the Governor or Mayor. Overall, the degree of integration of Malhiao into the economic and political system may be classified as low to medium.

Tradition of Cooperation and Collective Action. The oldest organization in Malhiao is the Malhiao Fishermen's Association, which existed for approximately seven years but became inactive after the completion of the CVRP-1. Other organizations are fairly recent, ranging from one to three years of existence. The *Alayon* organized by the Coastal Resources Management Office (CRMO), for instance, was established in 1993 to carry out tree planting and sloping agricultural land technology (SALT). Another young organization is the Farmers' and Fishermen's Association organized by the Department of Agriculture more than a year ago for projects involving a cage culture and a fish corral. More recently, DENR organized the *Malhiao Pundok Mauswagon* (MAPUMA) for planting mangrove and gmelina (fast-growing reforestation species) in the barangay.

Occupation Structure and Dependence on Coastal Resources. Farming is the most dominant occupation in Malhiao. According to key informants, farmers comprise 50 percent of the households. The only coastal-dependent occupation in Malhiao is fishing, upon which 25 percent of the households depend for their subsistence. Other occupations include tricycle driving, blacksmithing, *sari-sari* store operations and employment in government offices (Table 32).

Table 32. Distribution of major occupations.

Occupation	Percent
Farmers	50
Fishers	25
Blacksmiths	5
Tricycle drivers	5
Government employees	3
Others (carpenters, laborers, owners of *sari-sari* stores, shops, etc.)	12

Degree of Socio-Economic and Cultural Homogeneity. The residents of Malhiao are fairly heterogeneous in terms of occupation. Eighty percent (80%) of the barangay residents were born in Malhiao of Cebuano parents. About 18 percent came from various places within Cebu Province such as Ginatilan, Cebu City, Dalaguit, Zaragosa, Barili and Bogo. A very small percentage (2%) traced their roots to Negros and Bohol. In terms of religion, Malhiao is predominantly Roman Catholic (95%). The rest are Protestants, Seventh Day Adventists, Jehovah's Witnesses and members of the Philippine Benevolent Missionary Association (PBMA).

Political Organization and Conflict Resolution. A Barangay Captain heads the Barangay Council, whose members consist of seven councilors, a secretary and a treasurer. Like Zaragosa, a local committee called the *Katarungang Pambarangay* is the primary

mechanism for resolving conflicts which are not settled amicably at the level of the barangay captain. A resource use conflict involving the hauling of sand from the lot of a CSC holder was resolved amicably at the barangay level. To date, only one case has been elevated to the Municipal Trial Court, e.g., illegal mangrove cutting on the lot of a CSC holder. Court hearings are still on-going.

Population and Population Changes. The population of Malhiao grew from 1,602 persons in 1975 to 1,703 after one decade, and then to 2,474 persons in 1993, representing an annual average growth rate of 3% over 18 years. Annual population growth tended to be more rapid during the 1985-1993 period (5.7%) than in the preceding decade (0.6%). In terms of the age structure, the population is relatively young. The 0-21 age group constitutes the majority (55%), followed by the 22-60 age group (41%) and the 61 and older age group (4%).

Coastal Resource Use Rights, Formal and Informal. Informal use rights are non-existent in Malhiao. Use rights are governed by national and municipal legislation as well as by mangrove stewardship agreements. The national legislation, P.D. 704, restricts certain practices, including the capture of mother milkfish, sea turtles, and immature fish and regulates the use of chemicals in fishing. At the local level, formal use rights and rules are guided by municipal ordinances enacted by the Office of the *Sangguniang Bayan*. These ordinances, which were discussed in the Zaragosa case, also apply to Malhiao.

Women. The women of Malhiao are actively engaged in both coastal- and non-coastal dependent activities. Based on a survey of 32 households, 97 percent of the women are engaged in coastal-related activities. These include fish vending (80%), gleaning shellfish and other marine products (30%), fish paste production (13%), and to a lesser extent, fish drying and fishing. Multiple responses were allowed, accounting for a total of more than 100 percent when the responses are added up. Longer hours are devoted to fish drying (5 hrs) and fish vending (4 hrs) than to fishing (3 hrs) and gleaning (2 hrs). Except for gleaning shellfish for home consumption, these coastal-dependent activities augment household income by approximately P1,060 per month.

Non-coastal dependent activities undertaken by 70 percent of the female respondents essentially consist of raising livestock and poultry (50%) and farming (20%). Minor activities involve mat weaving, gardening and laundry services. These non-coastal dependent activities supplement household income by around P768 per season or per harvest. On the average, one head of livestock (e.g., swine) is sold only once a year.

In terms of the participation of women in CVRP-1 activities, 21 percent of the women from member-households attended training sessions on mangrove reforestation and livestock raising. In contrast, the women from non-member households did not participate in any project activity (100%) at all. According to the female respondents from member-households, the benefits derived from participation are knowledge gains on enhancing livelihood and improving the environment. For the majority (79%) of the women who were unable to participate in CVRP-1 activities, the reasons were associated with the lack of

time/preoccupation with other activities (63%), dislike for the organization (20%), and membership of the husband in the association (3%).

Individual and Household Level Context

Characteristics of Sample Fisher Households. A random sample of 32 households were drawn from a population of households which are dependent on coastal resources. The sample comprised 14 members of the Malhiao Fishermen's Association and 18 non-members. Table 33 shows that both members and non-members are similar in terms of mean educational attainment, household size, and number of years in marine-related work. The main differences lie in the mean age ($p<0.01$) and length of residence in the barangay ($p<.0.10$). Members are generally older than non-members by 10 years (51 versus 41). They have also lived longer in Malhiao (42 years versus 32 years).

Table 33. Characteristics of sample.

Variable	Member	Non-Member	Total	t-value	p
Age	51.50	40.72	45.44	3.15	<.01
Education	5.79	6.06	5.94	-0.32	>.10
Years residing in the area	42.36	31.67	36.34	1.83	<.10
Household size	7.07	6.11	6.53	0.92	>.10
Years doing marine-related work	23.43	16.00	19.25	1.55	>.10
N	14	18	32		

Similar to other sites, relative income was evaluated based on assets -- house structure, furnishings, and ownership of productive equipment. Table 34 shows that more non-members have minimal to low house structures (66%) than members (57%). Minimal structures refer to houses made of temporary materials such as bamboo, nipa or cogon. The difference, however, is not statistically significant ($X^2 = 0.305$, $p > 0.05$). Similarly, there is no statistical difference between members and non-members in house furnishings ($X^2=0.794$, $p>0.05$), and in boat ownership ($X^2=2.575$, $p>0.05$).

Table 34. Percent distribution of assets.

	% Member	% Non-Member	% Total	X^2	p
House structure				0.305	0.581
Minimal	43	22	31		
Low	14	44	31		
Medium	21	22	22		
High	21	11	16		
House furnishings				0.794	0.373
Minimal	43	39	41		
Low	14	33	25		
Medium	36	28	31		
High	07	00	03		
Productive equipment				2.575	0.109
Boat ownership	100	83	91		
N	14	18	32		

Occupational Multiplicity and Dependence on Coastal Resources. The survey of 32 fishing households in Malhiao showed that 100 percent of the sample are engaged in fishing. In addition, the respondents are engaged in farming (44%), carpentry (28%), and livestock raising (12%). In the past, 22 percent of the respondents also pursued other jobs such as laborers, photographers, *tuba* (coconut sap) gatherers, carpenters and bakers but these were non-coastal dependent. The majority (78%) of the respondents were not previously engaged in other types of work.

In terms of income, 75 percent of all the respondents ranked fishing as the most important source, providing more than half of their household earnings. Secondary income is derived from non-coastal dependent sources such as farming, carpentry and livestock raising. In terms of remittances from relatives working outside the barangay, only the members received remittances (21%).

In terms of food, fishing also provides more than half of the food requirements for 78 percent of the households. Other food sources are income from carpentry (12%) and farming (6%). Between members and non-members, the dependence on fishing is almost the same. For secondary food sources, there is no difference between members and non-members (X^2=0.653, p>0.05).

Collective Action. Two indicators of collective action were examined as a part of the survey: association membership and attitudes towards cooperation (cultural values). It must be noted that the sample was stratified based on membership in the Malhiao Fishermen's Association (MFA) and that the population from which the sample was drawn included only those dependent on the nearshore fishery. At present, the survey results show that the members of the MFA also belong to a livelihood association (29%). By contrast, the non-members of the

MFA have a higher percentage of non-affiliation at present even in other community organizations. The mean number of current affiliations is lower for non-members than for members (0.06 versus 1.21). The difference between non-members and members in this regard is statistically significant at 1 percent (t-value = 5.94). The members of the MFA perceive that the purpose of their association is to address the welfare of the fishers, improve fishery resources, and rehabilitate the mangrove forest.

In terms of past membership in various organizations, the non-members of the MFA consistently demonstrated a propensity for non-affiliation. The mean number of associations that non-members joined in the past was lower than that of members (0.00 versus 0.29). In terms of the overall picture, approximately 9 percent of the respondents indicated previous membership in the MFA. Only a few households (3%) joined a livelihood association. For the individual who left the MFA, the inability to perform one's duties and the lack of understanding of the purpose and regulations of the association were the underlying reasons. For the individual who left the livelihood association, the inactivity of the association was the compelling reason.

To some extent, cultural attitudes toward collective action tend to favor a collaborative effort between the government and fishers in solving fishery problems (66%). Forty-one percent (41%) of the respondents feel that fishers can work together to fight illegal fishing. Only 28 percent believe that people in the community can cooperate in solving community problems. For each of these aspects, however, there is no statistically significant difference between the members and non-members.

In general, the respondents are apparently not too optimistic on depending on themselves only for collective activities, either as fishers or as community members. They feel that the government still needs to come in. This attitude may have been influenced by resource constraints on the part of the households in the community. According to key informants, the fishers have attempted to band together in the past for *Bantay Dagat* activities on a no-compensation arrangement. The lack of speedboats and firearms hampered their efforts in apprehending violators. Attendance in hearings also compelled them to pay for their transportation and other related expenses out of their limited earnings.

Job Satisfaction. Given the chance to live their lives over, 91 percent of the respondents would still choose to become fishers. The difference between members and non-members is not statistically significant (93% versus 89%; $X^2 = 0.146$, $p > 0.05$). Dependence on fishing for subsistence and the absence of a more suitable occupation emerged as the top reasons (22% each). Others cited familiarity with fishing (12%), income considerations (15%), and absence of a boss (9%) as motivating reasons for remaining as fishers. In addition, fishers no longer have to buy fish for consumption. For those who would not like to be fishers again, the reason is linked to lower fish catch and insufficient income in meeting household needs.

Given the same income in another occupation, most respondents (84%) still would not switch from fishing to another occupation. This is primarily due to the relative ease in making money (34%) as well as to the absence of a boss and the existence of free time (19%). Other main

considerations are linked to the free food that goes with fishing (12%), low capital requirements (9%), familiarity with fishing (6%), and opportunity to do other types of work in addition to fishing (9%). Overall, the fishers of Malhiao are apparently satisfied with their chosen occupation. Rewards from fishing are not only economic but also psychological.

Ecological Knowledge. Among the characteristics of the sea that have a positive influence on the status of the resource, the respondents cited the presence of seaweeds/sea grasses (72%), abundance of mangrove trees (69%), and the presence of corals (22%). Multiple responses were allowed, explaining why the total percentage adds up to more than 100 percent.

For the 53 percent of the respondents who perceived the coastal resource as worse off today than 10 years ago, the observation is attributed to the increasing number of fishers (16%), illegal fishing and use of poisonous substances (15%), destruction of coastal resources (12%), declining fish/crab catch (9%), and complacency of the people (3%). For those who perceived that the resource is better off today (44%), the key reasons included coral reef management and protection of coastal resources (12%), fish crab increases (9%), mangrove reforestation (9%), and rehabilitation/conservation efforts (3%).

In terms of the specific status of the resource now, association members tended to be less positive than non-members. More members than non-members viewed the resource as a little worse off today (42% versus 28%; $X^2 = 0.794$, $p > 0.05$). The implications of these variations will be discussed together with the project impacts.

Impact Variables

Material Aspects. To evaluate the present status of the project's intermediate objectives in terms of material interventions aimed at improving the resource base and building the capability of residents for coastal resource management, the research team used project reports, interviews with ex-project staff, interactions with Malhiao fishers, and direct observations.

Artificial Reefs. Twenty (20) clusters of bamboo artificial reefs were constructed and installed in Malhiao through the CVRP-1. The bamboo materials, however, were short-lived, lasting for less than a year only. Rotting of materials, strong waves and typhoons all contributed to the deterioration of the bamboo artificial reefs.

Fish Cage Culture. A fish cage measuring 4 x 4 meters was provided by the CVRP-1. Every six months, the fish cage yielded more than 50 kilos per harvest. The association even sold 25 kilos of fish at one time to the Badian Beach Resort, consisting primarily of *lapu-lapu*. Fish cage operations, however, lasted for almost two years only. Based on the account of the fishers, their enthusiasm waned in the end due to the limited supply of feed, loss of fish due to theft, and death of fish associated with the release of pesticide-laden water from the mainland to the sea. The project beneficiaries no longer attempted to revive the fish cage culture after the completion of the CVRP-1 due to financial constraints on their part.

Mangrove Reforestation. The residents of Malhiao planted 36 hectares to mangroves but the survival rate was less than 50 percent due to barnacle infestation and the presence of big waves. The continuing interest of barangay residents in mangrove rehabilitation, nonetheless, is manifested in new mangrove plantings along the shoreline under the Coastal Environment Program (CEP) of the Department of Environment and Natural Resources (DENR). The program is expected to rehabilitate nine hectares in Malhiao.

Institutional and Organizational Aspects. CVRP-1 implementation and sustainability hinged heavily on the establishment and strengthening of fishers' associations in project sites. Unlike Zaragosa, the Malhiao Fishermen's Association lapsed into inactivity after the CVRP-1 phased out. From 39 members at the start, only 1 member has remained active. Except for the mangrove area, which has been maintained by the planters themselves, all CVRP-1 interventions are gone by now. No replacements took place.

Based on the household survey in Malhiao, members perceive the benefits of belonging to the coastal resource association as follows: 1) increased income/fish catch (50%); 2) compensation and harvest privileges from mangrove reforestation (29%); and 3) know-how on new technologies (7%). Approximately 14 percent of members, however, did not see any benefits. Among the non-members, the survey shows that a fairly high percentage (44%) did not know the benefits. For the rest who were familiar with the benefits, the responses were associated with increased fish catch/income (22%), service to the community (17%), access/exclusive rights to the use of fish cage and artificial reefs (11%), and knowledge of new technologies (6%).

Use Rights and Management Efforts. As part of project implementation, an understanding of use rights is essential in motivating and sustaining beneficiary participation. The research findings indicate that, in the case of the artificial reefs (ARs) and fish aggregating devices (FADs), the respondents viewed the reasons for the access rights primarily in terms of monitoring the status of the fish and the interventions (31%) and lengthening the life of the ARs/FADs (28%), rather than in terms of protecting the small fish (9%) and giving exclusive rights to members (6%). Some respondents, including association members themselves, did not know the reasons for the use rights (22%). Comparing the members and non-members, though, the members gave a slightly lower percentage of "don't know" answers (14% versus 28%; $X^2=0.839$; $p>0.05$).

For the mangrove stewardship contracts, the key reasons behind the contracts included the need to encourage the planters to maintain their mangrove trees (34%), to compensate the people involved (16%), give incentives to the planters (6%), and provide security of tenure (6%). Others cited the need to provide exclusive rights to the participants (6%) and avoid overlapping of claimants (3%).

Between the members and non-members, it appears that some members are not knowledgeable on the rationale for the stewardship contracts. The percentage, however, is slightly lower than that of non-members (21% versus 39%; $X^2=1.118$, $p>0.05$).

The "don't know" responses of some members may be partly explained by non-attendance in certain important meetings and lack of actual involvement in the technology-related interventions. Underlying these is their preoccupation with basic survival needs. Like typical residents in Malhiao, most members are largely subsistence farmers and fishermen whose priority is to earn a living to support their families.

Overall, it may be noted that the majority of the respondents have a fair grasp of the rules governing use rights and management efforts. The findings also suggest that though some members and non-members share the concept of rewarding those who are responsible for the improvements, more respondents related the use rights to maintenance and monitoring functions. The concept of exclusive rights did not surface as a prominent reason, probably because the translation of project-related efforts into actual fishing rights near the ARs did not occur. The short life span of the bamboo artificial reefs precluded the demonstration of these use rights.

In the context of the cage culture which lasted for less than two years, the concept of use rights broke down when non-members began stealing fish from the fish cage. It appears that the members were not fully equipped to guard the area and to collectively assert their rights to the fish cage.

Perceived Impacts on the Coastal Ecosystem

Method. To determine perceived impacts on the coastal ecosystem, respondents were requested to provide evaluations of a number of aspects of this ecosystem for pre-project and present periods. A self-anchoring, ladder-like diagram with 15 steps was used, where step 1 represents the worst possible situation and step 15 the best possible situation. The respondent was asked to indicate the step which best describes the situation for 10 impact indicators, namely: 1) overall well-being of the household; 2) overall well-being of the resource; 3) income; 4) access to resources; 5) control over resources; 6) ability to participate in community affairs; 7) ability to influence community affairs; 8) community conflict management; 9) community compliance with resource management; and 10) amount of traditionally harvested resource in the water.

Analysis. As an initial step in analyzing the results, a paired comparison t-test was computed to test if differences between means are statistically significant for the pre-project and present periods. For the total sample, Table 35 shows a perceived improvement in all indicators, except resource access and resource control, which are regarded as lower today than before the project. For resource access, the difference between the two periods is significant at 1 percent, but not for resource control ($p>0.10$).

Table 35. Perceived pre-project to post-project changes in indicators.

	MEMBER				NON-MEMBER				ALL			
	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p
Access	4.29	8.29	-4.00	<.01	5.39	6.72	-1.33	>.10	4.9	7.4	-2.5	<.01
Compliance	5.76	5.29	0.47	>.10	6.22	5.06	1.16	<.05	6.0	5.2	0.8	<.05
Conflict	5.86	5.50	0.36	>.10	6.61	4.78	1.83	<.01	6.3	5.1	1.2	<.05
Control	5.07	6.71	-1.64	>.10	7.22	6.17	1.05	>.10	6.3	4.4	1.9	>.10
Harvest	5.29	5.00	0.29	>.10	7.06	5.72	1.34	<.05	6.3	5.4	0.9	<.01
Household	4.21	3.07	1.14	<.10	5.72	4.50	1.22	<.10	5.1	3.9	1.2	<.01
Income	4.57	4.36	0.21	>.10	6.67	4.89	1.78	<.05	5.8	4.7	1.1	<.05
Influence	6.07	6.00	0.07	>.10	6.67	4.89	1.78	<.01	6.4	5.4	1.0	<.05
Participate	6.71	6.64	0.07	>.10	8.06	6.33	1.73	<.01	7.5	6.5	1.0	<.05
Resource	5.50	6.29	-0.79	>.10	5.89	5.17	0.72	>.10	5.7	5.7	0.0	>.10
N=32												

The second step in the analysis was to determine if association members differed significantly from non-members on perceived changes in the indicators. Table 36 indicates that non-members tended to perceive larger increases than members in all indicators, except resource access. However, the only statistically significant difference between the two groups is resource access ($p < 0.05$). More members perceived a much lower resource access today than before the project.

Table 36. Differences between members and non-members with respect to perceived changes.

	T2-T1 Member	T2-T1 Non-member	t-value	p
Access	-4.0	-1.3	-2.08	0.046
Compliance	0.5	1.2	-0.83	0.412
Conflict	0.4	1.8	-1.66	0.106
Control	-1.6	1.1	-1.17	0.086
Harvest	0.3	1.3	-1.77	0.087
Household	1.1	1.2	-0.09	0.929
Income	0.2	1.8	-1.68	0.102
Influence	0.1	1.8	-1.87	0.078
Participate	0.1	1.7	-1.82	0.087
Resource	-0.8	0.7	-1.57	0.127
N	14	18		

The third step in the analysis was to examine the relationships between perceived changes in the indicators and other individual and household level variables. The results in Table 37 show that perceived changes in resource control and access are negatively correlated with age. The younger the respondent, the lower are the perceived gains in resource access and

control. Other negative relationships emerged with respect to the following : 1) household size and perceived changes in the overall status of the resource, income, community conflict and amount of harvest and 2) length of residence in the barangay and perceived changes in resource control, amount of harvest, well-being of the resource, and community conflict. A positive correlation, by contrast, was observed between ecological knowledge and perceived changes in the well-being of the resource. Similarly, taxonomic knowledge is positively correlated with perceptions of compliance with resource management, amount of harvest, community conflict resolution, and to a lesser extent, perceptions of well-being of the resource, participation in community affairs and influence. Taxonomic knowledge is a measure that is based on the number of types of locally important fishes that the respondent could name.

Table 37. Correlations between indicators and selected household/individual level variables.

	Age	Educ.	House Member	Resid.	Eco-Know.	Taxa. Know.
Access	-.40**	-.02	.07	-.28	-.14	-.20
Compliance	.06	-.16	-.22	-.22	-.15	.43***
Conflict	.02	-.09	-.30*	-.33*	-.04	.39**
Control	-.49***	-.16	-.05	-.44***	.29	-.10
Harvest	-.23	-.07	-.32***	-.53***	-.07	.45***
Household	-.20	-.12	-.05	-.27	.08	.10
Income	-.28	-.14	-.32*	-.29	.18	.20
Influence	.02	-.05	-.17	-.25	-.10	.42*
Participate	-.03	-.06	-.21	-.25	-.18	.42*
Resource	-.06	.01	-.52***	-.30*	.31*	.29*

N=32 *=p<.10
**=p<.05 ***=p<.01

The relationships between occupation and economic variables and perceived changes in the indicators are presented in Table 38. These variables include important economic indicators such as boat ownership, income sources (e.g., non-fishing income, outside income or remittances from family members, and fishing as a primary income source) and occupation-related indicators (e.g., willingness to leave fishing and membership in a coastal user association). Households which receive remittances from outside tend to perceive smaller (or negative) changes in the overall well-being of the resource (p<0.01) and resource control (p<0.10). Households which are inclined to leave fishing perceive a lower level of resource control and resource access. Finally, members of the MFA tend to perceive smaller (or negative) changes in resource access, resource control, income, ability to participate in community affairs, influence, and amount of harvest.

Table 38. Correlations between indicators and selected occupational and economic level variables.

	Boat Owner	Nonfish Income	Outside Income	Fish Primary	Leave Fishing	Member
Access	-.10	.07	-.13	.04	-.34*	-.36**
Compliance	-.02	-.01	.07	.03	.18	-.15
Conflict	-.01	.03	-.02	.10	-.03	-.29
Control	-.13	-.26	-.31*	.40	-.50***	-.31*
Harvest	.10	-.29	-.10	.21	-.17	-.31*
Household	.11	-.13	-.11	-.07	-.25	-.02
Income	.05	-.05	-.21	.05	-.02	-.29*
Influence	.00	-.10	.04	.12	.06	-.34*
Participate	-.04	-.13	-.04	.24	-.07	-.34*
Resource	-.03	-.17	-.44***	.01	-.20	-.28

N=32 ***=p<.01
**=p<.05 *=p<.10

The 10 indicators were subjected to a principal component analysis with varimax rotation. This analysis is a powerful tool for reducing the observed variables into fewer indicators that account for most of the variance in the data set. In interpreting the rotated factor pattern, an item was said to load on a given component if the factor loading was equal to or greater than 0.50 for that component.

Table 39 indicates that the two rotated components explain 71 percent of the variance in the set of indicators. Component 1 includes conflict management, participation in community affairs, influence, compliance with resource management, and amount of harvest, implying a combination of behavioral and material variables. Component 2 consists of resource control, resource access, overall well-being of the household, overall well-being of the resource, and income.

Table 39. Principal component analysis of impact indicators.

	Component	
	One	Two
Conflict	.95**	.16
Participate	.91**	.15
Influence	.90**	.06
Compliance	.83**	-.24
Harvest	.83**	.35
Control	.03	.87**
Access	.04	.83**
Household	-.11	.80**
Resource	.42	.64**
Income	.35	.54**
Variance	46%	25%

Factor scores were created for each component. To determine the set of independent variables that explained most of the variance in each component, step-wise multiple regression was used. The procedure followed in the analysis is described in the section on Calagcalag. The criterion for entry into the regression equation was alpha <0.05)

For Impact Component 1, the coefficient of determination ($R^2 = 0.229$) indicates that about 23 percent of the variance in the impact component is explained by four variables which entered the regression equation -- household size, length of residence in the area, outside income, and membership in the beneficiary association. Among these independent variables, only outside income/remittances from other areas exerted a positive effect on the impact component (Table 40). The negative coefficient of membership in the beneficiary association affirms the lack of project success in Malhiao in terms of Impact Component 1. Likewise, household size and length of residence in the barangay have a negative effect on this impact component. The multiple regression equation is statistically significant ($p < 0.05$).

For Impact Component 2, only three independent variables entered the regression equation -- age, willingness to leave fishing, and length of involvement in marine-related work. Together, these three variables accounted for 35 percent of the variance in Impact Component 2 ($R^2 = 0.346$). Only the length of involvement in marine-related work, however, exhibited a positive influence on the impact component. Thus, a longer experience in marine-related work is likely to lead to perceptions of a greater change in the impact component, particularly in the perceived well-being of the household, well-being of the resource, income, resource access and resource control. The multiple regression equation is significant ($p < 0.01$).

Table 40. Regression analyses of impact components.

Dependent Variable: Impact Component One

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Household size	-0.488	-2.58	0.016
Years residing in the area	-0.338	-1.95	0.062
Outside income	0.464	2.24	0.034
Member	-0.283	-1.63	0.116

$R = 0.573$; $R^2 = 0.328$; Adjusted $R^2 = 0.229$
$N = 32$; $F = 3.301$; $p = 0.025$

Dependent Variable: Impact Component Two

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Age	-0.551	-0.34	0.002
Leave fishing	-0.449	-3.02	0.005
Years doing marine-related work	0.367	2.19	0.037

$R = 0.640$; $R^2 = 0.410$; Adjusted $R^2 = 0.346$
$N = 32$; $F = 6.474$; $p = 0.002$

Discussion

The Malhiao nearshore fisheries component of the CVRP-I was considered a relatively less successful case of a beneficiary community. Except for the mangrove reforestation area, all project interventions were not sustained. The members of the Malhiao Fishermen's Association, moreover, no longer met after project completion.

The impact evaluation indicates that, for the total sample, statistically significant increases were perceived for seven of the ten indicators. There were no significant differences with regard to control over the resource and status of the resource itself. A statistically significant negative change was perceived with respect to access to the resource. It is important to note that the largest positive changes were noted by those who were not members of the fishers' association. For the non-members, the decrease in access was not statistically significant, but the positive changes perceived in all other indicators except control over and status of the resource were statistically significant. In contrast, association members perceived a statistically significant negative change in access and a significant positive change only in status of the household (and a small change at that; $p<0.10$).

Why did non-members tend to perceive more positive changes than association members? "Members" were actually past members of an organization that was inactive at the time of

evaluation. They were individuals who had staked their hopes on membership and had seen many of the physical interventions result in failure. Their past experience with *Bantay Dagat* was negative in that they lacked the equipment and other resources necessary to effectively monitor and enforce fishery regulations. With their hopes dashed by these very real failures in organizational effectiveness, they were bound to be more critical of their progress,and this was evident in their evaluations. Additionally it is important to understand that no change in a fishery that has been evaluated as deteriorating in the past is a positive change!

Although it is difficult to say which came first, negative opinions concerning collective action or the failure of the association, responses concerning cultural values associated with collective action were not too encouraging. At the level of the people, only a minority (28%) felt that they could cooperate in solving community problems. At the level of the fishers, 41 percent felt that they could work together in fighting illegal fishing. The dominant perception was that of the need for government to intervene in solving fishery problems (66%). Thus, Malhiao residents are apparently not too confident in depending on themselves for collective efforts. To a certain extent, these attitudes are rooted in their past experience with the *Bantay Dagat* where the fishers were constrained by limited financial resources and by the absence of radios, firearms, speedboats and other paraphernalia. Subsistence fishers could not be expected to provide these, given their limited earnings.

One distinct difference between CVRP-1 implementation in Malhiao and Zaragosa was the community organizing approach adopted by the field personnel. The social preparation of the barangay residents was relatively weak in Malhiao since technical interventions were given more emphasis at the start of project implementation. The field personnel also claimed that they were under pressure to produce physical accomplishments in the early years of project implementation.

The findings on Malhiao highlight the need for project planners, implementors and budget personnel to view community organizing as a crucial, painstaking process wherein the important building blocks for empowerment and project sustainability are laid. At the outset, it is important to deal with the disenchantment of the local residents with past government programs and help them overcome negative perceptions and behavior. Cutting corners during the social preparation stage to comply with the achievement of physical targets for accomplishment reports is likely to weaken the foundation for a self-reliant development and for sustaining coastal resource management initiatives in the long run. The Zaragosa experience proved to be the opposite of Malhiao partly because project implementors consciously decided to alter their community organizing approach in the expansion site of Zaragosa, having learned from their pilot experience in Malhiao.

Household size, however, is negatively related to perceptions of changes in the well-being of the marine resource, amount of harvest, income, and community conflict management. This indicates that as household size increases, the amount of perceived changes in these indicators decreases. Individuals with larger households need more resources and income; hence, what might be perceived as a large change to one who needs little might be perceived as a little change to one who needs a lot. Those who need more might also perceive more

conflict in terms of competition for what they perceive as a limited resource. This highlights the need for current and future coastal resource management programs to look more closely into the dynamic interactions between population and a sustainable resource base. In the last 10 years, Malhiao's population growth rate accelerated to 5.7 percent annually from 1985 to 1993, much more rapidly than the 0.6 percent average growth rate per year in the preceding decade (1975-1985). A continued trend in the future will increasingly exert pressure on the marine resource and amount of harvest. The survival-driven behavior of larger households could also adversely affect conflict management in the community.

The relationship between perceived changes in the impact indicators and occupation variables shows that those willing to leave fishing perceive smaller (or negative) changes in the amount of resource access and control. The majority of the fishers in Malhiao, nonetheless, would still opt to stay in fishing, even if an alternative occupation with an equal income were available. Job satisfaction is linked to a combination of psychological and economic reasons such as flexible working hours, absence of a boss, easy money in fishing, easy type of work, and access to fish for food, among others. Thus, present and future coastal management efforts would still have to build on fishing in designing project interventions.

Looking back to the experience of CVRP-1 in Malhiao, several features can be extracted from the project process: 1) participation of beneficiaries during the project implementation stage; 2) presence of a core group; 3) training of project beneficiaries; 4) inter-agency coordination; 5) communication of project objectives; and 6) deployment of full-time field personnel in the project site, particularly in the first year of project implementation.

In terms of the preconditions for co-management, the Malhiao experience met 5 out of 9 preconditions, namely: 1) existence of use rights and a fair grasp of use rights and management efforts; 2) appropriateness of rules to local conditions; 3) provision for user participation in rule making, monitoring and enforcement; 4) access to local conflict resolution mechanisms; and 5) homogeneity in terms of religion and ethnicity (but not in terms of occupation). The 4 unmet preconditions are distinct boundary delineation, nesting of the beneficiary association, degree of multiplicity of the functions of the user organization, and size of membership/regional scope of operations (e.g., organizational scale). The Malhiao Fishermen's Association is a village-based organization with no affiliation to a national or regional federation. It was unable to expand its membership and scope of operations. After the completion of the CVRP-1, it lapsed into inactivity.

Notwithstanding the shortfalls of the CVRP-1 in Malhiao and the short-lived nature of many of its project interventions, the project left a visible legacy through the 36-ha mangrove reforestation area, which has been maintained by the mangrove planters up to now. New plantings along the shore are also encouraging, made possible through a new organization in Malhiao which linked up with a fairly recent DENR program in the area (e.g., Coastal Environment Program). Though the new mangrove plantings cannot be attributed to the CVRP-assisted beneficiary association, CVRP-1 was instrumental in stimulating interest in mangrove rehabilitation as part of coastal resource management.

3.2.1.5 Palanas, Ronda, Cebu

Site Description

Palanas is a coastal barangay of the municipality of Ronda. Ronda is located on the southwestern portion of the province of Cebu in the Central Visayas region. There are 14 barangays in Ronda. Ronda is located on the Tañon Strait separating Cebu and Negros Oriental.

Almost 80 kilometers from Cebu City, it is approximately a 2.5 hour bus ride on a paved road network. The small 53 hectare barangay of Palanas is bounded by Ronda town proper on the north, the municipality of Alcantara on the south, barangay Botong on the east, and Tanon Strait on the west.

Located one kilometer from the Ronda poblacion, Palanas is primarily accessible by pedicab and tricycle. The barangay lies on a narrow piece of land, measuring about 1.5 kms long and one-half km wide. The terrain is generally rocky, giving rise to the term "palanas" that aptly describes the stony surface of the barangay. Dominating the landscape are coconut, banana and some fruit trees. Residential houses are mostly found along the road and near the seashore.

Lining the shoreline of Palanas are relatively thick clusters of mangrove trees with wide canopies which were planted before and during the implementation of CVRP-1. Several open areas exist for passage and boat landing. The beach is relatively muddy and slippery and is full of dark stones whose edges are sharp and irregular. Small, multi-colored boats anchored near the mangrove trees characterize the coastal scenery. During low tide, both men and women can be seen busy collecting shellfish and other marine products.

The fishing is largely for small pelagics. Most fishers still regard the coastal waters as productive, providing adequate fish catch both for home consumption and sale.

Site Project Variables

Barangay Palanas was considered a relatively successful case of a beneficiary community in Ronda, Cebu. Prior to the CVRP-1, national government services delivery to Palanas was reportedly minimal. There were limited coastal resource management efforts. Two families had planted 9 ha of mangrove on their own initiative for sustainable harvesting.

The CVRP-1 activities began in October 1985. As at other CVRP-1 sites, the project concept was introduced to the residents of Palanas through a community assembly. A community organizer (CO) lived in the community for part of each year. The CO devoted long hours to establishing the project, working with both barangay officials and residents. These activities included house-to-house visits, informal dialogues, participation in the barangay's social activities, core group formation, and strategic planning exercises. The members of the core group were chosen with the assistance of the association president, largely based on

dedication and potential leadership. The project beneficiaries were consulted during project implementation but not during project design. The project was reportedly flexible since certain suggestions from the beneficiaries were favorably acted upon by project staff, e.g., the use of fish pots and fish aggregating devices.

Prior to CVRP-1, the Palanas Fishermen's Association was already in existence. The CO worked with this association for CVRP-1 activities. The association had 29 members in 1985.

Capability-building efforts involved the training of association members on various project activities and interventions including mangrove planting and management, artificial reef establishment, fish aggregating device establishment, environmental conservation, value formation, leadership, and use of fish pots. Visits to Bohol and Apo Island marine sanctuary exposed the beneficiaries to tangible cases of community-based coastal resource management.

CVRP-1 interventions in Palanas included: mangrove reforestation, deployment of bamboo artificial reefs (100 modules), deployment of rubber artificial reefs (200 tires), fish aggregating devices (2 units), and fish pot (1 pot).

Coordination between participating groups in CVRP-1 and others was achieved with assistance of the Federation of Fishermen's Associations (FFA) (a regional grouping of local fishermen's associations organized in 1986). FFA represented the views of fishers in meetings with officials of the Province of Cebu and the municipal government of Ronda. CVRP-1 phased out of Palanas in 1992.

A survey of community members was conducted to determine their degree of participation in CBCRMP planning and implementation as well as knowledge of project objectives (Table 41). Seventeen association members and 20 non-members were interviewed. One hundred percent of the association members expressed knowledge about the project objectives and 70 percent of non-members expressed similar knowledge. The difference is statistically significant (Yates corrected $X^2=4.079$, $p<0.05$). The association members stated project objectives as (multiple responses possible) to improve the coastal resources and the community welfare (53%), to control or minimize illegal fishing methods (24%), to rehabilitate the degraded condition of coastal resources (18%), to increase/improve fish production (12%), and to educate the people on coastal rehabilitation strategies (12%). Overall, 59 percent of association members compared to 75 percent of non-members felt that they influenced the planning aspect of the project. The difference is not statistically significant ($X^2=1.097$, $p>0.05$). Sixty-five percent of the association members felt that they had influence on project changes after the project began compared to 80 percent of non-members. The differences are not statistically significant ($X^2=1.09$, $p>0.05$). Attendance at CBCRMP training sessions and meetings was concentrated among association members. Eighty-two percent of association members attended meetings where the project objectives were discussed compared to 25 percent of non-members. The association members attended an average of three meetings where the project was discussed compared to four meetings by non-members. Sixty-five

percent of association members attended CBCRMP trainings and only 20 percent of non-members attended trainings.

Table 41. Community participation in CBCRMP implementation.

	% Member	% Non-Member	% Total	X^2	p
Influence Planning	59	75	68	1.10	0.295
Influence Project Changes	65	80	73	1.09	0.297
Attend CBCRMP Meetings	82	25	51	12.10	0.000
Attend CBCRMP Trainings	65	20	41	7.62	0.006
Knowledge of objectives	100	70	84	4.079*	0.043

* Yates corrected

Context Variables

Supra-community Context

Enabling Legislation. During the Palanas CBCRMP planning and implementation period, fisheries management was directed by PD 704. It was not possible for the researchers to locate a municipal basic fishing ordinance for Ronda. It was also not possible to locate a municipal fisheries code under the Local Government Code.

Supra-community Institutions. A number of organizations and institutions outside Palanas have influence on local fisheries and/or coastal management. Prior to the implementation of CVRP-1, the Bureau of Forest Development (BFD) conducted a survey of mangrove areas in the barangay but no mangrove reforestation was undertaken. In addition, BFD provided seedlings for mahogany and gmelina (a fast growing tree used for reforestation) planting. Foster Parent Plan, an international NGO, worked in Palanas providing educational scholarships for children below age 18, cattle dispersal, fishing gear, housing repair, and electricity connection.

During the CVRP-1 implementation, the Department of Environment and Natural Resources-Community Environment and Natural Resources Office (DENR-CENRO) initiated a mangrove reforestation project. It provided assistance in mangrove management, as well as stewardship contracts. The Provincial Government of Cebu initiated the *Bantay Dagat* (voluntary guards of the sea). Community members were trained for surveillance and enforcement of use rights and other coastal management measures.

After completion of CVRP-1, the Department of Agriculture-Badian initiated upland development activities and animal vaccination. The Department of Social Work and Development at the municipal level provided discount cards for senior citizens to purchase basic commodities. The mayor of Ronda initiated the Clean and Green Program, a program to improve the natural environment in the barangay, in 1995. It is reported, however, that the

mayor of Ronda and the governor of Cebu have not provided much active support to coastal resource management efforts in Palanas.

Supra-community Markets. Approximately 50 percent of the fish and shellfish harvested is consumed locally in Palanas and Ronda. The other 50 percent is marketed in the nearby towns of Dumanjug, Moalboal or Alcantara or shipped to Cebu City. In 1984 there were 10 fish traders working in Palanas. This has increased to 20 fish traders in 1995. It should be noted that it is reported that the number of fishers has also increased significantly in the last 10 years.

It is reported that there is greater demand for fish today than in the past. The demand reportedly increased over the last decade by 20 to 30 percent. Key informants attribute this demand to increasing population as well as increases in prices of other sources of animal protein. Along with increasing demand for fish, retail prices in Palanas have also increased from 60 to 300 percent.

Post-project, Supra-community "Shocks" to the System. No new technologies, other than those introduced by the project (ARs, FADs) have been used in the area since project implementation. Several strong typhoons, especially typhoon Ruping in 1990, have caused severe damage to the area. During the CVRP-1 project period, there were several periods of prolonged drought. Prior to CVRP-1 implementation, there was a New People's Army insurgency problem but this stopped at the time of project implementation.

Community Context

Perception of Trends in the Resource. Key informants noted that at the time of CVRP-1 implementation fish stocks were decreasing. A year or two after the completion of CVRP-1 coastal resources were felt to have improved due to minimization of illegal fishing practices. A survey of 37 community members in Palanas on their perception of the resource at the time of the project implementation finds that 81 percent felt it was in good shape (little good, good and very good) and 19 percent felt it was in bad shape (bad and little bad). When asked about the condition of the nearshore resources today in comparison to ten years ago, 76 percent felt it was better off (much better off, better off and little better off) and 27 percent felt it was worse off. In general, association members felt that the resource was better off now than did non-members. Aspects of this variation are discussed below in the section on individual and household data.

Target Species Composition and Distribution. Interviews with key informants representative of the major fishing gear types indicated that the following types of fish are considered most important in terms of income:

1. *barilis* (tuna)
2. *iho* (shark)
3. *bolinao* (anchovy)
4. *Malangsi* (sardine)

5. *Bansicol* (runner fish)
6. *Uyap* (small shrimp)
7. *Malubgas* (unidentified)
8. *Lokihok* (caesio)
9. *Gotob* (scad)

For home consumption the following species were indicated:

1. *Danggit* (siganid)
2. *Andohao* (mackerel)
3. *Ilak* (drummer)
4. *Sulid* (caesio, fusilier)
5. *Dalagang bukid* (caesio, fusilier)
6. *Samulok* (mojarra)
7. *Katambak* (snapper)
8. *Kitong* (spadefish)
9. *Bugaong* (therapon)

Information from the fishers indicates that there is a slight decrease in fish catch for kitong and katambak. There is no change in the catch of other fish species. Fishing effort has increased in the last ten years.

Environmental Features Influencing Boundary Definition. The shoreline of Palanas is marked by a rocky beach area covered with a thick cluster of old and well-established mangrove stand, especially in the southern portion of the coast. This feature is a distinguishing feature of Palanas. Coastal water boundary delineation would be of medium difficulty considering that there are no unique environmental features in the coastal waters of Palanas. Thus, it requires the use of marker buoys to define a protected area.

Technologies Used in Coastal Area. Most fishing is conducted from relatively small outrigger boats, ranging in size from a little over 2 meters to about 6 meters. The majority of boats are unmotorized and small. The unmotorized boats are powered by paddle, with only a few using sail. There are 50 non-motorized boats and 1 motorized boat in Palanas.

Among the commonly used fishing technologies, the most frequently (57% of respondents, multiple responses possible) used is the net. This includes the bottom set gill net, the top set gill net, and a hand push net for catching *bangus* fry. The bottom set gill net is used all year round but primarily during the first and last quarter of the moon. It is used near shore from 4 AM to 3 PM. The sharing system for the bottom net fishers is one share for each crew and one share for the net. The non-motorized boat usually includes a four man crew. The top set gill net is used from April to July. Its effective fishing time is at night from 8 PM to 4 AM. The net is usually set near a FAD. Forty-three percent of the respondents used hook and line. The peak season for this gear is August to January. Fishing is conducted during the day near the shore. Five percent or two respondents used spear. Spear fishers usually fish at night with a light to attract the fish near reef areas. Fishing is best during the new moon. The peak season

for use of this gear is April to October. One respondent uses a fish corral. It is reported that fishers from a neighboring municipality use a round haul seine in the waters of Palanas.

Level of Community Development. Level of community development is based on a checklist of items which are listed below. Items present in Palanas are presented in bold print. Those not present are normal print.

1. Hospital
2. Medical Clinic
3. Resident Doctor
4. Resident Dentist
5. Secondary School
6. **Primary School**
7. Public Water Supply Piped to Houses
8. Sewage pipes or canal
9. **Septic or Settling Tanks**
10. **Electricity**
11. Telephone
12. **Food market (sari-sari store)**
13. Drug store
14. Hotel or inn
15. Restaurant
16. Gas station
17. **Public transportation**
18. **Hard top road access**
19. Banking services
20. **Television reception**
21. **Radio reception**

Degree of Integration into National Economy and Political System. The coastal products (fish) are purchased and collected by up to 20 fish traders and transported to both the municipal center and other nearby municipalities and the provincial capital, Cebu City. This is facilitated by good transportation links (e.g., frequent buses and other public transport vehicles) using the paved road which connects the coastal communities. It takes two and one/half hours by bus to reach Cebu City from Palanas. Communication links are, however, limited. One has to travel to the municipal hall in Ronda population to find a telephone. Local residents with television and/or radio are able to receive broadcasts. The municipal mayor makes frequent trips (at least once a year) to Palanas. Except for communication, the degree of integration into the national economy and political system can be classified as medium to high.

Tradition of Cooperation and Collective Action. Over the past ten years collective action was initiated by the CVRP-1. For over 15 years the Mutual Aid or *Kasakit* has provided financial assistance to families in case of death of a household member. For over twenty years there has been a Parents and Teachers Association in the school. In 1985 the Palanas Fishermen's Association was formed. It is still functioning as of late 1995. In 1992 the Basic

Ecclesiastical Community was formed for Catholic teaching to the youth. In 1993 the Palanas Farmers Association was formed for procuring farm inputs.

Occupation Structure and Dependence on Coastal Resources. The only occupation dependent on coastal resources in Palanas is fishing. Approximately 43 percent of the households (46 households) depend, primarily on fishing for a livelihood. Approximately 6 percent of the households are fishers with other occupations. Approximately 5 percent of the households are fish traders (Table 42).

Fishing is the most important occupation to the local economy. Farming is second most important. Based on the percent of households dependent upon fishing, either as primary or secondary occupation and as a fish trader, we might estimate that the economy is about 40 percent dependent on coastal resources.

Table 42. Distribution of occupations.

Occupation	Percent
Fishers	43
Farmers	4
Fishers with other occupation	6
Government Employees	8
Drivers	5
Livestock raiser	5
Carpenters	3
Others	26

Degree of Socioeconomic and Cultural Homogeneity. An examination of barangay records concerning the principal occupation of the household head of 108 households in Palanas indicates that the most households (54%) are either fishers, fishers with other occupation, or fish trader. Very small percentages are represented by a diversity of other occupations, indicating a fair degree of occupational homogeneity. With respect to ethnicity, a key informant estimated that 90 percent of the population is local, from Palanas. The remaining 10 percent are from other areas of Cebu or from Bohol. This suggests a high degree of ethnic homogeneity. In terms of religion, the majority of residents (90%) are Catholic. The remaining 10 percent are a mix of various Christian religions including Protestant, Iglesia ni Christo, Seventh Day Adventist, and Born Again. Overall, the population of Palanas manifests a fair degree of socioeconomic and cultural homogeneity.

Political Organization and Conflict Resolution. Palanas is a barangay in the municipality of Ronda which forms part of the province of Cebu. The barangay is headed by a barangay captain who is assisted by a barangay council. The municipality is headed by a mayor with the assistance of a municipal council.

These levels of government are important in terms of conflict resolution. When conflicts arise, there are informal attempts at resolution. Usually the elders in the involved families will attempt

to resolve the conflict amicably. If this does not work, the conflict is brought to the attention of the barangay captain who attempts amicable settlement, with or without written agreement. If the barangay captain cannot resolve the conflict, it is brought to the attention of the *Lupong Tagapamayapa* (a committee of the barangay council). If the case cannot be settled by the *Lupong Tagapamayapa,* it is sent to the municipal trial court for filing of a case and adjudication at the municipal level.

Most cases of conflict concern the location for a *pukot* (gill net), permits for permanent *dompil* (fish corral), and movable *bungsod* (semi-permanent fish corral).

Population and Population Changes. In 1975 there were 809 residents of Palanas. This increased to 853 in 1980 and 919 in 1985, the start of the CVRP-1. In 1990 the population was 968. This is an average annual growth rate of 1.3 percent over 15 years; lower than the national average. In 1993 the population of Palanas was 1037.

Coastal Resource Use Rights, Formal and Informal. No informal systems of coastal use rights or rules were identified during the research period.

As stated earlier, it was not possible to locate a municipal basic fisheries ordinance under PD 704 or a municipal fisheries code under the LGC. There are three specific municipal ordinances which impact on fishing. Resolution No. 86, Ordinance No. 3 of 28 November 1987, prohibits any fisherman or any fishing vessel from fishing within the established marine reserve for fish sanctuary within the jurisdictional area located at Sitio Jandili-og, Barangay Sta. Cruz, Ronda. Resolution No. 58, Ordinance No.8 of 12 June 1988 prohibits any person or group of persons, partnerships or corporations using the fishing methods such as *basnig* (bagnet), *panalasa*, *cob-cob* (baby purse seine), *pamalo* (scare line with net), *baling (*beach seine), and trawl fishing within the distance of seven kilometers away from the shoreline of the municipal water jurisdiction of Ronda. Ordinance No. 5, Resolution No. 84 of 21 August 1988 prohibits any person from intruding into the jurisdiction of the mangrove areas to protect the growing young plants which are situated along the nearshore areas of Ronda.

Concerning coastal resource management measures, the *payao* (fish aggregating device) area is for association members only and non-members may fish upon payment of a set amount of fish to the association. The community still follows rules established under PD 704 including that it is restricted to catch "mother" bangus, turtle and undersized fish which will still mature. Banned fishing gear include *baling* (beach seine) and trawl and purse seiner. It is illegal to use poisons and explosives.

The system of surveillance and enforcement used in Palanas has been in effect since the CVRP-1 started. Enforcement is reportedly inadequate due to the lack of human, financial and capital resources. While a *Bantay Dagat* (voluntary guards of the sea) program was initiated, it is reportedly ineffective since members do not receive salaries and they are preoccupied with their own livelihood. Violators are merely issued warnings by the police and barangay captain. There are no reported cases of imprisonment for violating the law. It is reported that within

Palanas compliance with laws and regulations is 90 percent. Violators are reportedly from other barangays or municipalities.

Women. Women are engaged in both fishery and non-fishery based activities. Women (four of 37 households) gather shellfish for home consumption on an irregular basis for an average of two and one-half hours a day. Women in two of the 37 households report that they fish for an average of 6.5 hours per day. *Guinamos* making (fish paste) occupies an average of one hour a day for women in several households. A large number of women (29 of 37 households) are involved in marketing and vending fish. This includes selling the fish that their husbands caught to fish traders and direct, as well as being full-time fish traders. This activity can take between 3 to 11 hours per day. The women reported earning an average of 1791 pesos per year from coastal dependent activities. Women in PFA members households report earning more income than non-members (2147 pesos versus 1412 pesos, respectively). The women reported earning an average of 476 pesos from other sources. Women from non-member households earned more than women from PFA member households from other sources (633 pesos versus 280 pesos, respectively). The other sources include livestock and poultry raising (43% of households), vegetable gardening (11% of households), mat weaving (5% of households), and sari-sari store (5% of households). Forty-one percent of the women in PFA member households reported participating in aspects of the CBCRMP. No women from non-member households participated in aspects of the CBCRMP. The particular aspect that the women participated in was training on AR construction and sanctuary management, mangrove reforestation training, and *Bantay Dagat* seminar. The reported benefits from participating in the CBCRMP activities were gaining knowledge to improve livelihood and learning how to protect coastal resources. The reasons given by women for not participating in CBCRMP activities included busy with other activities and no time, old age, don't like organization, husband already participated, and sick during meetings.

Individual and Household Level Context

Characteristics of Sample Fisher Households. A random sample of 37 households were selected from a population of households identified as depending to some degree on the nearshore fishery of Palanas. The sample consisted of 17 households belonging to the Palanas Fishermen's Association (PFA) and 20 non-member households. All of the households are involved in some aspect of coastal resource exploitation either for income or subsistence. Some general background characteristics of the sample can be found in Table 43. As can be seen in the table, PFA members are older, have lived longer in the community, have more education, and have worked longer in marine resource related type of work than have non-members but the difference is not statistically significant.

Table 43. Characteristics of sample.

Variable	Member	Non-Member	Total	t-value	p
Age	52.82	46.40	49.35	1.54	>.10
Education	6.53	5.45	5.95	1.33	>.10
Years residing in the area	40.65	37.65	39.03	0.47	>.10
Household size	6.18	6.40	6.30	-0.29	>.10
Years doing marine-related work	28.59	22.25	25.16	1.20	>.10
Years doing previous marine-related work	0.00	0.15	0.08	-0.92	>.10
N	17	20	37		

In a similar manner to that described above for Calagcalag, relative income was evaluated based on assets including house structure, furnishings, and ownership of productive equipment. The results of the survey of assets are shown in Table 44. The distribution of house structure types in Table 44 suggests that PFA members and non-members have roughly equivalent house structure although some non-members have slightly higher housing structure than members. The differences are not statistically significant (X^2=0.016, p>0.05). The house furnishings may also be considered roughly equivalent with some non-members having higher quality furnishings but member having more medium quality furnishings. The differences are not significantly different (X^2=0.149, p>0.05). PFA members own a higher percentage of boats than non-members but not statistically significant (94% versus 80%, respectively; X^2=1.567, p>0.05).

Table 44. Percent distribution of assets.

	% Member	% Non-Member	% Total	X^2	p
House structure				0.016	0.900
Minimal	29	30	30		
Low	24	25	24		
Medium	29	20	24		
High	18	25	22		
House furnishings				0.149	0.699
Minimal	12	05	08		
Low	47	60	54		
Medium	41	30	35		
High	00	05	03		
Productive equipment				1.567	0.211
Boat ownership	94	80	87		
N	17	20	37		

Occupational Multiplicity and Dependence on Coastal Resources. When asked to provide their current occupation, 100 percent of the sample identified themselves as practicing a fishery related occupation (multiple responses possible). They reported being involved in this fishery related occupation for a mean of 25 years. Thirty-two percent said that they are also farmers, 14 percent said they were carpenters, and one or two respondents stated they were businessman, driver, or laborer. Fourteen percent of the respondents have done other types of work besides fishing such as farming, laborer or security guard. Such occupational multiplicity is common in rural areas as a survival strategy.

In terms of income, 95 percent of the respondents ranked fishing as the most important source. Eighty-six percent of the respondents receive over half of their income from fishing. Ninety-seven percent of the households had non-coastal resource related sources of income, primarily from farming or carpentry. Only one household received remittances from outside the household. Fishing is also the most important activity in terms of food for 95 percent of the households. Fishing provides more than half of the food for 89 percent of the households. Farming is another important source of food.

Collective Action. Two indicators of collective action were examined as a part of the survey: association membership and attitudes towards cooperation (cultural values). It must be noted that the sample was stratified on the basis of PFA membership, and the population from which the sample was drawn included only households identified as participating in the nearshore fishery. With these qualifications in mind, only 6 percent (1 respondent) of the PFA members also belongs to another association, and two non-members belong to an association. The PFA member and non-members belong to a youth group. PFA members perceive the purpose of their association to be to protect coastal resources from illegal activities, improve fishery resources, establish a marine sanctuary, ARs, FADs, and mangrove reforestation, and to improve the welfare of the fishers. Among the non-members, 2 of the 20 respondents have belonged to an association in the past. They belonged to a coastal resource user association. The reason given for leaving the association is not attending meetings anymore.

In terms of cultural attitudes toward collective action, 86 percent of the sample believe that the people of the community can work together to solve community problems. There is no statistically significant difference between PFA members and non-members (88% and 85%, respectively; $X^2=0.082$, $p>0.05$).

Eighty-six percent of the sample also believe that fishers could work together to solve a problem such as illegal fishing (88% PFA members and 85% non-members; $X^2=0.082$, $p>0.05$). Seventy percent of the sample agree that government and fishers should work together to solve a problem in the fishery. Interestingly, 80 percent of the non-members agree, while only 59 percent of the PFA members agree. Overall, the sample has an optimistic attitude towards collective action.

Job Satisfaction. When asked if they would become a fisher if they had their lives to live over, fully 100 percent of the respondents said yes. The most frequent reasons given were: used to

doing this type of work as a source of livelihood, there is no other source of income or occupation to do, family is dependent upon fishing for their subsistence, and it is an easy source of food and when there is surplus it can be sold immediately.

In response to a question concerning if the respondent would change from fishing to other employment if they could make the same income, 86 percent of the respondents said no. Ninety-five percent of the non-members said no, while 76 percent of the PFA members answered no. The most common reasons given for not changing were either economic (direct and sure source of food and income, don't have a large amount of capital) or inertial (used to fishing, all I've ever done). These responses made up 64 and 27 percent, respectively, of the reasons for not switching from fishing to another occupation. The few respondents who said that they would change from fishing to another occupation said the new job must be permanent with good income.

When asked what they like about fishing in comparison to other jobs, the most common responses were related to income and food for home consumption. Sixty-two percent of the 37 responses (multiple responses were allowed) indicated either food or income. Thirty-seven percent of the respondents indicated that these benefits could be obtained more easily by fishing. Low frequency responses included no boss, ease of work, used to fishing, and near house and family.

Overall, it seems as though that fishing is rewarding, both economically and psychologically, to the fishers of Palanas.

Ecological Knowledge. Fishers were requested to identify the characteristics of the sea that have a positive influence on the status of the resource. Seventy-three percent said the presence of seaweeds and seagrasses, 41 percent said the presence and/or abundance of mangrove trees, 19 percent said the dried leaves or detritus of mangrove trees, 8 percent said the presence of corals, and 8 percent said the presence of rotten wood. Multiple answers were permitted; hence, percentages can sum to more than 100. When asked about the condition of the nearshore resources today in comparison to ten years ago, 76 percent of the respondents said better off and 24 percent said worse off. PFA members were more likely to say the resource was better off than were non-members but the difference is not statistically significant (88 versus 65 percent, respectively; $X^2=2.695$, $p>0.05$). Reasons for improvement in the resource include improvement in mangrove areas and mangrove reforestation, coastal resources were protected by fishers, coral reef management and protection of other coastal resources, and conservation and rehabilitation measures. Reasons for a decrease in the condition of the resources include calamity (typhoon), use of unspecified chemicals which decrease fish abundance, illegal fishing activities, and destruction of coastal resources. Most of the respondents (81%) reported that the resource was in good shape at the time the CBCRMP began. Non-members were more likely to report that the resource was in good or very good condition at the time the CBCRMP began than PFA members (65% versus 53%, respectively; $X^2=0.3591$, $p>0.05$). While there is a great deal of variation with respect to the status of the resource, PFA members seem more positive than non-members. Implications of this variation will be discussed along with the discussion of project impacts.

Impact Variables

Achievement of Intermediate Objectives

Material Aspects. Five distinct intermediate objectives, which can be evaluated in terms of material aspects, formed part of the project. Project reports and interviews with ex-project staff, involved agencies, and Palanas fishers, as well as direct observations were used to evaluate the current status of the intermediate objectives. It should be noted that the project provided all the materials. Initially, the fishers rendered free labor, but they began to complain when they heard that other CVRP-1 sites, such as Saavedra, paid the laborers. This "unequal treatment", according to the beneficiaries, dampened their enthusiasm for the project.

Artificial Reefs. The project used two types of artificial reef, as separate project interventions, during the project. One hundred modules of bamboo artificial reefs were prepared by 20 fishers. These bamboo artificial reefs deteriorated quickly and lasted for only about one year. To rectify this problem, rubber artificial reefs made up of 200 tires were constructed and put in place. It is reported that the rubber artificial reefs are still intact.

Fish Aggregating Device. The project report notes that 2 fish aggregating devices (FADs) were installed with the involvement of 60 PFA members. The FADs reportedly deteriorated quickly and lasted for less than a year. No FADs exist at present.

Mangrove Reforestation. Over 15 hectares of mangrove were planted. Twenty-one Certificates of Stewardship Contract (CSC) were recorded. Sixteen CSCs were issued on 31 March 1986 and five were issued on 31 July 1992. It is reported that there was a 35 to 40 percent survival rate for the mangrove plantings. It should be noted that the municipality of Ronda issued Ordinance No. 5, Resolution 84 on 21 August 1988 prohibiting any person from intruding into the jurisdiction of the mangrove areas to protect the growing young plants which are situated along the nearshore areas of Ronda. Violations involved fines of 5 pesos for every plant destroyed and/or imprisonment of two weeks to one month.

Fish Pot One fish pot or *haponesa*, based on a Japanese design, was provided to the fishers, at their suggestion, for trial purposes. This design and use was based on a similar fish pot used by fishers in the municipality of Alcantara. The fish pot, made of bamboo, lasted only three months and its use was not continued.

Institutional and Organizational Aspects. CVRP-1 implementation depended on the establishment of fishers associations in project communities. The Palanas Fishermen's Association (PFA) is the organization strengthened by the project. CVRP-1 intermediate objectives, discussed above, were to be associated with institutional changes which would grant exclusive rights for cooperators (e.g., association members) use of interventions such as FADs, ARs, and marine sanctuaries. It was assumed that obtaining rights, along with associated training would stimulate conservation practices, including monitoring, among the cooperators - activities which would benefit the community as well as the resource.

Organization. The project conducted trainings and community organizing which resulted in the strengthening of the existing Palanas Fishermen's Association. In 1985 the PFA had 29 members. The PFA was reorganized as the Palanas Fishermen's and Farmers Association in 1991 with 60 members. About 36 are still active as of late-1995.

As part of the household survey, seventeen PFA members were asked what they perceive as the benefits of belonging to the association. Out of five benefits mentioned (respondents could provide more than one response), 59 percent said they have learned new technology about fishing and mangrove reforestation, 18 percent said they have exclusive rights to the use of the AR and FAD built by the association, 12 percent said they have attended seminars and trainings, and 6 percent (one response) said immediate services to the community. One respondent reported that he didn't know of any benefits for association membership.

Use Rights and Management Efforts. Specific association use fishing rights were provided as part of project interventions and activities. PFA members were given exclusive fishing rights to FADs and ARs and mangrove stewardship contracts.

Respondents were asked if they knew the reasons for creating rules for managing FADs, ARs and mangroves. With respect to rules for managing FADs and ARs, 24 percent of the PFA members said that the members built the FADs and ARs and they must be the ones to manage it, 18 percent said to encourage non-members to join the association, 12 percent said to encourage association members to participate in activities, 12 percent said to give exclusive rights to fishers, and 12 percent said they didn't know. Low frequency responses (one respondent) include to compensate the efforts of members, to regulate the use of FAD and AR, and to monitor the status of FAD and AR including the fish stock. Among non-members, 25 percent said to give exclusive rights to members, 20 percent said to monitor the status of FAD and AR including fish stock, 15 percent said that the members built the FAD and AR and they must be the one to manage it. Low frequency responses by non-members (one or two responses) included to encourage association members to participate in activities, encourage non-members to join the association, and to regulate use of the FAD and AR. Fifteen percent of non-members did not know. It appears that PFA members and non-members have an equally good understanding of the reasons for creating rules for FAD and AR access rights. While training received by PFA members can explain their understanding for creating rules, non-members must have learned through discussion with PFA members and observation.

When asked about mangrove stewardship contracts, both groups again seemed to have an equally good understanding of the reasons for CSCs. Among PFA members, 24 percent said to provide exclusive rights to members, 24 percent said compensation for the people involved, 24 percent said to encourage participants to maintain their mangrove trees, 12 percent said to provide incentives to participate, and 12 percent said they didn't know. Among non-members, 40 percent said to encourage participants to maintain their mangrove trees, 15 percent said to provide exclusive rights to participants, and 15 percent said they didn't know. Low frequency responses (one or two responses) included to provide incentives to participate, to allow the

mangrove to grow normally before being harvested, and to give honor and rights to members of the association.

It can be concluded that overall the fisher community both understands the reasons for and has a generally positive perception of use rights and management rules. Both PFA members and non-members have an equally good understanding of the reasons. Both provided responses indicating that those who make the improvements deserve exclusive rights, that it encourages association members to participate, and that it insures that the intervention and the resource is properly maintained.

Perceived Impacts on the Coastal Resource

Methods To determine perceived impacts on the coastal ecosystem, respondents were requested to provide evaluations of a number of aspects of this ecosystem for pre-project, present, and future time periods. A self-anchoring, ladder-like diagram with 15 steps was used, where step 1 represents the worst possible situation and step 15 the best possible situation. The respondent was asked to indicate the step which best describes the situation for 10 impact indicators, namely: 1) overall well-being of the household, 2) overall well-being of the resource, 3) local income, 4) access to resources, 5) control over resources, 6) ability to participate in community affairs, 7) ability to influence community affairs, 8) community conflict, 9) community compliance with resource management, and 10) amount of traditionally harvested resource in the water.

Analysis As a first step in the analysis mean values for each indicator for today and the pre-project time periods were calculated, and a paired comparison t-test was calculated to determine if differences between means are statistically significant. The results of this analysis are in Table 45. The results show an increase in perceived levels of all indicators. All the differences are statistically significant.

Table 45. Perceived pre-project to post-project changes in indicators.

	MEMBER				NON-MEMBER				ALL			
	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p
Access	8.29	6.76	1.53	>.10	7.70	6.15	1.55	<.10	7.97	6.43	1.54	<.05
Compliance	10.29	5.82	4.47	<.01	9.60	5.60	4.00	<.01	9.92	5.70	4.22	<.01
Conflict	9.24	7.47	1.76	<.05	9.20	6.20	3.00	<.01	9.22	6.78	2.43	<.01
Control	7.65	5.24	2.41	<.01	8.25	5.20	3.05	<.01	7.97	5.22	2.76	<.01
Harvest	9.29	6.53	2.76	<.01	9.10	5.65	3.45	<.01	9.19	6.05	3.14	<.01
Household	7.12	4.06	3.06	<.01	7.20	4.45	2.75	<.01	7.16	4.27	2.89	<.01
Income	8.18	5.24	2.94	<.01	8.15	4.80	3.35	<.01	8.16	5.00	3.16	<.01
Influence	8.76	5.00	3.76	<.01	8.00	4.50	3.50	<.01	8.35	4.73	3.62	<.01
Participate	8.76	4.59	4.18	<.01	8.00	4.80	3.20	<.01	8.35	4.70	3.65	<.01
Resource	8.41	5.35	3.06	<.01	8.05	4.65	3.40	<.01	8.22	4.97	3.24	<.01
N=37												

The next step in the analysis was to determine if project cooperators (PFA members) differed from non-cooperators with respect to perceptions of changes in the indicators. This was accomplished by subtracting the pre-project evaluation from the today evaluation for each indicator and calculating a two-sample t-test for the difference of mean values between the PFA and non-PFA samples. The results of the analysis can be found in Table 46. The results of the analysis show that non-cooperators are more positive on six of the ten indicators than cooperators. None of the differences are statistically significant ($p<0.05$).

Table 46. Differences between members and non-members with respect to perceived changes.

	T2-T1 Member	T2-T1 Non-member	t-value	p
Access	1.5	1.5	-0.02	0.987
Compliance	4.5	4.0	0.40	0.693
Conflict	1.8	3.0	-1.72	0.096
Control	2.4	3.1	-0.7	0.510
Harvest	2.8	3.5	-1.02	0.316
Household	3.1	2.8	0.60	0.551
Income	2.9	3.4	-0.55	0.588
Influence	3.8	3.5	0.31	0.758
Participate	4.2	3.2	1.13	0.268
Resource	3.1	3.4	-0.43	0.672
N	17	20		

As a next step in the analysis, relationships between perceived changes in the indicators and other individual and household level variables, which socio-cultural research and theory suggest may be important, are examined. Relationships with individual and household level variables such as age, education, number of household members, years of residency in the community, and ecological knowledge are found in Table 47. Most of these variables are self-explanatory except ecological knowledge. There are two ecological knowledge variables: eco-knowledge and taxa-knowledge. These are explained in the section on Calagcalag. A number of statistically significant relationships were found. These are between age and overall well-being of the resource and control over resources (it should be noted that the relationship is negative in both cases); education and overall well-being of the resource; number of household members and overall well-being of the resource and control; years of residency and overall well-being of the resource, access and control (note that the relationship is negative in all three cases); ecological knowledge and access (a negative relationship); and taxa-knowledge and overall well-being of the household.

Table 47. Correlations between indicators and selected household/individual level variables.

	Age	Educ.	House Member	Resid.	Eco-Know.	Taxa. Know.
Access	-.24	.04	-.21	-.29*	-.39**	.10
Compliance	.04	.19	.15	-.19	.23	.17
Conflict	-.08	-.04	-.16	.00	.12	.09
Control	-.28*	.04	.34**	-.28*	.20	.10
Harvest	.02	.08	.17	-.16	-.06	.11
Household	-.19	.22	.22	-.23	.03	.29*
Income	-.10	-.11	.11	-.25	-.06	.05
Influence	-.01	.05	.20	-.11	-.12	.17
Participate	-.01	.09	-.12	-.25	.24	.01
Resource	-.29*	.34**	.32**	-.30*	.00	.23

N=37 **=p<.05
*=p<.10

Relationships between occupation and economic related variables and perceived changes in the indicators are found in Table 48. These variables include important economic indicators such as ownership of productive equipment (boat ownership), sources of income (e.g., sources other than fishing, income from outside the household--e.g. remittances from family members in the city or abroad, and fishing identified as the primary source of income), and occupation related indicators (willingness to change from fishing to another occupation with comparable income and membership in a producer association--PFA). Table 48 indicates that individuals who have a non-fishing source of income tend to perceive a smaller (or more negative) change in compliance and amount of traditionally harvested resource in the water. Those who say they would switch from fishing to another occupation perceive a smaller (or more negative) change in overall well-being of the resource, local income and ability to influence community affairs.

Table 48. Correlations between indicators and selected occupational and economic level variables.

	Boat Owner	Nonfish Income	Outside Income	Fish Primary	Leave Fishing	Member
Access	-.27	-.03	.02	.10	.14	.00
Compliance	-.02	-29*	-.06	-.04	-.25	.07
Conflict	-.10	-.06	-.03	.18	-.14	-.27
Control	-.11	.06	-.04	.08	-.22	-.11
Harvest	.07	-.38**	-.09	.12	-.22	-.17
Household	.12	.06	-.09	.17	-.12	.10
Income	-.22	-.17	-.09	.07	-.31*	-.09
Influence	.00	-.08	-.24	-.04	-.35**	.05
Participate	-.05	.06	-.11	-.08	-.22	.19
Resource	.04	.02	-.09	.19	-.41***	-.07

N=37 **=p<.05
***=p<.01 *=p<.10

The ten indicators were submitted to a principal component (with varimax rotation) analysis to determine if relationships between the indicators were such that they could be reduced to fewer, composite indicators for further analysis. Results of the principal component analysis are in Table 49. Number of components were selected on the basis of the scree-test. The two rotated components explain 57 percent of the variance in the set of indicators. Component one is composed of household, resource, control, participation, influence, compliance and harvest. Component two is composed of income and access.

Table 49. Principal component analysis of impact indicators.

	Component	
	One	Two
Influence	.86**	.12
Participate	.73**	-.18
Compliance	.72**	.34
Harvest	.68**	.24
Resource	.59**	.28
Control	.57**	.48
Access	-.03	.87**
Income	.31	.78**
Household	.54**	.49
Conflict	.47	.18
Variance	44%	13%

Factor scores were created for each individual for each component. Step-wise multiple regression was used to determine the set of independent variables that explained most of the variance in each of the two components. The analysis procedure is discussed in the section on Calagcalag. The results of the analysis are in Table 50.

Two variables were entered into the regression equation for Impact Component One: education and leave fishing for another occupation. The adjusted coefficient of determination of 0.18 indicated that about one-fifth of the variance in Impact Component One can be accounted for with these two variables. Only one independent variable was entered into the regression equation for Impact Component Two (years of doing marine related work), and the probability associated with the regression coefficient is marginal ($p<0.10$). It is important to note that the regression coefficient is negative, indicating that those with more years of fishing experience tend to score low on this component.

Table 50. Regression analyses of impact components.

Dependent Variable: Impact Component One

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Education	0.275	1.80	0.080
Leave fishing	-0.347	-2.27	0.029

$R = 0.472$; $R^2 = 0.223$; Adjusted $R^2 = 0.177$
$N = 37$; $F = 4.884$; $p = 0.014$

Dependent Variable: Impact Component Two

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Years of doing marine related work	-0.320	-2.00	0.054

$R = 0.319$; $R^2 = 0.102$; Adjusted $R^2 = 0.077$
$N = 37$; $F = 3.986$; $p = 0.054$

Discussion

The Palanas nearshore fisheries component of CVRP-1 was considered a successful case of a beneficiary community. The Palanas Fishermen's Association, reorganized and strengthened under CVRP-1, is still active, although it has again been reorganized under a new government program. The mangroves, planted as part of the project, have survived. From the perspective of the fisher households interviewed, they perceived a statistically significant improvement in all ten impact indicators.

Comparing members of the association with non-members during the pre-project and present periods, the members indicated statistically significant improvements in 9 of 10 indicators (access to resources increased but was not statistically significant) while non-members perceived statistically significant gains in all 10 impact indicators. Non-members were more positive on six of the ten impact indicators compared to members (access, conflict, control, harvest, income, resource), although none of the differences were statistically significant. The results indicate that membership in the association cannot be associated with statistically significant perceived gains in the impact indicators, suggesting that the project had community-wide impact, a desirable outcome in terms of promotion of equity in contrast to social stratification.

Interestingly, a majority of the fisher households (both members and non-members) reported having influence on project planning and changes in the project although only minority non-members attended project meetings and trainings in contrast to a majority of the association members. Like the equitable distribution of project impacts, this seems to reflect the spread of perceived participation beyond association members, a factor that bodes well for sustaining project impacts and helps explain the overall significan impact of the project.

Age and years of residency were found to be negatively correlated with perceived amount of change in overall well-being of the resource and community conflict. These older, long-term residents fished the waters in times of lower human population density, with less pressure on the resource, and at a time when the waters were more productive. The recent positive changes in the resource may appear to be minor to one who has a longer time perspective, encompassing an era when the fishery probably was not over exploited. Palanas is characterized by a high degree of occupational multiplicity, and it is interesting to note that fisher households with income from non-fishing sources tend to perceive smaller (or more negative) changes in the amount of traditionally harvested resources in the water. Because they have other sources of income, the changes might not be perceived as being as significant as they would to those without other sources of income.

As at the other sites, the vast majority of respondents in Palanas reported that they would again become a fisher if they had their life to live over (100%) and they would not change from fishing even if other employment existed in which they could make the same income (86%). The few that said they would leave the occupation perceived less positive changes in income, overall well being of the resource, and influence in community affairs than those who would not change their occupation.

The majority of fishers in Palanas (76%) reported that the condition of the nearshore resources were better off today in comparison to 10 years ago. This corresponds with their perception of improvement in the overall well-being of the coastal resources. The reasons given for improvement had to do with project interventions such as mangrove reforestation and better resource management. The responses suggest a direct link between improved resource management and the CBCRMP activities.

The respondents indicated positive attitudes towards collective action. A large majority of the fishers reported that they could work together to solve community problems and solve a problem in the fishery. The optimistic attitude towards collective action may be due to the high degree of socioeconomic and cultural homogeneity which exists in Palanas. Most residents have lived in the same barangay all their lives and feel that they can work together with their neighbors to solve problems. More non-members believed that the government and fishers should work together to solve a problem in the fishery than members. This may be due to the training association members received in leadership and community organizing which gave them greater confidence to solve problems themselves without the need for outside assistance.

In terms of the preconditions for co-management, the Palanas project met 7 of 9 preconditions, namely: 1) existence of use rights, 2) provision for user participation in rule making, monitoring and enforcement, 3) access to local conflict resolution mechanisms, 4) socioeconomic homogeneity, 5) nesting of associations, 6) organizational scale, and 7) appropriateness of rule to local conditions. The two unmet preconditions are multiplicity of association functions and boundary delineation. The Palanas Fishermen's Association is affiliated with a regional association, the Federation of Fishermen's Associations.

As a successful CVRP-1 site, Palanas offers several useful lessons. Although not all of the project interventions were sustained, the interventions which were sustained (association and mangrove reforestation) have been expanded (increase in membership and functions of the association). All respondents perceived improvements in their household, community and resource. While it is not possible to attribute all the improvements to the project, at least part of the improvements can be explained by involvement in and with the project. The project seems to have stimulated interest in and knowledge of resource management and conservation and empowered community members to act together to solve problems.

3.2.1.6 Sta. Cruz, Ronda, Cebu

Site Description

Sta. Cruz is a barangay of the municipality of Ronda located on the southwestern coast of the Province of Cebu. Almost 80 kilometers from Cebu City, it is approximately a two hour bus ride on a paved road network. A relatively large barangay at 335 hectares, Sta. Cruz is bounded by the municipality of Dumanjug on the north, barangay Canduling on the south, barangay Cangayahon on the east, and Tañon Strait on the west. Sta. Cruz is composed of three sitios, namely: Jandiling, Cambun-an, and Laum-atabay.

Located three kilometers from the Ronda poblacion, Sta.Cruz is accessible by pedicab or tricycle from the national highway. The interior, upland areas, however, can be reached only by foot using narrow and rocky pathways.

The shoreline of Sta. Cruz is characterized by a continuous stretch of white sand beach dotted occasionally by sparse mangrove trees that have managed to withstand the strong wave action. Small, unmotorized boats are scattered on the beach near the homes of the fishers. The white sand beaches of Sta. Cruz are a tourist attraction and a beach resort has been recently constructed to take advantage of this economic opportunity. The relatively flat coastal zone leads to a rugged, mountainous interior of the barangay.

Site Project Variables

Barangay Sta. Cruz was considered a less successful beneficiary community of CVRP-1 in Ronda, Cebu. Prior to the CVRP-1, national government services delivery to Sta. Cruz were reportedly minimal. There were limited coastal resources management efforts. CVRP-1 was the first government program to extend assistance to the barangay.

The CVRP-1 activities began in 1987. As at other CVRP-1 sites, the project concept was introduced to the residents of Sta. Cruz through a community assembly. Project implementation was participatory and flexible. A part-time community organizer (CO), who resided in the Site Management Unit office in Ronda poblacion, divided his time between five barangays. The CO acted in a similar fashion as described for Palanas.

Prior to CVRP-1, the Bantay Dagat Sugbo Association (BDSA) was already in existence, having been organized in March 1985 by the municipality under the governor's program for marine protection. The BDSA had 82 original members. The CVRP-1 worked with the existing BDSA and renamed it the Sta. Cruz Fishermen's Association (SFA). The association is still in existence and currently has 60 members, of which 40 are reportedly active, under the recently reorganized Sta. Cruz Farmers and Fishermen's Association initiated by the Department of Agriculture.

Capability-building efforts involved the training of association members on various project activities and interventions including leadership, value formation, community organizing,

mangrove planting and management, coral reef management and fish sanctuary, fish processing, abalone culture, small enterprise development, fish aggregating devices, and artificial reefs. Cross visits were made to Apo Island marine sanctuary, Bantayan and Zamboanga to expose the beneficiaries to tangible cases of community-based coastal resource management and alternative livelihood activities.

CVRP-1 interventions in Sta. Cruz included communal mangrove reforestation (15,000 seedlings), concrete artificial reefs (53 modules), marine sanctuary (20 ha) fish aggregating device (4 units), and abalone (kapinan) culture (500 pieces). The CVRP-1 phased out of Sta. Cruz in 1992.

A survey of community members was conducted to determine their degree of participation in CBCRMP planning and implementation as well as knowledge of project objectives (Table 51). Overall the results indicate that the project cooperators (association members) had the greatest amount of participation as well as knowledge concerning project objectives. Twenty association members and 13 non-members were interviewed. One hundred percent of the association members expressed knowledge about the project objectives compared to only 62 percent of non-members. The difference was statistically significantly (X^2=6.32, $p<0.05$). The association members stated project objectives as (multiple responses possible) to rehabilitate the degraded condition of coastal resources (50%), to improve the coastal resources and the community welfare (30%), to control or minimize illegal fishing methods (10%), and to provide the opportunity to protect coastal resources (10%). Overall, 80 percent of association members compared to 54 percent of non-members felt that they influenced the planning of the project. The differences are not statistically significant (X^2=2.55, $p>0.05$). In contrast, 75 percent of the association members versus 62 percent of non-members felt that they had influence on changes in the project after it began. The differences are not statistically significant (X^2=2.55, $p>0.05$). Attendance at CBCRMP training sessions and meetings also seem to be concentrated among association members. As for meeting attendance where the project was discussed, 95 percent of association members attended and only 54 percent of non-members. Eighty percent of the association members attended training sessions. They attended an average of 3 training sessions and 4 meetings where the project objectives were discussed. Fifty-four percent of non-members attended training sessions. Non-members attended an average of one training and one meeting where the project was discussed.

Table 51. Community participation in CBCRMP implementation.

	% Member	% Non-Member	Total	X^2	p
Influence Planning	80	54	70	2.55	0.110
Influence Project Changes	75	62	70	0.68	0.411
Attend CBCRMP Meetings	95	54	79	7.98	0.005
Attend CBCRMP Trainings	80	54	70	2.55	0.110
Knowledge of Objectives	100	62	85	6.32*	0.012

* = continuity corrected (Yate's correction)

Context Variables

Supra-community Context

Enabling Legislation. During the Sta. Cruz CBCRMP planning and implementation period, fisheries management was directed by PD 704. It was not possible for the researchers to locate a municipal basic fishing ordinance for Ronda. It was also not possible to locate a municipal fisheries code under the Local Government Code.

Supra-Community Institutions. A number of organizations and institutions outside Sta. Cruz have influence on local fisheries and/or coastal management. Prior to the implementation of CVRP-1, the provincial government of Cebu organized a Bantay Dagat Sugbo group (voluntary guards of the sea) in 1985. No services were provided to the group by the provincial government and members were not active. The Department of Agriculture-Bureau of Fisheries and Aquatic Resources (BFAR) held fisheries-related seminars and had prepared plans to develop the coastline, e.g., mangrove reforestation and marine sanctuary. Foster Parent Plan, an international NGO, worked in Sta. Cruz providing educational scholarships for children below age 18.

During the CVRP-1 implementation, BFAR personnel visited Sta. Cruz to provide technical assistance to fishers. Foster Parents Plan expanded its program with cattle and pig dispersal, provision of potable water source, toilets, electricity, and seminars on coastal resource conservation. The Department of Environment and Natural Resources-Community Environment and Natural Resources Office (DENR-CENRO) initiated a mangrove reforestation project. It provided assistance in mangrove management but no certificates of stewardship contracts were granted. The municipality of Ronda provided an area for the establishment of the marine sanctuary.

After completion of CVRP-1, the Department of Agriculture-Badian initiated a program of pig, cattle and goat dispersal. The Department of Agriculture also provided extension services on crop and livestock production and fishing. Foster Parent Plan continued its activities with the construction of a mill to produce animal feed. The mill was part of activities of the Sta. Cruz Multi-Purpose Cooperative. The Land Bank of the Philippines provided loans for the purchase of cattle and fertilizer. The governor has not provided active support to coastal resource management efforts in Sta. Cruz. The mayor of Ronda visits Sta. Cruz on a regular basis. Recent visits by the mayor have been to support a water project. The Department of Education, Culture and Sports conducts vocational training courses for residents.

Supra-community Markets. Approximately 25 percent of the fish and shellfish harvested in Sta. Cruz is consumed locally in Sta. Cruz and Ronda town proper. Approximately 50 percent is transported for sale in the neighboring municipality of Dumanjug. The remaining 25 percent is transported for sale in Cebu City. In 1985 there were 10 fish traders in Sta. Cruz. This has decreased to 8 fish traders in 1995. The decrease is reportedly due to the death of two fish

traders. The distribution channels and markets for fish from Sta. Cruz have reportedly stayed the same during the last ten years.

It is reported that there is a greater demand for fish today than in the past. The demand reportedly increased over the last decade by 60 to 70 percent. Key informants attribute this demand to increasing population as well as increases in prices of other sources of animal protein. Along with increasing demand for fish, retail prices in Sta. Cruz have also increased from 60 to 250 percent.

Post-project, Supra-community Shocks to the System. No new technologies, other than those introduced by the project (ARs, FADs) have been used in the area since project implementation. Several strong typhoons, especially typhoon Ruping in 1990, have caused severe damage to the area. During the CVRP-1 project period, there were several severe periods of prolonged drought.

Community Context

Perception of Trends in the Resource. Key informants noted that prior to CVRP-1 implementation fish stocks were decreasing. During CVRP-1 the key informants state that the fisheries resource were in good condition due to the control of illegal fishing. After CVRP-1 it was reported that the fisheries resources were in slightly worse shape due to the proliferation of FADs.

A survey of 33 community members provided mixed opinions. Most of the respondents felt that the resource was in good or very good condition (88%) at the time the CBCRMP began. When asked about the condition of the nearshore resources today in comparison to ten years ago, 48 percent of the respondents said it was better off and 52 percent said it was worse off. Members of the Sta. Cruz Fishermen's Association (SFA) felt it was better off than non-members (55% and 38%, respectively; $X^2=0.863$, $p>0.05$). Aspects of this variation are discussed below in the section on individual and household data.

Target Species Composition and Distribution. Interviews with key informants representative of the major fishing gear types indicated that the following types of fish are considered most important in terms of income:

1. *Andohao* (round scad)
2. *Lumiyagan* (squid)
3. *Lokihok* (caesio)
4. *Mulmol* (parrot fish)
5. *Danggit* (siganid)
6. *Uyap* (small shrimp)
7. *Tikab* (unknown)
8. *Bansicol* (runner fish)
9. *Sunghan* (unicorn fish)

For home consumption the following species were indicated:

1. *Danggit* (siganid)
2. *Gotob* (scad)

Information from the fishers indicates that there is a slight increase in fish catch, especially for *andohao* which has increased significantly, in the last five years.

Environmental Features Influencing Boundary Definition. The coastline of Sta. Cruz is straight in shape with large rocks in the southern part of the barangay which delineates its boundary from the next barangay. The beach is white sand. The northern boundary of Sta. Cruz is open beach which makes it difficult to delineate from the next barangay. There are no natural boundaries in the sea. Boundary definition would be of medium difficulty. For example, marker buoys would be needed to define the boundary of a marine sanctuary as there are no natural boundary markers.

Technologies Used in Coastal Area. Most fishing is conducted from relatively small outrigger boats, ranging in size from a little over 2 meters to about 6 meters. The majority of boats are unmotorized and small. The unmotorized boats are powered by paddle, with only a few boats using sail. There are over 100 non-motorized boats and no motorized boats in Sta. Cruz.

Among the commonly used technologies, the most frequently used is the hook and line. The reported peak fishing season for using this gear is January to April. It is normally used at night between the hours of 4 PM and 6 AM. A variety of nets are used including the bottom set gillnet, the top set gillnet, and the scoop net. The top set gill net is used at night and the reported peak season for its use is April to July. The net is usually set near FADs. The bottom set gill net is used throughout the year but the peak periods of use are during the first and last quarter of the moon. The fishing time is early in the morning, 4 AM, to early afternoon, 3 PM. The fishing ground for both gillnets is Sta. Cruz and Moalboal. The scoop net is used with bait and a light to target squid. The hours of use are normally 6 PM to midnight. It is most effective during the new moon period. The peak season for use of this gear is January to May. Less common fishing gears in Sta. Cruz are spear and fish trap.

Level of Community Development. Level of community development is based on a checklist of items which are listed below. Items present in Sta. Cruz are presented in bold print. Those not present are normal print.

1. Hospital
2. **Medical Clinic (Health Center)**
3. Resident Doctor
4. Resident Dentist
5. Secondary School
6. **Primary school**
7. Public Water supply piped to home
8. Sewage pipes or canal

9. Sewage treatment facility
10. **Septic or settling tanks**
11. **Electric service**
12. Telephone service
13. **Food market (sari-sari store)**
14. Drug store
15. **Hotel or inn (Kasadya Resort)**
16. **Restaurant (Kasadya Resort)**
17. Gas station
18. **Public transportation**
19. **Hard top road access**
20. Banking services
21. **Television reception**
22. **Radio reception**

Degree of Integration into National Economy and Political System. The coastal products (fish) are collected by eight fish traders and transported to both the municipal center and neighboring municipalities to the north (Dumanjug), as well as to the provincial capital of Cebu City. This is facilitated by good transportation links (e.g., frequent buses and other transport vehicles) using the paved road which connects the coastal communities. Tricycles are used to travel to the barangay proper. Communication links are limited. One has to go to the municipal center of Ronda to find a telephone or other form of modern communication. Television and radio reception is possible and a number of homes have television. The governor of the province shows little interest in Sta. Cruz (e.g., no recent visits). The mayor of Ronda visits Sta. Cruz on occasion. Except for the communication links, the degree of integration into the national economy and political system can be classified as medium.

Tradition of Cooperation and Collective Action.The residents of Sta. Cruz have been involved in a number of groups or associations. Since the mid-1980's there has been a Rural Improvement Club, organized by the Department of Agriculture, for nutrition training for women. For over ten years there has been a Parents and Teachers Association in the local primary school. For over 20 years the Sta. Cruz Catholic Women's Association has organized fiestas and church-related activities. The Jandiling Young Mens and Ladies Association has for over 20 years organized social events in the community. In 1986 the Land Bank organized the Sta. Cruz Multi-Purpose Cooperative to provide credit for farming and livestock purposes. In 1992 the barangay organized the Sanguniang Kabataan, with assistance from the Department of Interior and Local Government, to provide sports programs for young people. The Bantay Dagat Sugbo Association (BDSA) in Sta. Cruz, started in 1985, was organized by the Province of Cebu as voluntary guards of the sea. The CVRP-1 worked with and strenghtened the BDSA through its activities and interventions and renamed it as the Sta. Cruz Fishermen's Association in 1987. In 1995 the BDSA was reorganized under the Department of Agriculture as the Sta. Cruz Farmers and Fishermen's Association.

It was reported that Sta. Cruz was torn by many internal conflicts. The barangay residents were divided into several factions as a result of long standing differences over several issues.

For example, relatives of an elected official violated the rules of the marine sanctuary without any punishment. The respondents reported that the project fostered greater understanding and harmony in the community and reduced the level of conflict.

Occupation Structure and Dependence on Coastal Resources. The only occupation dependent on coastal resource in Sta. Cruz is fishing and beach resort. Approximately 27 percent of the households (121 households) depend, at least in part, on fishing for a livelihood. Five households are fish traders. The distribution of occupations in Sta. Cruz can be found in Table 52.

Key informants identified fishing and farming as the most important economic livelihoods in Sta. Cruz. Other livelihoods included driver, housekeeper, handicrafts and carpenter. Based on the percent of households dependent on only fishing or fishing and farming, we might estimate that the economy is about 40 percent dependent upon coastal resources.

Table 52. Distribution of occupations.

Occupation	Percent
Fishers	13
Farmers	24
Fishers/Farmers	12
Drivers	5
Housekeepers	6
Carpenters	4
Fishers with other occupation	2
Farmers with other occupation	*
Others	33

* = <1%

Degree of Socioeconomic and Cultural Homogeneity. A discussion with key informants indicates that approximately 55 percent of the households in Sta. Cruz are either fishing, mixed fishing/farming, or farming. Smaller percentages of the households are represented by other occupations, indicating a fair degree of occupational heterogeneity. With respect to ethnicity, the key informants estimated that 90 percent of the households consisted of locals and 10 percent of households from other places including the island of Negros and other barangays in Ronda. In terms of religion, 90 percent of the households are reportedly Catholic and 10 percent are Protestant. Overall the population of Sta. Cruz manifests a fair degree of socioeconomic and cultural homogeneity.

Political Organization and Conflict Resolution. Sta. Cruz is a barangay in the municipality of Ronda which forms part of the province of Cebu. The barangay political organization and conflict resolution is similar to that described for Calagcalag.

Population and Population Change. The population of Sta. Cruz was 1315 in 1975. This increased to 1609 in 1980, 1734 in 1985, 1870 in 1990, and 1955 in 1993. Between 1975 and

1990 there was a 2.8 percent average population growth rate. In 1990 there were 380 households. This increased to 420 households in 1995.

Coastal Resource Use Rights, Formal and Informal. An informal systems of coastal use rights or rules were identified during the research period.

As stated earlier, it was not possible to locate a municipal basic fisheries ordinance under PD 704 or municipal fisheries code under the LGC. Three specific municipal ordinances which impact fishing were located and described in the Palanas section. Specific to Sta. Cruz was the establishment of a marine reserve for fish sanctuary under Resolution No. 86, Ordinance No. 3 of 28 November 1987. The sanctuary was located in the waters of sitio Jandili-og about 400 meters by 500 meters reserved for fish breeding as defined by appropriate markers or buoys. The ordinance stated that no fishermen or group of fishermen or any fishing vessel or group of fishing vessels shall be allowed to fish within the marine reserve or fish sanctuary. Penalties for violation included fines and imprisonment. Despite the ordinance, it is reported that violations of the marine reserve were rampant due to lack of enforcement. It was stated that the legality of the marine reserve was questioned since it did not have approval of the secretary of the Department of Agriculture. There was also reportedly reluctance on the part of the mayor's office to implement the provisions of the ordinance.

Use rights for mangrove areas cannot be sold but can be transferred to heirs. According to DENR, mangrove stewardship contract holders are given a 25 year lease. If the contract holder dies, the family needs to apply to DENR-CENRO for the contract to be transferred to the new family member who will become the contract holder.

Women. Women in Sta. Cruz are engaged in both fishery and non-fishery based activities. Women in two of the 33 respondent households gather shellfish for home consumption on an irregular basis on an average of two hours a day. Fish paste making is conducted by women in several households on an irregular basis. Women in 26 of the 33 households are involved in fish marketing or trading. This includes selling the catch of their husbands to fish traders or direct. This activity can take anywhere from 3 to 12 hours a day. The women of Sta.Cruz are known for mat weaving of handicrafts. The women earn an average annual income of PhP 1727 from coastal dependent activities. Women from non-member households earn more than women from SFA member households (PhP 2088 versus PhP 1413, respectively). Women from non-member households also earn more from other sources than women from SFA member households (PhP 913 versus PhP 537 , respectively). The non-coastal related activities include livestock and poultry raising (52%), vegetable gardening (9%), farming (6%), dressmaking (6%), and sari-sari store (3%). Women from seven of the 20 SFA member respondent households participated in the CBCRMP activities. A woman from one non-member household participated in the CBCRMP activities. The aspects of the CBCRMP participated by women included training on AR construction and sanctuary management, community organizing, and mangrove reforestation training. The reported benefits the women derived from participation in the CBCRMP included learning how to protect coastal resources, improved environmental benefits, gaining knowledge to improve livelihood, received fish net, and gaining knowledge about rules and regulations on fishing. The reasons given by women

for not participating in the CBCRMP included being busy with other activities or having no time, husband is already participating, and old age.

Individual and Household Level Context

Characteristics of Sample Fisher Households. A random sample of 33 households were selected from a population of households identified as depending to some degree on the nearshore fishery of Sta. Cruz. The sample consisted of 20 households belonging to the SFA and 13 non-member households. All of the households are involved in some aspect of coastal resource exploitation either for income or subsistence. Some general background characteristics of the sample can be found in Table 53. As can be seen from the table, SFA members are older, have lived longer in the area, have more education, have a larger household size, and have worked longer in marine resource related type of work than have non-members.

Table 53. Characteristics of sample.

Variable	Member	Non-Member	Total	t-value	p
Age	51.90	47.31	50.09	1.23	>.10
Education	5.20	5.15	5.18	0.10	>.10
Years resident	42.05	40.62	41.48	0.26	>.10
Household size	6.55	5.31	6.06	1.64	>.10
N	20	13	33		

In a similar manner to that describe above for Calagcalag, relative income was evaluated based on assets including house structure, furnishings, and ownership of productive equipment. The results of the survey of assets are shown in Table 54. The distribution of house structure types in Table 54 suggests that more SFA members than non-members are characterized by a medium to high level of housing. The differences are not statistically significant (X^2=0.041, p>0.05). The house furnishings of SFA members are also of a slightly higher quality than non-members. The differences are not statistically significant (X^2=0.122, p>0.05). All of the 33 respondents own their own boat.

Table 54. Percent distribution of assets.

	% Member	% Non-Member	% Total	X^2	p
House structure				0.041	0.840
Minimal	15	31	21		
Low	20	08	15		
Medium	45	62	52		
High	20	00	12		
House furnishings				0.122	0.727
Minimal	00	08	03		
Low	40	39	39		
Medium	50	54	52		
High	10	00	06		
Productive equipment				-	-
Boat ownership	100	100	100		
N	20	13	33		

Occupational Multiplicity and Dependence on Coastal Resources. When asked to provide their current occupation, 100 percent of the sample identified themselves as practicing a fishery related occupation (multiple responses possible). They reported being involved in this fishery related occupation for a mean of 27 years. Twenty-seven percent said they were also farmers, 6 percent said they were laborers, and 3 percent said *sari-sari* store operator. Twelve percent of the respondents have done some other type of work such as farming, carpenter or welder. Such occupational multiplicity is common in rural areas as a survival strategy.

In terms of income, 97 percent of the respondents ranked fishing as the most important source. Three percent said raising livestock. Ninety-one percent of the respondents derived over half of their income from fishing. Seventy percent of the households have non-coastal resource related sources on income, primarily from farming and livestock raising. Only one household received remittances from outside the household. Fishing is the most important activity in terms of food for 100 percent of the households. Fishing provides more than half the food for 97 percent of the households. Farming is another important source of food.

Collective Action. Two indicators of collective action were examined as part of the survey: association membership and attitudes towards cooperation (cultural values). It must be noted that the sample was stratified on the basis of SFA membership, and the population from which the sample was drawn included only households identified as participating in the nearshore fishery. With these qualifications in mind, none of the SFA members belong to another association. None of the non-members belong to an association. None of the SFA members ever belonged to any other type of association. Three of the 13 non-members belonged to a coastal resource user association in the past. The stated reasons for leaving the association include that they did not understand the purpose or regulations of the association and inactive membership. The SFA members perceive the purpose of their

association to be to protect coastal resources from illegal activities, to improve the fishery resources, to improve the welfare of the fishers, as a source of funds for members, to establish marine sanctuary, AR, FAD and mangrove reforestation, and to rehabilitate the mangrove forest. The SFA members report that the benefits of belonging to the association include learning new technology about fishing and mangrove reforestation (45%), immediate services to the community (15%), obtain income from mangrove reforestation (5%), increased catch and income of small fishers (5%), exclusive rights to use the ARs and FADs built by the association (5%), unity of fishers for resource management (5%), and attending seminars and trainings (5%). Several non-members reported their perceptions for belonging to the association including obtaining income from mangrove reforestation, learning new technology about fishing and mangrove reforestation, attending seminars and trainings, and unity of fishers for resource management.

In terms of cultural attitudes toward collective action, 88 percent of the sample believe that the people of the community can work together to solve community problems. More SFA members believe this than non-members (100% versus 69%, respectively; $X^2=2.417$, $p>0.05$). Eighty-eight percent of the sample believe that fishers could work together to solve a problem such as illegal fishing (95% SFA members versus 77% of non-members). Seventy-nine percent of the respondents agree that government and fishers should work together to solve a problem in the fishery. Eighty-five percent of SFA members agree versus 69 percent of non-members. Overall, the sample has an optimistic attitude towards collective action.

Job Satisfaction . When asked if they would become a fisher if they had their lives to live over, fully 100 percent of the sample said yes. The most frequent reasons given were: have been doing this type of work as a source of livelihood, no other source of income or occupation, fishing is the first work I have known, it is a good source of income, and it is an easy job.

In response to a question concerning if the respondent would change from fishing to other employment if they could make the same income, 88 percent of the respondents said no. Ninety percent of the SFA members said no and 85 percent of the non-members said no. The most common reasons given for not changing were either economic (direct and sure source of food and income, don't have a large amount of capital) or inertial (used to fishing, all I've ever done). These responses made up 58 and 31 percent, respectively, of the reasons for not switching from fishing to another occupation.

When asked what they like about fishing in comparison to other jobs, the most common responses were related to income and food for home consumption. Forty-nine percent of the 33 responses (multiple responses were allowed) indicated food or income. Twenty-seven percent of the responses stated having own time and no boss. Lower frequency responses included near house and family (15%), easy type of work (15%), and it can be done day or night.

Overall, it seems as though that fishing is rewarding, both economically and psychologically, to the fishers of Sta. Cruz.

Ecological Knowledge. Fishers were requested to identify the characteristics of the sea that have a positive influence on the status of the resource. Eighty-two percent said the presence of seaweeds and seagrasses, 42 percent said the presence and/or abundance of mangrove trees, 18 percent said the presence of corals, 18 percent said the presence of algae, and 18 percent said the presence of dried leaves or detritus of mangrove trees. Multiple answers were permitted; hence, percentages can sum to more than 100. When asked about the condition of the nearshore resources today in comparison to ten years ago, 52 percent of the respondents said worse off and 48 percent said better off. More SFA members reported that the resource was better off than non-members (55% versus 38%, respectively; $X^2=0.863$, $p>0.05$). Reasons for the resource being worse-off included fish catches decreased due to use of chemicals, less food for fish, entry of commercial fishers, coastal resources were destroyed, illegal fishing activities, increasing numbers of fishers, declining coral population, calamity (typhoon), and coastal resources have not been fully rehabilitated. Reasons given by respondents for the resource being better off include coral reef management and protection of other coastal resources, establishment of marine sanctuary, coastal resources protected by fishers, conservation and rehabilitation efforts, and reduced use of illegal fishing methods. Most of the respondents (88%) reported that the resource was in good or very good condition at the time of project implementation. SFA members were more likely to report that the resource was in good condition at the time of project implementation than non-members (100% versus 92%, respectively). The differences are not statistically significant ($X^2=1.587$, $p>0.05$). SFA members seem more positive than non-members with respect to the good status of the resource. Implications of this variation will be discussed along with the discussion of project impacts.

Impact Variables

Achievement of Intermediate Objectives

Material Aspects. Five distinct intermediate objectives, which can be evaluated in terms of material aspects, formed part of the project. Project reports and interviews with ex-project staff, involved agencies, and Sta. Cruz fishers, as well as direct observations were used to evaluate the current status of the intermediate objectives. It should be noted that the project provided all the materials.

Artificial Reefs. The project placed 53 modules of concrete artificial reefs into the waters of Sta. Cruz. It is reported that the ARs subsequently became detached at the joints and broke apart. It was not possible to determine the current status of the ARs due to lack of monitoring.

Fish Aggregating Device. The project reported that four fish aggregating devices (FADs) were installed with the involvement of SFA members. The FADs reportedly lasted more than two years. Both members and non-members of the association were allowed to fish the FADs. The non-members, however, were required to contribute 25 percent of their catch to the association as payment of use of the FAD. Privately placed FADs currently exist in the coastal waters of Sta. Cruz.

Mangrove Reforestation. A communal mangrove reforestation project was implemented in Sta. Cruz. Fifteen thousand seedlings were planted and maintained by SFA members. The unprotected open shoreline, tidal movements and heavy foot traffic in the reforestation area led to a low survival rate. Reportedly only 50 mangrove plants have survived. No certificates of stewardship contracts were issued to the mangrove planters. This lack of individual or family partitioning (privatization) of mangrove plots may have dampened member enthusiasm to maintain the area. Low survival of the mangrove seedlings was due in part to poor environmental conditions in the area (soil, wave action).

Fish Sanctuary. As mentioned earlier, a fish sanctuary was established in Sta. Cruz and a municipal ordinance passed to support the reserve. The municipal ordinance was not approved by the Department of Agriculture. The beneficiaries reported an increase in fish volume six months after establishment of the sanctuary. A buffer zone of 25 meters around the sanctuary was agreed upon by members. A guard house was built. Commercial fishers reportedly entered the sanctuary and non-members insisted on fishing in the area. Non-punishment of violators, who were often reportedly relatives and friends of municipal officials, discouraged the members who were guarding the sanctuary on a voluntary basis. With the breakdown in enforcement, even association members began to violate sanctuary regulations. The sanctuary was no longer in existence before CVRP-1 completed its activities in Sta. Cruz. A privately-owned beach resort, which started operation in 1993, now stands near the sanctuary area.

Abalone Culture. Five hundred pieces of abalone were transplanted for grow-out in the waters of Sta. Cruz. This was a short lived project as the abalone only lasted three weeks after being transplanted. It is reported that the absence of ice during shipping shortened the life span of the abalone.

Except for a few mangrove trees and an unmaintained guard house near the sanctuary, all project interventions were not sustained after project completion.

While project FADs were not maintained, the technology is being utilized by private individuals in the barangay. This can be viewed as a succesful interventions as the technology is maintained.

Institutional and Organizational Aspects. CVRP-1 implementation depended on the establishment of fishers associations in project communities. The Sta. Cruz Fishermen's Association (SFA) is the organization utilized by the project. CVRP-1 intermediate objectives, discussed above, were to be associated with institutional changes which would grant exclusive rights for cooperators (e.g., association members) use of interventions such as FADs, ARs and marine sanctuary. It was assumed that obtaining rights, along with associated training would stimulate conservation practices, including monitoring, among the cooperators - activities which would benefit the community as well as the resource.

Organization. The project conducted trainings and community organizing which resulted in the strengthening of the existing BDSA. In 1985 the BDSA had 82 members. Recently, it was

reorganized as the Sta. Cruz Farmers and Fishermen's Association with 60 members. About 40 are still active as of late 1995. At present the association does not have any active coastal resource management projects but it is planning to register with the Department of Labor and Employment.

As part of the household survey, 20 SFA members were asked what they perceive as the benefits of belonging to the association. Out of the seven benefits mentioned (multiple responses were allowed), 45 percent said they had learned new technology about fishing and mangrove reforestation, 15 percent said immediate services to the community. A relatively small number (one response) involved increased income, unity of fishers, attending seminars and lectures, and exclusive use rights to interventions.

Use Rights and Management Efforts. Specific association use fishing rights were provided as part of project interventions and activities. SFA members were given exclusive fishing rights to FADs and ARs . No mangrove stewardship contracts were awarded.

Respondents were asked if they knew the reasons for creating rules and managing FADs and ARs, creating a marine sanctuary, and, although not provided, mangrove stewardship contracts. With respect to rules for managing FADs and ARs, 25 percent of SFA members said to monitor the status of AR and FAD including the fish stocks, 15 percent said to compensate the efforts of members, 15 percent said to give exclusive rights to members. Low frequency responses (one or two responses) were to encourage association members to participate, members are more familiar with the technology, to encourage non-members to join the association, and to regulate the use of AR and FAD. Twenty-three percent of non-members didn't know, 23 percent said to encourage non-members to join the association, 15 percent said to encourage members to participate, and 15 percent said because members were more familiar with the technology. Multiple responses were permitted.

When asked the reasons for creating rules for the fish sanctuary, 45 percent of SFA members said to provide protection in the area since it's a habitat and breeding area for fish, 20 percent said to restore coral reefs in the sanctuary, 20 percent said to improve fish productivity and the coral on which they live, and 15 percent said to allow fish to grow big and healthy. Twenty-three percent of non-members said to provide protection in the area since it's a habitat and breeding place for fish, 23 percent said to improve fish productivity and the corals where they live, 23 percent said to ensure protection of the area, 23 percent said they don't know, and 15 percent said to allow fish to grow big and healthy. Multiple answers were allowed.

When asked about mangrove stewardship contracts, 30 percent of BDSA members said to provide exclusive rights to members, 20 percent said to compensate people involved, 20 percent said to encourage participants to maintain their mangrove trees, and 10 percent said to avoid overlapping of claims. Thirty-eight percent of non-members said to compensate the people involved, 21 percent said to provide exclusive rights to members, 18 percent said to encourage participants to maintain their mangrove trees, 12 percent didn't know, and 9 percent said to avoid overlapping claims.

It can be concluded that overall the fisher community both understands the reasons for and has a generally positive perception of use rights and management rules. Although it should be noted that SFA members have a greater understanding than non-members. Both provided responses indicating that those who make the improvements deserve exclusive use rights, that it encourages association members to participate, and that it insures that the intervention and the resource is properly maintained.

Perceived Impacts on the Coastal Ecosystem

Methods. To determine perceived impacts on the coastal ecosystem, respondents were requested to provide evaluations of a number of aspects of this ecosystem for pre-project, present, and future time periods. A self-anchoring, ladder-like diagram with 15 steps was used, where step 1 represents the worst possible situation and step 15 the best possible situation. The respondent was asked to indicate the step which best describes the situation for 10 impact indicators, namely: 1) overall well-being of the household, 2) overall well-being of the resource, 3) local income, 4) access to resources, 5) control over resources, 6) ability to participate in community affairs, 7) ability to influence community affairs, 8) community conflict, 9) community compliance with resource management, and 10) amount of traditionally harvested resource in the water.

Analysis. As a first step in the analysis mean values for each indicator for today and the pre-project time periods were calculated, and a paired comparison t-test was calculated to determine if differences between means are statistically significant. The results of this analysis are in Table 55. The results show an increase in perceived levels of all indicators. All differences are statistically significant.

Table 55. Perceived pre-project to post-project changes in indicators.

	MEMBER				NON-MEMBER				ALL			
	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p
Access	7.80	6.50	1.30	>.10	8.54	5.69	2.85	<.05	8.1	6.2	1.9	<.05
Compliance	9.25	5.65	3.60	<.01	9.31	6.00	3.31	<.01	9.3	5.8	3.5	<.01
Conflict	9.35	5.60	3.75	<.01	8.85	6.00	2.85	<.01	9.2	5.8	3.4	<.01
Control	8.75	4.90	3.85	<.01	8.92	5.23	3.69	<.01	8.2	5.0	3.8	<.01
Harvest	9.55	5.55	4.00	<.01	9.15	5.77	3.38	<.01	9.4	5.6	3.8	<.01
Household	7.90	4.25	3.65	<.01	8.38	5.38	3.00	<.01	8.1	4.7	3.4	<.01
Income	7.80	4.05	3.75	<.01	7.54	3.46	4.08	<.01	7.7	3.8	3.9	<.01
Influence	8.40	4.40	4.00	<.01	9.23	5.62	3.62	<.01	8.7	4.9	3.9	<.01
Participate	8.95	4.80	4.15	<.01	9.31	4.85	4.46	<.01	9.1	4.8	4.3	<.01
Resource	7.80	4.85	2.95	<.01	8.54	6.23	2.31	<.05	8.1	5.4	2.7	<.01
N=33												

The next step in the analysis was to determine if project cooperators (SFA members) differed from non-cooperators with respect to perceptions of changes in the indicators. This was

accomplished by subtracting the pre-project evaluation from the today evaluation for each indicator and calculating a two-sample t-test for the difference of mean values between the SFA and non-SFA samples. The results of this analysis can be found in Table 56. The results of the analysis show that project cooperators are more positive on all indicators except income, access and participation; however, none of the differences are statistically significant ($p>0.05$).

Table 56. Differences between members and non-members with respect to perceived changes.

	T2-T1 Member	T2-T1 Non-member	t-value	p
Access	1.3	2.9	-1.01	0.318
Compliance	3.6	3.3	0.45	0.654
Conflict	3.8	2.9	1.15	0.260
Control	3.9	3.7	0.16	0.877
Harvest	4.0	3.4	0.70	0.490
Household	3.7	3.0	1.15	0.260
Income	3.8	4.1	-0.46	0.650
Influence	4.0	3.6	0.44	0.663
Participate	4.2	4.5	-0.36	0.719
Resource	3.0	2.3	0.41	0.682
N	20	13		

As a next step in the analysis, relationships between perceived changes in the indicators and other individual and household level variables, which socio-cultural research and theory suggest may be important, are examined. Relationships with individual and household level variables such as age, education, number of household members, years of residency in the community, and ecological knowledge are found in Table 57. Most of these variables are self-explanatory except ecological knowledge which is explained in the section on Calagcalag. A number of the relationships are statistically significant, especially those for taxa-knowledge.

Table 57. Correlations between indicators and selected household/individual level variables.

	Age	Educ.	House Member	Resid.	Eco-Know.	Taxa. Know.
Access	.30*	-.14	.20	-.02	-.002	.27
Compliance	.02	b .07	.22	.05	.19	.44***
Conflict	.20	-.11	.07	.09	.17	.58***
Control	.35**	-.02	.01	-.02	.01	.52***
Harvest	-.03	.07	.10	.04	.30*	.31*
Household	.16	-.15	.19	-.03	.23	.41**
Income	.32*	-.11	.05	.08	.16	.62***
Influence	.22	.08	.19	-.001	.29	.60***
Participate	.08	-.08	.00	-.06	-.04	.50***
Resource	.03	.15	.05	.11	.38**	.35**

N=33 **=p<.05
***=p<.01 *=p<.10

Relationships between occupation and economic related variables and perceived changes in the indicators are found in Table 58. These variables include important economic indicators such as ownership of productive equipment (boat ownership), sources of income (e.g., sources other than fishing, income from outside the household--e.g. remittances from family members in the city or abroad, and fishing identified as the primary source of income), and occupation related indicators (willingness to change from fishing to another occupation with comparable income and membership in a producer association--SFA). Note that the coefficient for boat ownership could not be computed. Table 58 indicates that individuals from households with non-fishing source of income tend to perceive a smaller (or more negative) change in household, participation and conflict. Those with income from outside the household have a positive change in overall well-being of the household. Those who say they would switch from fishing to another occupation perceive a smaller (or more negative) change in overall well-being of the resource.

Table 58. Correlations between indicators and selected occupational and economic level variables.

	Nonfish Income	Outside Income	Fish Primary	Leave Fishing	Member
Access	.11	.17	.25	.16	-.18
Compliance	-.27	.15	.05	-.05	.08
Conflict	-.36**	.13	.03	.02	.20
Control	-.24	-.05	.05	.10	.03
Harvest	-.20	.02	-.24	-.001	.12
Household	-.38**	.40**	-.07	-.03	.20
Income	-.28	.01	-.10	-.26	-.08
Influence	-.24	.23	-.09	.06	.08
Participate	-.43**	-.02	.10	-.004	-.07
Resource	.25	.18	.03	-.37**	.07

N=33 **=p<.05

The ten indicators were submitted to a principal component (with varimax rotation) analysis to determine if relationships between the indicators were such that they could be reduced to fewer, composite indicators for further analysis. Results of the principal component analysis are in Table 59. Number of components were selected on the basis of the scree-test. The two rotated components explain 62 percent of the variance in the set of indicators. Component one is composed of household, participation, influence, conflict, compliance and harvest. Component two includes income, access and control.

Table 59. Principal component analysis of impact indicators.

	Component One	Component Two
Household	.72**	.09
Harvest	.84**	.06
Influence	.80**	.37
Compliance	.84**	.12
Participate	.72**	.48
Conflict	.81**	.19
Access	-.01	.75**
Control	.20	.77**
Income	.46	.68**
Resource	.36	.23
Variance	50%	12%

Factor scores were created for each individual for each component. Step-wise multiple regression was used to determine the set of independent variables that explained most of the variance in each of the components. An explanation of the analysis is provided in the section on Calagcalag. The results of the analysis are in Table 60.

Two variables were entered into the regression equation for Impact Component One: non-fishing source of income and association membership. The adjusted coefficient of determination of 0.16 indicates that about 20 percent of the variance in Impact Component One can be accounted for with these two variables. Only one independent variable was entered into the regression equation for Impact Component Two (age), and the probability associated with the regression coefficient is statistically significant ($p<0.05$).

Table 60. Regression analyses of impact components.

Dependent Variable: Impact Component One

Variables	Standardized Coefficient	t-value	Probability (2-tail)
Nonfish income	-0.438	-2.60	0.014
Member	0.308	1.83	0.078

$R = 0.460$; $R^2 = 0.212$; Adjusted $R^2 = 0.159$
$N = 33$; $F = 4.036$; $p = 0.028$

Dependent Variable: Impact Component Two

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Age	0.406	2.47	0.019

$R = 0.406$; $R^2 = 0.165$; Adjusted $R^2 = 0.138$
$N = 33$; $F = 6.116$; $p = 0.019$

Discussion

The Santa Cruz nearshore fisheries component of the CVRP-1 was considered to be less than successful by project staff since none of the material interventions were sustained after project completion. From the perspective of the fisher households interviewed, however, the project was a success. They perceived a statistically significant increase in all ten impact indicators. It is important to note that this overall perception of positive change in the impact indicators exists despite partial or complete failure of most project interventions. The association, reorganized and strengthened under CVRP-1, is still in existence, although it has again been reorganized under a new program.

Comparing the members with the non-members of the beneficiary association during the pre-project and present periods, the members perceived statistically significant improvements in 9 of 10 impact indicators. Non-members perceived a statistically significant increase in all 10 impact indicators. The non-members perceived higher increases in income, access and participation than did members. It is important to note that perceived improvements were noted by both members and non-members, a desirable impact of the project in order not to create new social strata in the community.

Both members and non-members reported a high level of knowledge of project objectives and a high level of participation in project planning and changes in the project. The association members (project cooperators) reported a higher knowledge of objectives and participation than non-members. The differences in participation between members and non-members was not statistically significant. The participatory and adaptive nature of the project resulted in fishers, both members and non-members, feeling that they were active participants of the project, despite its reported overall lack of success at meeting the project objectives.

Cultural values towards collective action were high in Sta. Cruz. Eighty-eight percent of the respondents believe that the people of the community can work together to solve community problems and to solve a problem in the fishery. Despite this optimistic attitude towards solving community problems on their own, the dominant perception was that of the need for government to work together with fisher to solve problems. This optimistic attitude may be attributed to the training and organizing provided by the project and past and present experiences with different associations and organizations.

The fish sanctuary established in Sta. Cruz was widely supported by association members and the municipal government in its early stages. Yet despite this initial support and a municipal ordinance, the members were not able to maintain the marine reserve due to rampant violations, lack of enforcement, and lack of continued support from the government. This case illustrates the importance of fisher and government cooperation in resource management. Stronger action by the municipal government to support the fishers initiative may have been the needed ingredient for the marine reserve to survive.

As noted above, 100 percent of the respondents reported that they would again become a fisher if they had their life to live over and 88 percent said they would not change from fishing even if other employment existed in which they could make the same income. Rationales for preference of fishing over other occupations included both economic and psychological aspects of job satisfaction, suggesting that projects with an alternative employment component will have to overcome potential resistance to shifting out of fishing.

Reviewing the experience of CVRP-1 in Sta. Cruz several features of the project process can be generalized for use at the other sites: 1) participation of beneficiaries during project planning and implementation phases; 2) presence of an association; 3) training of project beneficiaries; 4) communication of project objectives; and 5) deployment of a part-time organizer in the barangay.

In terms of the preconditions for co-management, the Sta. Cruz CBCRMP project met 7 of 9 preconditions, namely: 1) use rights; 2) appropriateness of rules in regard to local conditions; 3) provisions of user participation in rule making, monitoring and enforcement; 4) access to local conflict resolution mechanism; 5) degree of multiplicity of user organization function; 6) organizational scale; and 7) socioeconomic homogeneity. The two unmet preconditions are boundary delineation and nesting of associations. The Sta. Cruz Fishermen's Association is still active, although it has been reorganized and its functions have been increased under a new government initiative.

Despite project shortfalls, the respondents stated that the CBCRMP had, to some extent, fostered greater understanding and harmony in the community, which was previously torn by many internal conflicts. The CVRP-1 also made the residents of the barangay aware of environmental management and protection.

3.2.2 Coastal Environment Program (CEP)

The Coastal Environment Program (CEP) of the Department of Environment and Natural Resources (DENR) was prompted by the need to protect and preserve the remaining coastal and marine resources in the country. Anchored on equitable and sustainable resource use, its mission is to improve the quality of life of coastal residents through a community-based management approach. The program was launched in 1993 in 12 regions of the Philippines, using funds from the Philippine Government. To date, the CEP is still on-going nationwide. In Region 4, the project site is Ulugan Bay in Puerto Princesa City (CEP 1993).

The CEP seeks to achieve five objectives, namely:

1) Protect, manage and enhance the marine and terrestrial resources of coastal areas by using community organizing as the basic means of intervention and involving the community and immediate stakeholders of resources as principal partners of the DENR;

2) Aspire for higher levels of productivity, bio-diversity, sustainability and economic integrity of natural resources through the promotion of environment-friendly technologies;

3) Improve the cultural, socio-economic and generational equity in access towards natural resource use by expanding livelihood opportunities and democratizing control of the ecological support system;

4) Expand sectoral participation in the protection and management of the coastal environment; and

5) Reinforce concerns on resource degradation and provide examples of benefits derived from improved resource management.

To achieve these objectives, the program components cover the conservation and management of coastal habitats; protection of endangered species; monitoring and control of coastal pollution; inventory/assessment of coastal resources; applied research; development of special projects; and establishment of coastal/marine protected areas (DENR 1993).

The implementation of the CEP is being carried out in three phases over a five-year period. Phase I covers information campaign and community organizing in the first two years of CEP implementation to prepare the ground for people participation and support. Phase II calls for the introduction of interventions/package of developmental activities for adoption by partner communities and sectors. Phase III involves the monitoring and evaluation of activities to allow for program improvements. To date, CEP implementation in Ulugan Bay has largely addressed Phase I and part of Phase III. Direct interventions related to the management of coastal habitats, protection of endangered species and the establishment of protected areas have yet to be pursued.

The initial phase of the program focused on community organizing as a cornerstone strategy. It is rooted in the premise that communities can develop their skills in management, communication, decision-making, conflict resolution, and advocacy through functional organizations. Lending substance to community organizing was a livelihood-driven intervention that is consistent with reducing the pressure on existing coastal resources and preparing the beneficiaries for collective action. This was done by building responsibility around beneficial projects which were identified and planned by the beneficiaries themselves.

In Ulugan Bay, the community organizing process was carried out by a non-government organization (NGO) in several identifiable phases: a) rapport-building with local leaders; b) project site selection; c) community profiling; d) problem identification; e) core group formation; f) training; g) establishment of a community organization; and h) selection and implementation of livelihood projects. The overall process was directed at obtaining a deeper understanding of the people, along with the problems, needs and opportunities facing the village. To capture the interest of barangay residents and to provide a rallying point for collective action, the community organizers built on prevailing community issues such as threats to livelihood, resource use, and a ban on the use of compressors in the bay. Social profiling, together with social mapping and investigation, was also conducted to generate benchmark information for planning purposes (CEP 1993).

Complementing the community organizing activities of the NGO were project orientation sessions, consciousness-raising campaigns and lectures on coastal and terrestrial management spearheaded by the DENR in 1993. In line with the information, education and communication (IEC) activities of CEP, DENR aired a radio program called *Baybayanihan* on a local radio station and set up billboards on coastal resource management in strategic locations. In 1995, it launched a *Mulat Kaisipan* information caravan which targeted young students as stakeholders in environmental management and protection. It also inducted the *Bulilit Bantay Ulugan Bay*, whose members were drawn from Grades 4 to 6 pupils of the barangay elementary schools and whose task was to report irregularities observed in Ulugan Bay (DENR 1995). Through the *Bantay Sagip Ulugan Bay*, which emphasized proper waste disposal and coastal maintenance, the community actively participated in cleaning up the bay as an initial manifestation of collective action.

In terms of resource assessment, DENR conducted geohydrological, geochemical and geo-hazard surveys to generate benchmark information for environmental and industrial concerns and draw up measures for mitigating threats to the coastal environment system. A survey of the benthic community of Ulugan Bay was also carried out to study the status of reefs, coral cover, and reef fishes, highlighting the need for monitoring the spatio-temporal variations of the reef fish community structure to determine ecological processes.

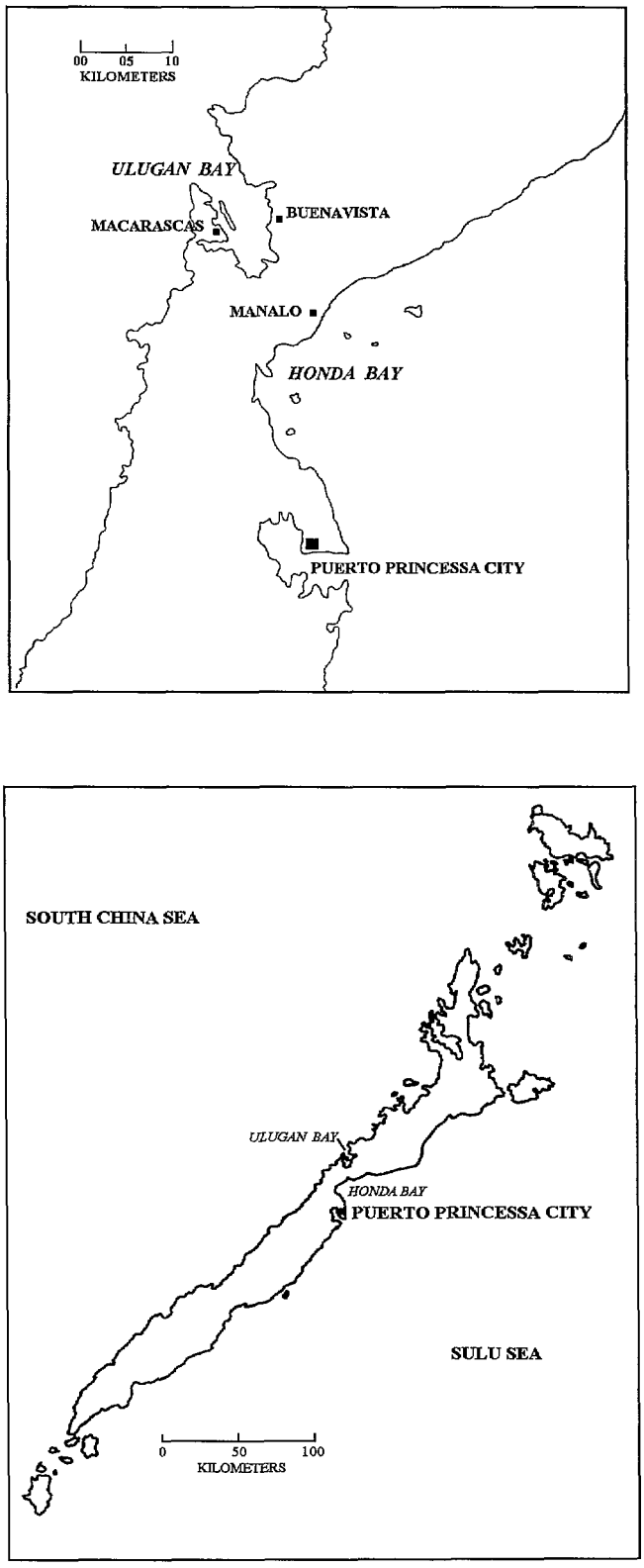


Figure 2. Location map of CEP sites (Ulugan Bay).

3.2.2.1 Macarascas, Puerto Princesa City, Palawan

Site Description

Macarascas is a coastal barangay along Ulugan Bay which lies at the midwestern coast of mainland Palawan. Located some 47 kms away from Puerto Princesa City, Ulugan Bay is a major, shallow bay with diverse coastal mangrove forests. It spans around 110 kilometers of coastline and covers 7,200 hectares at mean low water. Dominated by short and narrow fringing reefs, particularly at the western portion, the bay is susceptible to influences from land-based sources. Silt from 11 rivers that empty into the bay threatens the integrity of coastal systems, specifically coral reefs and seagrass beds.

Notwithstanding the generally poor condition of the reefs, the mangroves of Ulugan Bay still represent the most pristine condition (DENR-ERDS 1994). The dense mangrove forests dotting the coast of Ulugan Bay is significant because mangrove roots are known to trap sediments and lessen the sediment load that goes into nearby reefs. The whole plant, moreover, serves as refuge and nursery ground for some juvenile fish and other vertebrates as well as invertebrates.

The salinity structure of Ulugan Bay is largely controlled by two factors: the freshwater discharge from the rivers which tends to enhance water column stability and the tidal volume which tends to destroy the stratification. In Ulugan Bay, the tidal volume is greater than the freshwater discharge. Consequently, turbulence generated by frictional effects at the bottom results in the vertical mixing between low salinity waters at the surface and high salinity waters at the bottom. In turn, this leads to a weakening of the stratification, making Ulugan Bay a slightly stratified estuary (DENR-ERDS 1994). Circulation patterns which bring nutrient-rich bottom waters up into layers penetrated by sunlight contribute to high biological productivity in Ulugan Bay.

Five barangays (villages) are covered by Ulugan Bay, namely: Macarascas, Buenavista, Bahile, Tagabinit and Cabayugan. The topography of the land surrounding the bay is generally hilly to mountainous, with several crests exceeding 300 meters within 3 kms of the shore. Forest cover is still extensive in upland areas of the watersheds around Ulugan Bay, but clearing for agriculture and human settlement has occurred in many lowland areas.

Macarascas, a site of the Coastal Environment Program (CEP), is a 3-hour jeepney ride on an unpaved road from Puerto Princesa City. It is bounded by barangay Buenavista on the north, barangay Manalo and part of Bahile on the south, Maruyugon on the east, and Bahile on the west. The 2,871-hectare village of Macarascas is marked by a gently rolling to hilly topography. For most residents, subsistence is dependent on fishing and farming. Dotting the landscape are coconut, bananas, cashew, rice, corn and other upland crops. Lush nipa plants grow near the shore, providing raw material for shingles which supplement the livelihood of women in the barangay.

The beach is dominated by thick clusters of mangrove trees thriving on a muddy substrate. A wharf serves as the main passage of passengers alighting from various boats, apart from doubling as a major fish landing.

Site Project Variables

Macarascas represents a showcase of CEP implementation in Ulugan Bay, particularly for community organizing and livelihood activities. In a little over two years of CEP implementation, Macarascas has produced functioning beneficiary associations whose livelihood projects have survived amid initial struggles. Since the program is still on-going, only the initial phase is covered by this study.

The start-up activities of CEP in Macarascas were marked by consultations and dialogues with local political leaders from May to June 1993. The Ecosystems Research and Development Office (ERDS) of the DENR Region IV-A, in coordination with its provincial and city offices in Palawan, informally joined forces with the Ulugan Bay Development Foundation, Inc. (UBFI) at the outset. The intent was to obtain first hand information on the site and draw up a tentative plan for CEP implementation. The plan, which highlighted the role of the coastal community as a development partner in the area, was presented by DENR to the barangay in mid-1993 for validation and acceptance. In turn, the supportive barangay officials executed a resolution to formally signify support for the CEP.

The UBFI immediately started its community organizing activities in early July 1993, even before receiving formal notice to proceed from the DENR. Having worked with the barangay residents since 1992 on another program (e.g., Fisheries Sector Program), rapport-building was relatively easy for the UBFI. Subsequently, the DENR officially launched the CEP in Ulugan Bay on July 30, 1993 and formally entered into a contract with the UBFI for community organizing and livelihood activities.

As an implementing strategy, the UBFI decided to have an informal two-week social integration for its community organizers (COs), followed by a more structured refresher course which featured lectures, experience-sharing among COs in various sites, team-building, and group discussions. To strengthen rapport with the barangay residents, the community organizer resorted to a mix of house-to-house visits, informal dialogues, participation in social events, training activities, and formal consultations with residents — all in line with fulfilling the role of a learning facilitator and developing the community's capability to effect change. To generate benchmark information for planning purposes, the CO conducted a socio-economic profiling of the barangay, together with social mapping and investigation. (The full processing of the benchmark data, however, has yet to be completed).

Key leaders from each *purok* (e.g., a sub-group within the village) were identified and core groups were formed based on the participation and interest demonstrated by barangay residents during assembly meetings and small group discussions. The core group eventually became the nucleus of the CEP livelihood association.

In the first year of program implementation (1993), a full-time, resident CO was deployed in Macarascas which enhanced interaction with barangay residents. Full funding support and prompt fund releases from the DENR favored smooth implementation. In the following years, however, the CO was no longer working full-time, having been tasked to simultaneously service 3 to 4 livelihood associations in more than one barangay. The annual mode of contract renewal, the delay in contract signing between the DENR and UBFI, and late fund releases from the Department of Budget and Management led to cash flow problems and resignation of some UBFI field personnel in 1994 and 1995. The CEP funds, which flowed from the Department of Budget and Management to the DENR, came after May or June of each year. This made full implementation difficult during the first six months of the year and delayed the payment of UBFI's services.

Based on key informant interviews, program implementation was participatory. The beneficiaries were involved in objective formulation, planning and implementation, particularly of livelihood projects. Community planning for livelihood activities provided the springboard for assessing the advantages and disadvantages of proposed livelihood projects. From a long list of projects identified by the beneficiary association, the project selection process called for data generation on selected projects, subsequent project conceptualization, consensus building, and preparation of a detailed project study with UBFI assistance. Community validation was a built-in step, leading to project acceptance or rejection. Accepted projects, in turn, were further refined or revised prior to the release of livelihood assistance. A survey of 30 households in Macarascas also attests to the participatory approach adopted by the project. All the respondents felt that they were able to influence project planning while 97 percent felt that they were able to suggest changes after the project began (Table 61).

Table 61. Community participation in CBCRMP implementation.

	% Member	% Non-Member	% Total	X^2	p
Attend CBCRMP Training	73	33	53	4.82	0.028
Attend CBCRMP Meetings	87	40	63	7.03	0.008
Knowledge of Objectives	80	80	80	0.00	1.000
Influence Planning	100	100	100	-	-
Influence Project Changes	100	93	97	1.03	0.309

Before the end of 1993, the UBFI had already laid the foundation for livelihood activities, basically as a mechanism for community organizing and as a preparation for the community to accept bigger responsibilities. The process was painstaking but it struck at the essence of CEP — capability building for collective action and people empowerment. The UBFI organized two (2) associations in Macarascas — the *Kilusang Pangkabuhayan at Kaunlaran* (or Movement for Livelihood and Development) and the Masaya Mini-Rice Trading Association. Both associations were organized in June 1994, with 23 founding members and 29 members, respectively.

Training was given to barangay residents on pre-membership, leadership, cooperative membership, bookkeeping and accounting. In addition, training sessions were also conducted on mangrove reforestation, ecological awareness and protection, and fish cage management. A survey of 30 households in the barangay revealed that 73 percent of the association members attended various training activities compared to 33 percent of non-members (X^2=4.82, $p<0.05$).

The difference between members and non-members in attendance at meetings where CEP objectives were discussed was also significant (X^2 = 7.033, $p < 0.01$). In terms of the knowledge of program objectives, most members and non-members were aware of what CEP intended to achieve. Only 20 percent of the respondents gave a "don't know" response. Among those who cited program objectives, the most widely known objectives were linked to improving coastal resources and community welfare (37%), protecting coastal resources (30%), helping the community via the provision of low-cost products (20%), providing alternative livelihood (7%), and organizing fishers (3%). Multiple responses were permitted.

Actual CEP interventions in Macarascas included a community store and a rice trading enterprise. These alternative livelihoods were selected by the community to ease pressure on coastal resources and supplement household incomes. Phase 1 of CEP covered 1993 to 1995.

Context Variables

Supra-Community Context

Enabling Legislation. The Basic Fishery Ordinance of Puerto Princesa dates back to the 1960s, representing an early attempt of the local government to define user rights, boundaries and exclusive fishing rights. From the 1960s to the 1980s, most of the legislations were actually amendments to the ordinance regulating fishing and fisheries. The first revision was done on 21 February 1968 by virtue of Ordinance No. 17-s-1968, followed by another revision in 1973. These ordinances required the procurement of permits/licenses from the City Government before any person, association or corporation can catch fish and other marine products by means of nets, traps, or other fishing gear, or by means of fishing boats three tons or less. The ordinances classified the city waters into eight fishing zones for the privilege of catching milkfish fry and erecting fish corrals, set the minimum bid per fishing zone, and provided a schedule of annual license fees for fishing nets, fishing boats and fishing devices. Identified as eligible for fishing and fishery privileges were Filipino and American citizens as well as corporations duly registered under Philippine laws, at least 60 percent of whose stock belongs to Filipino citizens (UP-LGC 1996).

Subsequently, the City Government enacted Ordinance No. PD 826-8-76 on 10 August 1976 which amended the 1968 legislation (Ordinance No. 17-s-68). The revised ordinance changed the zonal classifications of fishing areas from 8 to 11 zones and also provided for the establishment of a government milkfish reservation, pursuant to section 29a of P.D. No. 704. Several other revisions were made in 1980, 1981, 1982 and 1994, largely for updating the

amount of minimum bids and license fees of fish corrals, use of fishing gears and expansion of milkfish fry reservations. In particular, Ordinance No. 16-80 provided for a government milkfish fry reservation in the west coast, which included the whole of Ulugan Bay. A more recent legislation enacted on 9 March 1994 now requires the establishment of a government milkfish fry reservation in every barangay. The gathering of milkfish fry is limited to 1/5 of the reservation area.

The facilitating aspects of the Basic Fishery Ordinance of Puerto Princesa City may be summarized as follows: 1) it encourages and allows the formation of user groups; 2) it spells out areas for exclusive access; and 3) it provides security for user groups through exclusive fishing privileges with a fixed tenure. However, the ordinance does not expressly prohibit destructive fishing methods, despite several revisions (UP-LGC 1996). It essentially prescribes the rates for different fishing gears and vessels. The only exception is the prohibition of trawl fishing at any depth within the territorial jurisdiction of Puerto Princesa City, but this was superseded by Ordinance No. 59-s-1971 which banned trawl fishing one nautical mile from the shoreline at certain areas for a very limited period (1971-1975).

A more recent legislation, popularly known as the Strategic Environmental Plan (SEP) or Republic Act No. 7611 dated 19 June 1992, governs the entire province of Palawan. At the core of the SEP is the improvement of the quality of life of the present and future generations, largely through complementary development and conservation activities that protect life-support ecosystems and rehabilitate exploited areas. Guided by the threefold feature of ecological viability, social acceptability, and integrated approach, the SEP provides the framework for planning and implementing programs and projects in Palawan. The SEP establishes a graded system of protection and development control over the whole province known as ECAN, or environmentally critical areas network, which covers three main components, namely: terrestial, coastal/marine area (whole coastline up to the open sea), and tribal ancestral lands. For the coastal/marine zone, equitable access to the resource and management responsibility by the local community serve as the guiding management philosophy. The SEP calls for the designation of core zones, which include sanctuaries for rare and endangered species, selected coral reefs, seagrass and mangrove ecosystem reserves, as well as of multiple use zones where development and buffer areas are allowed, i.e., fishery, mariculture, recreation, rehabilitation of small islands and mangrove ecosystem, and education and research.

The SEP, moreover, encourages the establishment of linkages with non-governmental organizations (NGOs), community leaders, business sector representatives, and line agencies to hasten the shift from destructive practices to practical and viable alternatives. Apart from training and information drives, the SEP views community organizing as a vital element in reinforcing non-formal approaches. Support mechanisms cover environmental research, inclusive of bio-physical and socio-economic dimensions, monitoring and evaluation, and environmental education and extension.

At the forefront of implementing the SEP and providing policy directions is the Palawan Council for Sustainable Development (PCSD), which is under the Office of the President.

Among other functions, the PCSD is tasked to coordinate with local government units to ensure the alignment of plans, programs and projects with the SEP, call on government agencies and private organizations for assistance in the performance of its functions, negotiate funding from domestic and foreign sources to carry out the intent of SEP, adopt and amend rules and regulations for the effective implementation of SEP, and recommend to Congress legislation in support of SEP objectives.

Thus, the SEP formally addresses access issues, linkage establishment, and provision of administrative structures for co-management functions such as resource monitoring, enforcement, and information. More vigorous efforts, nonetheless, need to be pursued by the City Government to translate the intent of the SEP into concrete results. Formulating a comprehensive fishery management plan, fleshing out the ECAN areas, and forging linkages with NGOs are some areas which have yet to be addressed.

Supra-community Institutions. Several institutions outside Macarascas have influenced coastal resource management (CRM) in the barangay. Before the CEP was implemented, service delivery was limited to the Department of Environment and Natural Resources (DENR) and the UBFI. The DENR was the lead implementing agency of the Fisheries Sector Program which addressed mangrove reforestation in the area. The UBFI, an NGO based in Puerto Princesa City, was engaged in community organizing, training, and mangrove planting under the program.

During the implementation of the CEP in Macarascas (1993 to date), more agencies were involved in CRM-related activities, namely: DENR, UBFI, City Government and Naval Station Unit. The DENR-PENRO (Provincial Environment and Natural Resources Office) has been responsible for CEP orientation, CRM training, and information campaigns while the UBFI has been the implementing arm of the CEP for community organizing and livelihood projects.

The City Government of Puerto Princesa, through its *Bantay Dagat* (Baywatch), has actively protected the city's coastal areas and marine resources under the leadership of Mayor Edward Hagedorn. Providing the driving force is the local leadership's resolve to preserve the relatively pristine environment of Puerto Princesa City.

The *Bantay Dagat* represents a drive against illegal fishing and related activities in the four strategic bays of Puerto Princesa --- Ulugan Bay, Honda Bay, Puerto Princesa Bay and Turtle Bay. Bantay Dagat has five outposts equipped with hand-held radios and motorized patrol boats (8 outrigger pumpboats and 1 speedboat) which respond to cases of illegal fishing, blast fishing, and violations of laws and ordinances on a 24-hour basis. One of these outposts is found in Ulugan Bay, specifically in barangay Bahile.

The *Bantay Dagat* staff conduct 24-hour patrols and monitor the movement of seacraft in the city waters. Working under the guise of fishermen, they communicate illegal activities by means of hand-held radios to their outpost. The responsibility for apprehending the violators is lodged with law enforcers who normally arrive on the scene riding speedboats.

The City ENRO (Environment and Natural Resource Office) of the Puerto Princesa City Government, which was created in mid-March 1993, also complements the *Bantay Dagat* staff. It handles the survey of claims within the coastal areas and links up with DENR on the enforcement of environmental laws and coastal-related programs.

Lastly, the Naval Station Unit in Ulugan Bay is also actively involved in enforcing fishery-related laws and in apprehending violators. Based on the perceptions of Macaracas residents, the Navy's presence is a deterrent to illegal activities. The resources at their disposal, moreover, are a positive factor in enforcing relevant ordinances in the area.

Supra-community Markets. The marketing of fresh fish in Macarascas is externally-oriented. The bulk (90%) of fresh fish harvested in Macarascas is sold in the Puerto Princesa Public Market where various buyers converge. Of this volume, around half is shipped to Metro Manila. Only a little trading takes place within the barangay, which absorbs roughly 10 percent of the total fish catch. All lobsters and sea cucumbers are sold at the City Proper.

Based on key informant interviews, the demand for fish has increased by around 30-40 percent due to shipments to Metro Manila and to population increase. There was a tripling in the number of fish traders in Macarascas from 2 traders in 1992 to 6 traders in 1995. The retail prices of fish also increased substantially in the past three years, ranging from 50 percent to 300 percent. *Lapu-lapu* (grouper), *suno* (grouper), *maya-maya* (snapper), *tanigue* (Spanish mackerel), *talakitok* (jack/trevally), and *danggit* (rabbit fish) registered price increases of 100 percent or more. The prices of *banak* (mullet) and *mulmol* (parrotfish) grew more slowly by at least 50 percent.

Supra-community Shocks to the System. Macarascas has been spared from strong typhoons, earthquakes and other calamities. No new technologies, other than the fish trap introduced by a resident and the fish corral introduced by the Navy, have been used in the area since the CEP started.

Community Context

Perception of Trends in the Resource. A survey of 30 households (15 members and 15 non-members) in Macarascas indicated that, at the time of CEP implementation, the status of the resource was good (77%). Others perceived the situation as bad (20%). The rest felt no change (3%).

Comparing the condition of the nearshore fisheries today to the situation 10 years ago, most respondents felt that the resource is worse off today (53%). Only 10 percent felt that the situation remained the same. The rest (37%) said that the resource is better off. Slightly more members than non-members were inclined to think that the resource is better off today (47% versus 27%; $X^2 = 1.401$, $p > 0.05$). Further details on the underlying reasons are discussed in the section on individual and household data.

Target Species Composition and Distribution. Interviews with key informants representative of the major fishing gear types indicated that the following types of fish are considered most important in terms of income:

1. *kalapato* (jack/trevally)
2. *suno* (grouper)
3. *maya-maya* (snapper)
4. *bararawan/danggit* (rabbit fish)
5. *banak* (mullet)
6. *lapu-lapu* (grouper)

In terms of consumption, *banak* (mullet) and *danggit* (rabbit fish) are important, along with *talakitok* (jack/trevally), *bisugo* (threadfin bream), *mulmol* (parrotfish), squid, octopus, and *galunggong* (round scad). Fishers observed that their catch of *danggit, mulmol, banak* and crabs increased by more than 60 percent from 1993 to the present. However, anchovies and sea shells declined by about 50 percent. For other fish types, no change has been observed but fishing effort has increased.

Environmental Features Influencing Boundary Definition. The coastline of Macarascas is characterized by a muddy beach, with very thick clusters of mangrove trees thriving near the shore. A protruded land form separates Macarascas from the borders of barangay Bahile while a busy fish port in the barangay provides a distinctive landmark. Delineating the boundaries of the coastal waters would be of medium difficulty due to absence of natural boundaries at sea.

Technologies Used in Coastal Area. Fishing is generally done from outrigger boats. Overall, there are 70 boats in Macarascas, of which 50 boats are motorized. Among the existing fishing technologies, the gill net is the most frequently used (37%), followed by hook and line (33%), and spear fishing (23%). A variety of nets is used in Macarascas such as bottom set gill net (*palubog*) and drift net (*paanod*). The bottom set net is used year-round at night time, except during full moon. The drift net is deployed from March to May. The hook and line includes longline (*palangre*) for catching large fish species, multiple handline (*kawil*) for catching reef fish, and squid jigger for cuttlefish and squid. Spear fishing is done during the day or at night time. In general, most fishers use spear from 7 p.m. to 2 a.m. They dive into a reef area by using an air compressor or by holding their breath for a certain period of time. Less common gears include the crab pot or trap, fish corral (*baklad*) and drag seine (*likom*).

Level of Community Development The level of community development is based on a checklist of items given below. The facilities which are in place are marked by bold print while those which are absent are presented in normal print.

1. Hospital
2. Medical Clinic
3. Resident Doctor
4. Resident Dentist

5. Secondary School
6. **Primary School**
7. Public Water Supply Piped to Homes
8. Sewage Pipes or Canal
9. Sewage Treatment Facility
10. Septic or Settling Tanks
11. **Electric Service (Generator at port area only)**
12. Telephone Service
13. **Food Market (Sari-Sari Stores)**
14. Drug Store
15. Hotel or **Inn**
16. **Restaurant**
17. Gas Station
18. **Public Transportation**
19. Hard Top Road Access
20. Banking Service
21. **Television Reception (Battery-operated television)**
22. **Radio Reception**

Degree of Integration into National Economy and Political System. Macarascas traders bring their iced fish and fish products by jeepney to the Puerto Princesa City Proper while wholesalers ship their fish to Metro Manila by plane or by boat. Regular trips from Macarascas to the City Proper provide a medium market link to other areas. Communication links may be regarded as low due to the barangay's sole dependence on hand-held radios. Similarly, transportation links may be regarded as low due to the absence of hard top road access. Political links, however, are high because of almost monthly visits from the City Mayor. Overall, the degree of integration of Macarascas into the economic and political system may be classified as low to medium.

Tradition of Cooperation and Collective Action. The longest surviving organization in Macarascas is the *Sangguniang Kabataan*, a youth organization which has existed for approximately five years and which has actively promoted sports development. A coastal user association also exists, known as the Macarascas Coastal Mangrove Association, Inc., whose existence dates back to 1992 when DENR and UBFI organized the fishers for mangrove reforestation under the Fisheries Sector Program. A women's group is also in place, called the Charity Women's Association. It was organized by the wife of the City Mayor in 1992 for stuffed toy production.

In the past two years, three new organizations emerged: the Farmers' Cooperative of Macarascas, which has been engaged in tractor operations, the Masaya Mini-Rice Trading Association, and the *Kilusang Pangkabuhayan at Kaunlaran.* The last two associations were organized by the CEP for livelihood activities. The youngest association in the barangay is the one-year old Macarascas Elementary School Alumni Association, which aims to help improve the primary school facilities in the barangay through direct donations from the members.

Occupation Structure and Dependence on Coastal Resources. The only coastal-dependent occupations in Macarascas are fishing and fish trading. Based on key informant interviews, 37 percent of the households are engaged in fishing while 26 percent are dependent on farming for economic survival (Table 62). Another 24 percent of the households work as hired laborers. The rest are traders (4%), employees in government and private offices (7%), and domestic helpers (2%).

Table 62. Distribution of occupations.

Occupation	Percent
Fishers	37
Farmers	26
Laborers/carpenters	24
Government employees	6
Traders/Vendors	4
Private employees	1
Others (domestic helpers, etc.)	2

Degree of Socio-Economic and Cultural Homogeneity. The residents of Macarascas are heterogeneous. The majority are migrants from the provinces of Aklan (60%) and Zambales (20%). Other migrants trace their roots to Cebu/Leyte (10%) and Ilocos/Bicol (5%). Only a minority are native Cuyunins. Based on key informant interviews, the members of the Licerio family from Aklan were the pioneer settlers in the area. Other relatives subsequently joined them and together, they established a community amid relatively harsh conditions in a forested and malaria-infested area. They also developed a strong political clout in the barangay. In terms of religion, the Roman Catholics are dominant in Macarascas (70%), followed by Protestants (20%). The members of the Iglesia ni Cristo and the Seventh Day Adventists comprise only 5 percent each.

Political Organization and Conflict Resolution. A Barangay Captain heads the Barangay Council, whose members consist of councilors, a secretary and a treasurer. A local committee, called the *Lupong Tagapamayapa*, is the primary mechanism for resolving conflicts which are not settled amicably at the level of the barangay captain. So far, conflicts have revolved around slight physical injuries, land disputes, drunkenness, debts and petty thefts. Most cases (95%) never reach the City Court since they are resolved at the barangay level.

Population and Population Changes. The population of Macarascas grew from 438 persons in 1975 to 682 persons after 10 years, and then to approximately 1,301 persons in 1995. Annual population growth tended to be more rapid during the 1985-1995 period (9.1%) than in the preceding decade (5.6%).

Coastal Resource Use Rights, Formal and Informal. Informal use rights are non-existent in Macarascas. Use rights are governed by national and city legislation as well as by mangrove stewardship agreements. The national legislation, P.D. 704, restricts the capture of mother

milkfish, sea turtles, and immature fish as well as regulates the use of chemicals in fishing. It also bans fine-meshed nets, among other practices.

At the local level, formal use rights and rules are guided by ordinances enacted by the Office of the *Sangguniang Panglungsod.* City Ordinance No. 199-92 dated March 24, 1992 regulates the use, sale, distribution and transfer of sodium cyanide, potassium phosphate and other obnoxious substances. Using these chemicals without a mayor's permit carries a fine of P2,000 and/or a 5-month imprisonment upon the discretion of the court. Closure is also imposed on erring corporations and business partnerships.

City Ordinance No. 15-92 dated December 15, 1992 bans the shipment of all live fish and lobsters outside Puerto Princesa City via aircraft or seacraft over a five-year period — from January 1, 1993 to January 1, 1998. Live fish includes breathing fish species for food and aquarium purposes, except sea bass, catfish, mudfish and milkfish fries. Violators are penalized with a fine of P5,000 and/or an imprisonment of not more than 12 months and a cancellation of business permits.

The enforcement of fishery-related regulations is done with the assistance of the *Bantay Dagat.* Residents help in reporting violations. The Bureau of Fisheries and Aquatic Resources (BFAR) inspects the fish caught by violators while the Naval Station Unit and the Coast Guard confiscate the fishing equipment until the violator is cleared. Based on key informant interviews, the level of compliance is 100 percent for Macarascas residents and 85-90 percent for outsiders.

Women. The women of Macarascas are engaged in both fishery- and non-fishery based activities. Based on a household survey of 29 respondents, the majority (69%) are engaged in coastal-dependent activities*. These include fish vending (45%), gleaning shellfish and other marine products (34%), and fish drying (21%). To a certain extent, some women in Macarascas also fish (7%). The length of time spent for these coastal-dependent activities varies from 6-12 hours for fishing, to 10 hours for fish vending, 8 hours for drying marine products, and 2 hours for gleaning shellfish for home consumption. The supplemental household income derived from fish trading and drying is approximately P2,250 per month.

About 52 percent of the women are also engaged in non-fishery based activities. These include raising livestock and poultry (41%), nipa shingle making (7%), and tending *sari-sari* stores (7%). Other activities consist of vegetable gardening, buy and sell operations, and serving as barangay officials (3% each).

In terms of the participation of women in CEP activities, 41 percent of the women attended project-related seminars and training sessions while 59 percent did not join any activity at all. More women from member-households participated than from non-member households (60%

* Out of 30 households, one household head did not have a wife. This accounts for only 29 female respondents.

versus 21%, X^2 = 4.441, p < .05). The most frequently attended training activities were community store operation and cooperative management. Other seminars attended included livestock raising and mangrove planting.

The benefits derived by the women respondents from project participation include earning dividends from shareholdings in the community store (14%), receiving a patronage refund (10%), and gaining knowledge on coastal resource protection (10%). Other benefits are knowledge gains on livelihood improvement and cooperative management (13%), and discounts on products bought from the community store (7%). Among those women who did not participate in CEP activities, the reasons were primarily due to preoccupation with other activities/ lack of time (28%), dislike for the association (3%), and distant location of the training venue from the residence (3%).

Individual and Household Level Context

Characteristics of Sample Fisher Households. A random sample of 30 households were drawn from a population of coastal-dependent households. The sample comprised 15 members of the CEP-organized livelihood associations and 15 non-members. Table 63 shows that both members and non-members are similar in terms of mean age, length of residence in the barangay, educational attainment, number of years in marine-related work, and previous engagement in marine-related occupations. The only significant difference lies in household size.

Table 63. Characteristics of sample.

Variable	Member	Non-Member	Total	t-value	p
Age	38.80	41.13	39.97	-0.58	>.10
Education	8.00	7.53	7.77	0.43	>.10
Years residing in the area	16.60	16.20	16.40	0.11	>.10
Household size	4.80	6.33	5.57	-2.07	<.05
Years doing marine-related work	12.07	17.47	14.77	-1.28	>.10
Years doing previous marine-related work	9.29	9.86	9.57	-0.18	>.10
N	15	15	30		

Similar to other sites, relative income was evaluated based on assets -- house structure, furnishings, and ownership of productive equipment. Table 64 indicates that more members have medium to high quality house structures than non-members (47% versus 20%; X^2 = 2.40, p > 0.05). Medium quality structures refer to houses made of a combination of lumber/cement and native roofing materials (e.g., nipa) while high quality structures are made of concrete materials. The house furnishings of members are more likely to be characterized as medium to high relative to non-members (67% versus 47%: X^2 = 1.22, p > 0. 05).

Table 64. Percent distribution of assets.

	% Member	% Non-Member	% Total	X^2	p
House structure				2.400	0.121
Minimal	00	20	10		
Low	53	60	57		
Medium	40	13	27		
High	07	07	07		
House furnishings				1.222	0.269
Minimal	00	27	13		
Low	33	27	30		
Medium	60	40	50		
High	07	07	07		
Productive equipment				1.222	0.209
Boat ownership	67	47	57		
N	15	15	30		

Occupational Multiplicity and Dependence on Coastal Resources. When asked to state their current occupations, 97 percent of the respondents mentioned that they are practicing a fishery-related occupation. Occupational multiplicity as a survival strategy in Macarascas is evident in the pursuit of other activities. In addition to fishing, the respondents are engaged in farming (20%), fish vending (17%), and carpentry (17%). In the past, half of the respondents also pursued other jobs such as farm and construction laborers (13%), carpenters (10%), farmers (7%), and barangay official (7%). Minor occupations included driving, fruit picking, and coconut/nipa shingle making.

In terms of income, the majority of the respondents (57%) ranked fishing as the most important source, providing more than half of their household earnings. Secondary income is derived from non-coastal dependent sources such as farming and fish vending. Only 20 percent of the respondents received remittances from relatives working outside the barangay. This holds true for both members and non-members.

In terms of food, fishing also provides more than half of the food requirements for 47 percent of the households. Members, however, tend to have a slightly higher dependence on fishing as a source of food than non-members (53% versus 40%; $X^2=0.536$, $p>0.05$). Secondary food sources include farming and fish vending.

Collective Action. Two indicators of collective action were examined as a part of the survey: association membership and attitudes toward cooperation (cultural values). It must be noted that the sample was stratified based on membership in the livelihood association in Macarascas and that the population from which the sample was drawn included only those dependent on nearshore fishery. Based on the household survey results, the members of the CEP livelihood association also belong to the Macarascas Coastal Mangrove Association at

present. Non-members of the livelihood association, on the other hand, have a lower percentage of affiliation at present even in other community organizations. The mean number of current affiliations is 0.13 for non-members and 1.07 for members (t-value = 8.28, $p<0.01$. The members of the CEP-organized livelihood associations in Macarascas perceive that the purpose of their association is to provide alternative income sources.

The mean number of associations that members joined in the past was zero for members and one for non-members. Approximately 3 percent of all barangay respondents used to be members of the mangrove association. For the individual who left the mangrove association, the inability to perform one's duties served as the underlying reason.

Cultural attitudes toward collective action strongly favor a collaborative effort among the people in the community in solving community problems (93%). Ninety-seven percent (97%) of the respondents feel that the fishers can work together to fight illegal fishing while 83 percent believe that the government and the fishers can cooperate in solving fishery problems. For each of these aspects, however, the difference between members and non-members is not statistically significant. The overall picture reflects a very positive attitude toward collective action.

Job Satisfaction. Given the chance to live their lives over, 90 percent of the respondents would still choose to become fishers. Between members and non-members, the difference is not statistically significant (87% versus 93%; $X^2 = 0.37$, $p > 0.05$). Non-members indicated that they are less likely to leave fishing (93% for non-members versus 67% for members; $X^2=0.370$, $p>0.05$).

Having no other income source/occupation emerged as the top reason (23%) for staying in fishing. Others cited that fishing is an easy source of food, fishers have food all the time, and fishing is the only job they know (10% each). Some felt that the absence of a boss and the simplicity of the task make fishing attractive as an occupation (7% each). For the individuals who would not like to be fishers again, the reasons are associated with less fish catch and difficulty of the job (7%). Given the same income in another occupation, most respondents (80%) still would not switch from fishing to another occupation. This is primarily due to the perceived ease of fishing as a job (43%), fishing as a quick source of money (33%), free food that goes with fishing (27%), and absence of a boss/ existence of free time (13%). Other considerations are linked to the prospects of greater profit and food gains (10% each) and the enjoyment derived from the activity (7%). Overall, the fishers of Macarascas are highly satisfied with their chosen occupation. The perceived rewards from fishing are both economic and psychological.

Ecological Knowledge. Among the characteristics of the sea that have a positive influence on the status of the resource, the respondents cited the abundance of mangrove trees (73%), presence of corals (50%), and clean coastal water (23%). Also mentioned were the presence of algae (13%), the existence of sea grasses (10%), and the abundance of plankton (3%). Multiple responses were allowed.

For the 37 percent of respondents who perceived the resource as better off today than 10 years ago, the improvement is attributed to improved fishing conditions (17%), earlier mangrove reforestation efforts (13%), coastal resource protection, reduction of illegal fishing, and existence of more breeding and nursing grounds for fishes (7% each). For those who perceived that the resource is worse off today (53%), the key reasons included a declining fish catch (23%), increasing number of fishers and fishery-dependent populace (20%), and worsening fishing conditions due to longer fishing time and varied fishing gears (13%), illegal fishing (13%), and incomplete rehabilitation of coastal resources (3%).

In terms of the specific status of the resource, association members tended to be more positive than non-members. More members than non-members viewed the resource as slightly better off today (27% versus 13%; $X^2=0.833$, $p>0.05$) and much better off today (7% versus 0%; $X^2=1.034$, $p>0.05$).

Impact Variables

To evaluate the present status of the project's intermediate objectives in terms of establishing community-based organizations and implementing livelihood projects, the research team reviewed project reports, held interviews with present project staff, ex-project staff, and project beneficiaries, and directly observed activities in the barangay.

Material Aspects. Tangible material interventions like marine sanctuaries and other related activities are not covered at this stage because they have yet to be pursued by the DENR as part of CEP's Phase II activities.

Institutional and Organizational Aspects. The desired end results of Phase I are functional community-based organizations that will serve as partners and stakeholders in the management of Ulugan Bay. Thus, preparing the ground for people's participation is a major activity. In this regard, the CEP has succeeded in establishing livelihood associations in Macarascas and in providing livelihood projects as initial venues for mobilizing collective action.

Community Store. A livelihood association called the *Kilusang Pangkabuhayan at Kaunlaran* was formally organized in Macarascas in June 1994 after almost a year of capability building, participatory planning, and livelihood assessments. The organization, which started with 23 members, has demonstrated a very stable membership in the past two years due to sound store management and provision of financial incentives to the members. A new member was also added in 1995.

The community store received a starting capital of P8,301.80 from the CEP in 1994, which was given in kind rather than in cash. Based on the most recent inventory conducted in November 1995, the total capital of the organization grew to P27,444, representing more than a three-fold increase. A patronage refund of P10,421 was given in 1995 to motivate the members to buy their goods from the community store. To boost sales, a raffle draw was also introduced in the last quarter of 1995 as a marketing strategy.

At the time of the field research in early 1996, the community store was very much alive. The store not only gave the women members an opportunity to develop and hone their skills for managing small enterprises but also provided low-priced products to the community in response to the basic food and non-food needs of the community.

Mini-Rice Trading. A rice trading association was also set up in Macarascas in June 1994 with 29 founding members from Purok Masaya. The CEP, through the UBFI, provided seed funds of P8,000 which covered rice supplies and a weighing scale. Unlike the community store association, the Masaya Mini-Rice Trading Association went through a more difficult struggle due to problems associated with fund mismanagement and reduction in membership. It lost two members to out-migration and another six members to disenchantment with organizational management, but was able to recruit two new members. This brings its current membership to 23. The rice trading association, despite its internal problems, has survived. It has also succeeded in recovering P2,200 (or 32% of the diverted funds) and is determined to collect the balance of P4,600 in the succeeding months. Only after the officers have returned the total seed funds to the bank and made a profit from rice trading operations can the members expect to receive a patronage refund.

At this stage, it is too early to assess the sustainability of these livelihood projects, having been in operation for less than two years only. However, the bold step taken by the CEP beneficiaries in managing the enterprises that they themselves identified and planned is a tribute to their willingness to participate as stakeholders in the management of Ulugan Bay.

Based on the household survey in Macarascas, the members expressed that belonging to the livelihood association has several benefits, namely: 1) patronage refund (87%); 2) dividend and interest on capital (60%); and 3) availment of low-priced products (13%). Multiple responses were permitted. The survey also shows that even non-members are aware of these benefits since only 27 percent gave a "don't know" response.

Use Rights and Management Efforts. No program-related use rights and management efforts were uncovered in Macarascas that applied to coastal resources.

Perceived Impacts on the Coastal Ecosystem

Method. To determine perceived impacts on the coastal ecosystem, the respondents were asked to provide an evaluation of a number of aspects of this ecosystem using the pre-CEP and present periods. A self-anchoring, ladder-like diagram with 15 steps was used, where step 1 represents the worst possible situation and step 15 the best possible situation. The respondent was asked to indicate the step which best describes the situation for 10 impact indicators, namely: 1) overall well-being of the household; 2) overall well-being of the resource; 3) income; 4) access to resources; 5) control over resources; 6) ability to participate in community affairs; 7) ability to influence community affairs; 8) community conflict management; 9) community compliance with resource management; and 10) amount of traditionally harvested resource in the water.

Analysis. As an initial step in analyzing the results, a paired comparison t-test was computed to determine if differences between means are statistically significant for the pre-CEP and present periods. For the total sample, Table 65 shows an increase in perceived levels of all indicators, except resource access and amount of harvested resource in the water, which are deemed lower today than before the project. This perceived downtrend may be partly linked to the drive against illegal fishing and stricter enforcement efforts of the City Government. For positive changes in the impact indicators, the significant differences ($p<0.01$) during the two time periods covered by this study include perceptions of the overall well-being of the household, ability to influence community affairs, community conflict management, and community compliance with resource management. The other significant differences ($p<0.05$) are perceptions of the well-being of the resource and participation in community affairs.

Table 65. Perceived pre-project to post-project changes in indicators.

	MEMBER				NON-MEMBER				ALL			
	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p
Access	10.47	11.33	-0.86	>.10	7.73	9.27	-1.54	>.10	9.1	10.3	-1.2	<.10
Compliance	10.73	7.27	3.46	<.01	10.20	9.13	1.07	<.05	10.5	8.2	2.3	<.01
Conflict	9.80	8.40	1.40	<.05	9.53	8.47	1.06	<.01	9.7	8.4	1.3	<.01
Control	8.00	6.67	1.33	<.05	5.33	5.60	-0.27	>.10	6.7	6.1	0.6	>.10
Harvest	9.87	10.87	-1.00	>.10	7.87	8.53	-0.66	>.10	8.9	9.7	-0.8	<.10
Household	8.73	5.87	2.86	<.01	7.47	5.87	1.60	<.01	8.1	5.9	2.2	<.01
Income	7.40	7.07	0.33	<.10	6.20	5.93	0.27	>.10	6.8	6.5	0.3	>.10
Influence	10.13	8.40	1.73	<.01	8.27	7.67	0.60	<.05	9.2	8.0	1.2	<.01
Participate	8.27	7.53	0.74	>.10	7.53	7.07	0.46	<.05	7.9	7.3	0.6	<.05
Resource	10.27	8.67	1.60	<.05	9.07	8.73	0.34	>.10	9.7	8.7	1.0	<.05
N=30												

The second step in the analysis was to test if association members differed significantly from non-members on perceived changes in the indicators. Table 66 indicates that the association members perceived higher increases in most impact indicators than non-members. However, the only statistically significant differences between the two groups are perceptions of control over resources, ability to influence community affairs, and community compliance with resource management ($p < 0.05$).

Table 66. Differences between members and non-members with respect to perceived changes.

	T2-T1 Member	T2-T1 Non-member	t-value	p
Access	-0.9	-1.5	0.53	0.599
Compliance	3.5	1.1	2.20	0.038
Conflict	1.4	1.1	0.54	0.596
Control	1.3	-0.3	2.39	0.026
Harvest	-1.0	-0.7	-0.36	0.721
Household	2.9	1.6	1.70	0.100
Income	0.3	0.3	0.07	0.942
Influence	1.7	0.6	2.11	0.047
Participate	0.7	0.5	0.54	0.594
Resource	1.6	0.3	1.60	0.117
N	15	15		

The third step in the analysis was to examine the relationships between perceived changes in the indicators and other individual and household level variables. The results in Table 67 show that perceived changes in the ability to participate in community affairs are positively linked to educational attainment ($p<0.05$). Moreover, household size is negatively correlated with perceptions of resource control ($p<0.01$) and compliance with resource management ($p<0.05$). The higher the number of household members, the lower are the perceived gains in resource control and perceived compliance with resource management. Perceived changes in the ability to participate in community affairs, to influence community affairs, and to control resources are positively correlated with ecological knowledge. A negative relationship exists between perceived changes in resource access and taxonomic knowledge while a positive link holds between perceived compliance with resource management and taxonomic knowledge.

Table 67. Correlations between indicators and selected household/individual level variables.

	Age	Educ.	House Member	Resid.	Eco-Know.	Taxa. Know.
Access	.28	.29	.27	-.10	-.23	-.31*
Compliance	-.10	.03	-.42**	.01	.18	.43**
Conflict	.27	.28	-.18	.15	.14	.17
Control	-.01	-.09	-.53***	.03	.36**	.10
Harvest	-.03	.15	.00	-.01	-.29	-.30
Household	.25	.04	-.26	.08	.29	.15
Income	.14	-.06	-.17	.06	-.05	.02
Influence	-.02	.25	-.09	-.02	.37**	.04
Participate	-.15	.36**	-.01	.07	.38**	.27
Resource	-.20	.04	-.11	.00	.25	-.28

N=30 *=p<.10
**=p<.05 ***=p<.01

The relationships between occupation and economic variables and perceived changes in the indicators are presented in Table 68. These variables include important economic indicators such as boat ownership, income sources (e.g., non-fishing income, outside income or remittances from family members, and fishing as a primary income source) as well as occupation-related indicators (e.g., willingness to leave fishing and membership in a coastal user association). Perceptions of changes in the overall well-being of the household are positively correlated with boat ownership. Moreover, outside income is positively associated with perceived changes in household income, overall well-being of the resource, community conflict management, and amount of harvest. This implies that the greater the remittances are from other areas, the more positive the likely effect is on the perceptions of income, resource status, conflict management, and level of harvest. The table also shows that perceived participation in community affairs is negatively correlated with dependence on fishing as a primary occupation. Among households which are likely to leave fishing, a negative correlation with the perceived overall well-being of the household is indicated (p<0.10).

Table 68. Correlations between indicators and selected occupational and economic level variables.

	Boat Owner	Nonfish Income	Outside Income	Fish Primary	Leave Fishing	Member
Access	-.01	.00	.11	-.05	-.05	.10
Compliance	-.01	.39**	.09	-.16	.25	.39**
Conflict	.21	.22	.33*	-.30	.12	.10
Control	-.04	.27	-.01	-.25	.02	.41**
Harvest	.00	.29	.30*	-.09	-.03	-.07
Household	.33*	.21	.27	-.20	-.31*	.31*
Income	-.06	.27	.39**	-.20	-.24	.01
Influence	.27	-.02	.16	-.21	-.17	.37**
Participate	.04	-.05	.22	-.42**	.07	.10
Resource	.20	.17	.35*	-.14	-.24	.29

N=32
**=p<.05 *=p<.10

Finally, association members perceive an improvement in resource control, ability to influence community affairs, and compliance with resource management ($p<0.05$). This confirms the initial gains of the CEP in Macarascas and its positive effects on the perceptions of association members. Another positive correlation is between the perceived improvement in the overall well-being of the household and membership in the association.

The 10 indicators were subjected to a principal component analysis with varimax rotation. This analysis is a powerful tool for reducing the observed variables into fewer indicators that account for most of the variance in the data set. In interpreting the rotated factor pattern, an item was said to load on a given component if the factor loading was equal to or greater than 0.50 for that component.

Table 69 indicates that the three rotated components explain 66 percent of the variance in the set of indicators. Component 1 consists of influence, ability to participate in community affairs, community conflict management and well-being of the resource. Component 2 includes compliance resource access, control over resources and income. Resource access has a negative loading in the case of Component 2. Lastly, Component 3 consists of harvest, well-being of the resource, and well-being of the household. The well-being of the resource is shared by Component 1 and Component 3.

Table 69. Principal component analysis of impact indicators.

	Component		
	One	Two	Three
Influence	.89**	.15	-.02
Participate	.83**	.08	-.04
Conflict	.65**	.21	.28
Resource	.55**	.02	.58**
Compliance	.13	.85**	.10
Access	-.02	-.76**	.17
Control	.36	.61**	.17
Income	.08	.53**	.76
Harvest	-.11	-.31	.75**
Household	.34	.46	.53**
Variance	37%	15%	14%

Factor scores were created for each component. To determine the set of independent variables that explained most of the variance in each component, step-wise multiple regression was used (see Calagcalag for the procedure used). The criterion for entry into the regression equation was alpha <0.05.

For Impact Component 1, the coefficient of determination ($R^2 = 0.297$) indicates that around 30 percent of the variance in the impact component is explained by three independent variables which entered the regression equation — ecological knowledge, outside income, and willingness to leave fishing (Table 70). The multiple regression equation is significant ($p < 0.01$). Except for the willingness to leave fishing, the explanatory variables are positively correlated with the impact component.

For Impact Component 2, only household size entered the regression equation. It accounted for 17 percent of the variance in the impact component ($R^2 = 0.171$). The negative regression coefficient implies that a bigger household size exerts a negative influence on Impact Component 2. The multiple regression equation is statistically significant ($p < .05$).

For Impact Component 3, two independent variables entered the regression equation – non-fishing income and outside income. Together, these explained about 22 percent of the variance in the impact component ($R^2 = 0.222$). The presence of these non-coastal dependent income sources favors increases in Impact Component 3. The multiple regression equation is statistically significant ($p < 0.05$).

Table 70. Regression analyses of impact components.

Dependent Variable: Impact Component One

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Ecological knowledge	0.452	2.80	0.009
Outside income	0.293	1.81	0.083
Leave fishing	-0.326	-2.02	0.055

$R = 0.612$; $R^2 = 0.375$; Adjusted $R^2 = 0.297$
$N = 30$; $F = 4.799$; $p = 0.009$

Dependent Variable: Impact Component Two

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Household size	-0.449	-2.56	0.017

$R = 0.449$; $R^2 = 0.202$; Adjusted $R^2 = 0.171$
$N = 30$; $F = 6.571$; $p = 0.017$

Dependent Variable: Impact Component Three

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Non-fishing income	0.318	1.73	0.096
Outside income	0.318	1.73	0.097

$R = 0.530$; $R^2 = 0.280$; Adjusted $R^2 = 0.222$
$N = 30$; $F = 4.873$; $p = 0.016$

Discussion

The Phase 1 experience of the Coastal Environment Program (CEP) in Macarascas may be regarded as a success from the perspective of the total sample, particularly in terms of statistically significant perceptions of improvements in all impact indicators except access to and control over the resource and income. Relatively small negative changes were perceived in the amount of harvest and access to the resource. Members of CEP-organized associations perceived greater positive changes in terms of compliance with regulations, control over the resource, and influence in community affairs--all consistent with desired outcomes of the CEP.

The two CEP-nurtured livelihood associations in Macarascas, moreover, are still managing a community store and a mini-rice trading enterprise in the barangay. They have survived start-up problems and have pursued concrete measures to foster a stable membership. Worth noting here is the *Kilusang Pangkabuhayan at Kaunlaran*, which has ventured into a community store. From a starting capital of P8,302 in June 1994, it has built up its total capital to P27,444 in the following year. This represents more than a three-fold increase in capital. The association also succeeded in giving a patronage refund after a year of operation to its 23 members, which was instrumental in sustaining the support of its members and in demonstrating the financial rewards of membership.

Cultural values on collective efforts are also very encouraging at three levels: fishers' level, people in the community, and fishers and government. Most of the fishers felt that they could work together in fighting illegal fishing (97%). Similarly, the people were confident that they could collaborate in solving community problems (93%). A favorable attitude, too, was seen towards a partnership between the people and government in solving fishery problems (83%). For community-based coastal resource management projects, these positive values are crucial to the pursuit of efforts on a collective front.

In the case of Macarascas, membership in the beneficiary association is positively associated with perceived improvements in control over the resource, ability to influence community affairs, compliance with resource management, and overall well-being of the household. This affirms that the community organizing efforts by the Ulugan Bay Foundation, Inc. in the project site have had a positive impact. The results are consistent with preparing the ground for people participation through functional organizations and building responsibility for resource management around tangible and beneficial activities.

The fishers of Macarascas have expressed satisfaction with fishing as the occupation of their choice, largely due to psychological and economic reasons. Even if an alternative job with an equal income were available, they would still stay in fishing. For one, fishing is regarded as an easy job that generates quick money and food for the household. It is also appealing to an independent personality type, marked by the absence of a boss and the existence of unregimented working hours. Thus, the program strategy of augmenting household earnings from fishing through non-coastal dependent livelihood activities appears to be on a realistic track. It is consistent with fishers' preferences as well as current occupational multiplicity in Macarascas.

A quick look at the experience of the CEP in Macarascas highlights the presence of several elements in program implementation: 1) early participation of the beneficiaries in project planning; 2) continuous beneficiary participation during program implementation; 3) presence of a core group trained in leadership; 4) conduct of training/capability-building; 5) coordination between groups involved; 6) project flexibility; 7) communication of clearly defined objectives to most program beneficiaries; and 8) full-time deployment of a community organizer, particularly in the first year of CEP implementation.

The initial experience of the CEP in Macarascas met only one precondition for co-management -- access to local conflict resolution mechanisms. The absence of direct coastal interventions in Phase I precluded the operation of other preconditions, particularly those related to use rights and management efforts, appropriateness of the rules, and user participation in rule making and enforcement. In terms of the characteristics of the CEP associations, these associations have no regional and national affiliations. Their membership and scope of operations are limited to the village of Macarascas. The village residents, moreover, are generally heterogeneous.

The CEP experience in Ulugan Bay illustrates the involvement of a locally-based non-government organization (NGO) in community organizing and in preparing the beneficiaries for collective action. Based on the experience of the UBFI in Macarascas, community organizing was a long and tedious process which demanded the presence of committed, competent and credible field personnel. Rapport-building with barangay residents and subsequent mobilization of program beneficiaries as partners in coastal resource management called for carefully thought-out strategies that were rooted in a clear understanding of prevailing needs, aspirations, and opportunities.

The Macarascas experience also shows that in cases where the government enters into a collaborative arrangement with an NGO, it is important for government personnel to internalize the principles of community organizing and to work closely with the NGO as a development partner, not merely as a contractor. This is consistent with reinforcing collaborative action, broadening the base of stakeholders, and enriching the learning process. Important, too, are the timely renewal of contracts and the prompt release of funds to the NGO to sustain the momentum of field activities and the enthusiasm of community organizers.

The experience also demonstrates that the complementarity of programs at the local level compensates for certain gaps in the interventions of individual programs. The CEP, for instance, does not have an enforcement component that ensures compliance with fishery laws and acceptable fishing practices. Nonetheless, the external initiative of the Puerto Princesa City Government to implement a Baywatch Program reinforced the efforts of the CEP to instill the imperatives of caring for the environment. Though the Baywatch Program has its own share of problems, the firm resolve of the local government to apprehend violators has partly contributed to the perceived improvement in the well-being of the marine resource due to reduced illegal fishing activities.

At this stage, maintaining the gains achieved by the CEP in community organizing and implementation of livelihood projects poses a serious challenge to program implementors, particularly to the DENR which will implement the program in the remaining 2-3 years. The CEP livelihood associations, which were organized only in mid-1994, are still relatively young and will likely need further organizational strengthening. The NGO's contract with the DENR officially lasted for only 1.5 years (August 1993 to January 1995), precluding a longer social preparation phase and a smooth NGO phase-out from the site. The NGO, nonetheless, retained a part-time, resident community organizer in the barangay to cope with the situation and somehow maintain interaction with program beneficiaries. The viability of the CEP

livelihood associations will heavily depend on their ability to build on earlier initiatives and to cope with more complex situations in the future.

3.2.2.2 Buenavista, Puerto Princesa City, Palawan

Site Description

Buenavista is a coastal barangay along Ulugan Bay. Located some 56 kms away from Puerto Princesa City, it is 3.5-hour jeepney ride on an unpaved road that traverses seven other barangays as one moves from the city proper to the west coast.

Buenavista is bounded by barangays Tagabinit and Cabayugan on the north, barangay Macarascas on the south, Lucbuan on the east, and Bahile on the west. Dotting its white, sandy shoreline are tall mangrove trees whose growth is not as thick as those found in Macarascas. Thriving near the shore are large patches of verdant nipa plants.

The relatively big 5,855-hectare barangay of Buenavista is marked by a rolling to hilly topography. For most residents, subsistence is dependent on farming and fishing. Coconut, bananas, and other upland crops dominate the landscape.

Like Macarascas, Buenavista's fishing grounds still yield demersal and pelagic species. Fishing effort, however, has reportedly doubled due to the increase in the number of fishers.

Site Project Variables

Buenavista represents a less successful case of CEP implementation in Ulugan Bay, particularly for community organizing and livelihood activities. In less than two years from their establishment in mid-1994, the three beneficiary associations have become inactive, largely due to shortfalls in managing their CEP-assisted livelihood enterprises.

When the Ulugan Bay Foundation, Inc. (UBFI) started its community organizing efforts in July 1993, it was greeted by relatively unsupportive barangay officials and unenthusiastic barangay residents. Attendance at community gatherings was generally low, except during fiestas and local elections when the community was momentarily roused from its typical lethargy. The barangay itself has suffered from government neglect in earlier decades, compelling the residents to quietly fend for their own survival.

To strengthen rapport with the barangay residents, the community organizer (CO) conducted house-to-house visits, informal dialogues, participation in social events, and barangay assemblies. The CO also generated benchmark information for planning purposes through socio-economic profiling and social mapping. Unlike Macarascas, Buenavista had a non-resident, part-time CO. The CO lived in a nearby barangay that was accessible by boat or by jeepney.

The CO identified key leaders from each *purok* (e.g., a sub-group/neighborhood within the village) and formed core groups based on the interest demonstrated by the

residents during assembly meetings and small group discussions. The core group eventually became the nucleus of the CEP livelihood association.

Based on key informant interviews, program implementation was participatory. The beneficiaries were involved in objective formulation, planning and implementation, particularly of livelihood projects. A survey of 30 households in Buenavista also confirms that the program adopted a participatory approach. Eighty-seven percent (87%) of the respondents felt that they were able to influence project planning while 93 percent felt that they were able to suggest changes after the project began (Table 71).

Table 71. Community participation in CBCRMP implementation.

	% Member	% Non-Member	% Total	X^2	p
Attend CBCRMP Training	53	33	43	1.22	0.270
Attend CBCRMP Meetings	73	33	53	4.82	0.030
Knowledge of Objectives	87	73	80	0.83	0.361
Influence Planning	93	80	87	1.15	0.280
Influence Project Changes	100	87	93	2.14	0.140

The UBFI organized three (3) associations in Buenavista --- the Centro Rice Trading Association, the Madahon Community Store, and the Morning Glory Goat-Raising Association. These community-based organizations were set up in June and July 1994, approximately a year after the UBFI initiated community organizing and capability-building in the barangay.

Training was given to barangay residents on pre-membership, leadership, business management, and bookkeeping. In addition, training sessions were also conducted on ecological protection as well as on coastal and terrestial management. A survey of 30 households in the barangay showed that 53 percent of the association members attended various training activities versus 33 percent of the non-members ($X^2 = 1.22$, $p > 0.05$), as shown in Table 71.

The difference between members and non-members in attendance at meetings where CEP objectives were discussed was significant (73% versus 33%; $X^2 = 4.82$, $p < 0.05$). A review of the knowledge of program objectives revealed that most members and non-members were aware of what CEP intended to achieve. Only 20 percent of all the respondents gave a "don't know" response. Among those who cited program objectives, the most widely known objectives were linked to protecting the coastal resources (40%), improving the well-being of the community (17%), and reducing illegal fishing (13%), which are consistent with program objectives. Others viewed the objectives in terms of the provision of alternative livelihood, coastal rehabilitation and improvement, and provision of low-cost products. Multiple responses were permitted.

Actual CEP interventions in Buenavista included a community store, a rice trading enterprise, and a goat-raising project --- livelihood activities selected by the community to ease pressure on coastal resources and supplement household incomes. Phase 1 of CEP covered 1993 to 1995.

Context Variables

Supra-Community Context

Enabling Legislation. Like Macarascas, Buenavista is governed by the Basic Fishery Ordinance of Puerto Princesa City (Ordinance No. PD 826-8-76), which defines user groups, boundaries and exclusive fishing rights, as well as by the Strategic Environment Plan (SEP) embodied in Republic Act No. 7611, which provides the framework for planning and implementing programs and projects in Palawan. The SEP also formally addresses access issues, linkage establishment, and provision of administrative structures for co-management functions such as resource monitoring, enforcement, and information (discussed earlier under Macarascas).

Supra-community Institutions. Several institutions outside Buenavista have influenced coastal resource management (CRM) in the barangay. During the implementation of the CEP (1993 to date), several institutions started to become involved in the barangay, namely: DENR, UBFI, City Government and the Department of Social Work and Development (DSWD). The DENR-PENRO (Provincial Environment and Natural Resources Office) has been responsible for CEP orientation, CRM training, and information campaigns while the UBFI has been the implementing arm of the CEP for community organizing and livelihood projects.

The City Government of Puerto Princesa, through its *Bantay Dagat* (Baywatch), has aggressively pursued the protection of coastal areas and marine resources under the leadership of Mayor Edward Hagedorn. Lastly, the Provincial Office of the Department of Social Work and Development has provided interest-free loans of about P5,000 per household for vending and other livelihood projects.

Supra-community Markets. The marketing of fresh fish in Buenavista is outward-oriented. Practically all of the fresh fish harvested in the barangay (99%) is sold in the Puerto Princesa Public Market. Very minimal trading takes place within Buenavista and with the neighboring barangays of Tagabinit and Cabayugan. Together, these areas absorb merely 1 percent of the total fish catch.

Based on key informant interviews, the demand for fish in the past three years has increased by around 20-40 percent due to shipments to Metro Manila and to population increase. The distribution structure, nonetheless, has remained the same. The retail prices of fish also increased, ranging from 50 to 100 percent. *Tanigue* (Spanish mackerel), *lapu-lapu* (grouper), *maya-maya* (snapper), and *danggit* (rabbit fish)

registered price increases of approximately 100 percent. Only the price of *samaral* (siganid/rabbit fish) grew more slowly by 50 percent.

Supra-community Shocks to the System. Buenavista has been spared from strong typhoons, earthquakes and other calamities. No new technologies have been introduced in the area since the CEP started, other than the hook and line with chicken feather and crystallate used by a Cebuano.

Community Context

Perception of Trends in the Resource. At the time of CEP implementation, a survey of 30 households in Buenavista indicated that the status of the resource was good (87%). Only 20 percent perceived the situation as bad. Between members and non-members, members were inclined to be positive on the situation. The difference between members and non-members is statistically significant (X^2=7.76, df=6, $p<0.05$).

Comparing the condition of the nearshore fisheries today to the situation 10 years ago, most respondents felt that the resource is worse off today (73%). Only 17 percent felt that the situation is better off while the rest (10%) felt that the situation remained the same. The difference between members and non-members is statistically significant ($X^2 = 8.18$, df = 2, $p < 0.05$). Further details on the underlying reasons are discussed in the section on individual and household data.

Target Species Composition and Distribution. Interviews with key informants representative of the major fishing gear types revealed that the following types of fish are considered most important in terms of income:

1. *tanigue* (Spanish mackerel)
2. *maya-maya* (snapper)
3. *mulmol (*parrotfish)
4. *bararawan or danggit* (rabbit fish)
5. *samaral* (siganid/rabbit fish)
6. *bisugo* (threadfin bream)
7. squid

In terms of consumption, *baritos* (halfbeak), *mulmol* (parrotfish) and *talakitok* (jack/trevally) are important, along with *bisugo* (threadfin bream) and squid. Fishers observed that their fish catch declined by more than 50 percent from 1992 to 1995 due to more fishers. *Kanduli* (sea catfish) reportedly disappeared in 1994.

Environmental Features Influencing Boundary Definition. The coastline of Buenavista is slightly irregular and sandy. Boundary delineation would be of medium difficulty in the absence of natural boundaries at sea. For instance, marker buoys would be necessary in defining a protected area or sanctuary.

Technologies Used in Coastal Area. Fishing is generally done from outrigger boats. Overall, there are 109 boats in Buenavista, of which only 20 boats are motorized.

Among the existing fishing technologies, the hook and line is the most frequently used (67%), followed by gill net (27%). The hook and line consists of long line (*kawil panlaot*) for catching big fish offshore, single handline (*kawil*) for catching small or medium fish nearshore, and squid jigger for squid and cuttlefish. For the nets, the bottom set gill net (*palubog*), top set gill net (*palitaw*) and drift net (*paanod*) are used in Macarascas. The top set net and drift net are deployed from March to May, which coincide with the summer months. The bottom set net is used year-round at night except during full moon. Fishers also use the spear (*pana*), particularly during the dark phases of the moon. Less common gears are fish corral (*baklad*), drag seine (*sarap*) for small shrimp, and danish seine (*hulbot-hulbot*).

Level of Community Development. The level of community development is based on a checklist of items given below. The facilities which are in place are marked by bold print while those which are absent are presented in normal print.

1. Hospital
2. Medical Clinic
3. Resident Doctor
4. Resident Dentist
5. Secondary School
6. **Primary School**
7. Public Water Supply Piped to Homes
8. Sewage Pipes or Canal
9. Sewage Treatment Facility
10. Septic or Settling Tanks
11. Electric Service
12. Telephone Service
13. **Food Market (Sari-Sari Stores)**
14. Drug Store
15. Hotel or Inn
16. Restaurant
17. Gas Station
18. **Public Transportation**
19. Hard Top Road Access
20. Banking Service
21. Television Reception
22. **Radio Reception**

Degree of Integration into National Economy and Political System. Buenavista traders bring their iced fish and fish products by jeepney to the Puerto Princesa City Proper while wholesalers ship their fish to Metro Manila by plane or by boat. Regular trips from Buenavista to the City Proper provide a medium market link to other areas.

Communication links may be regarded as low due to the barangay's total dependence on hand-held radios. Similarly, transportation links may be regarded as low due to the absence of hard top road access. Political links, however, are medium because of visits from the City Mayor. Overall, the degree of integration of Buenavista into the economic and political system may be classified as low to medium.

Tradition of Cooperation and Collective Action. The organizations in Buenavista are fairly recent. The three CEP-organized associations have existed for less than two years but are inactive at present. These include the Centro Rice Trading Association, the Madahon Community Store, and the Morning Glory Goat-Raising Association. A women's group, called the Charity Women's Association, was organized by the wife of the City Mayor in 1994. It has engaged in barangay clean-up activities and has put up a picket fence through self-help efforts, using inexpensive materials available locally. The youngest organization in the barangay is the Tribal Organization. Barely a year old, it has recruited Tagbanuas, Cagayanins and other minority groups for future projects on mat-weaving, basket-making and other livelihood projects.

Occupation Structure and Dependence on Coastal Resources. The only coastal-dependent occupations in Buenavista are fishing and fish trading. Based on key informant interviews, most households are dependent on farming (32%) on a full-time basis (Table 72). About 23 percent of the households are engaged in fishing while 10 percent are dependent on nipa shingle-making for economic survival. Fishing households which have multiple occupations (e.g., fishing combined with farming, fish trading, carpentry and nipa shingle-making) comprise around 27 percent. The rest are carpenters, government employees, laborers and charcoal-makers.

Table 72. Distribution of major occupations.

Occupation	Percent
Farmers	32
Fishers with other jobs	27
Fishers	23
Nipa shingle makers	10
Carpenters	3
Government employees	1
Others (laborers, charcoal makers, etc.)	4

Degree of Socio-Economic and Cultural Homogeneity. The residents of Buenavista are fairly heterogeneous in terms of ethnic grouping. The majority are native Cuyunins (58%) while some 25 percent belong to the minority group known as Tagbanuas. The rest are migrants from Visayas (10%) and Bicol (7%). In terms of religion, the Roman Catholics are predominant (90%), followed by Iglesia ni Cristo (3%). Protestants and other religious groups account for the balance of 7 percent.

Political Organization and Conflict Resolution. A Barangay Captain heads the Barangay Council, whose members consist of councilors, a secretary and a treasurer. A local committee, called the *Lupong Tagapamayapa,* is the primary mechanism for resolving conflicts which are not settled amicably at the level of the barangay captain. So far, conflicts have revolved around slight physical injuries, land disputes, drunkenness, and debts. Most cases (95%) are resolved at the barangay level. Informal conflict resolution also exists, involving the mediation of elders and *purok* presidents.

Population and Population Changes. The population of Buenavista grew from 283 persons in 1975 to 389 persons in 1985, and then to 569 persons in 1995. Annual population growth tended to be more rapid during the 1985-1995 period (4.6%) than in the preceding decade (3.7%).

Coastal Resource Use Rights, Formal and Informal. Informal use rights are non-existent in Buenavista. Use rights are governed by national and city legislation. The national legislation, P.D. 704, restricts certain practices, including the capture of mother milkfish, sea turtles, and immature fish. It also regulates the use of chemicals in fishing and bans fine-meshed nets.

At the local level, formal use rights and rules are guided by ordinances enacted by the Office of the Sangguniang Panglungsod. These ordinances, which were discussed earlier under Macarascas, also apply to Buenavista. According to key informants, the level of compliance in Buenavista is 85-90 percent.

Women. The women of Buenavista are engaged in both fishery and non-fishery based activities. Based on a household survey of 30 respondents, more than half (53%) are engaged in coastal-dependent activities. These include fishing (23%), fish vending (20%), gleaning shellfish and other marine products (20%), and fish drying (13%). Multiple responses were permitted. The length of time spent for these coastal-dependent activities varies from 6-12 hours for fishing, to 11 hours for fish vending at the City Proper, and 8 hours for fish drying. Selling fish within Buenavista lasts for 2-3 hours only while gleaning shellfish for home consumption also lasts for 2-3 hours.

About 93 percent of the women are also engaged in non-fishery based activities. These include raising livestock and poultry (53%) and nipa shingle-making (47%). Lower frequency responses of 3 percent each include farming, vegetable gardening, teaching, and serving as a barangay health worker.

In terms of the participation of women in CEP activities, 37 percent of the women attended project-related seminars and training sessions while the majority (63%) did not join any activity at all. The most frequently attended training activities were those on coastal management, cooperative, and rice trading. The benefits derived by the women respondents from project participation were gaining knowledge on coastal resource protection, availing of low-cost products, and learning about cooperative

management, among others. Among those women who did not participate in CEP activities, the reasons were attributed to preoccupation with other activities/ lack of time (33%), dislike for the association (7%), and inability to get along with others (7%). Other women no longer attended the activities because their husbands already participated (3%).

Invidual and Household Level Context

Characteristics of Sample Fisher Households. A random sample of 30 households were drawn from a population of coastal-dependent households. The sample comprised 15 members of the CEP-organized livelihood associations and 15 non-members. Table 73 shows that both members and non-members are similar in terms of mean age, education, length of residence in the village, household size, number of years in marine-related work, and previous engagement in marine-related occupations.

Table 73. Characteristics of sample.

Variable	Member	Non-Member	Total	t-value	p
Age	39.87	44.73	42.30	-1.18	>.10
Education	7.60	6.71	7.17	0.80	>.10
Years residing in the area	19.73	21.00	20.37	-0.24	>.10
Household size	5.67	5.07	5.37	0.82	>.10
Years doing marine-related work	16.00	15.67	15.83	0.09	>.10
Years doing previous marine-related work	9.20	13.60	12.13	-0.71	>.10
N	15	15	30		

Similar to other sites, relative income was evaluated based on assets -- house structure, furnishings, and ownership of productive equipment. Table 74 shows that slightly less members have minimal house structures made of bamboo and nipa to low quality house structures made of light materials and lumber than non-members (87% versus 94%; $X^2=0.370$, $p>0.05$). There is no significant difference in the house furnishings of members and non-members, which are characterized as minimal (e.g., bench only) to low (e.g., a few chairs and tables).

Table 74. Percent distribution of assets.

	% Member	% Non-Member	% Total	X^2	p
House structure				0.370	0.543
Minimal	40	27	33		
Low	47	67	57		
Medium	13	06	10		
House furnishings					
Minimal	33	27	30	0.000	1.000
Low	60	67	63		
Medium	07	06	07		
Productive equipment					
Boat ownership	80	73	77	0.186	0.666
N	15	15	30		

Occupational Multiplicity and Dependence on Coastal Resources. When asked to state their current occupation, 93 percent of the sample mentioned that they are practicing a fishery-related occupation. Occupational multiplicity as a survival strategy in Buenavista is evident. In addition to fishing, the respondents are engaged in farming (63%), nipa shingle-making (17%), and charcoal-making. In the past, less than half of the respondents also pursued other jobs such as farmers (17%), laborers (17%), and drivers (7%). Lower frequency responses included baking, laundering, nipa shingle-making, and working as a fishery aide (3% each).

In terms of income, the majority of the respondents (77%) ranked fishing as the most important source. Fishing provides more than half of the household earnings for 60 percent of the households. Secondary income is derived from non-coastal dependent sources such as farming, charcoal-making, nipa shingle-making and other jobs. Only 20 percent of the respondents receive remittances from relatives working outside the barangay. Between the members and non-members, fewer members receive external remittances than non-members (7% versus 33%; Yates corrected $X^2=1.875$, $p>0.05$).

In terms of food, fishing also provides more than half of the food requirements for 53 percent of the households. Members and non-members show the same trend in this regard. Farming serves as a secondary food source.

Collective Action. Two indicators of collective action were examined as a part of the survey: association membership and attitudes towards cooperation (cultural values). It must be noted that the sample was stratified based on membership in the livelihood association in Buenavista and that the population from which the sample was drawn included only those dependent on the nearshore fishery. Based on the survey results, the current members of the CEP livelihood association have no history of affiliation with

another group in the past. Non-members of the livelihood association share the same pattern. At present, the mean number of affiliations of the members is approximately 0.93, slightly higher than the mean of 0.13 for non-members. The difference between the members and non-members in this regard is statistically significant at 1 percent (t-value = 7.1). The members of the CEP-organized livelihood associations in Buenavista perceive that the purpose of their association is to provide alternative income sources (80%).

Cultural attitudes toward collective action favor a collaborative effort among the people in the community in solving community problems (77%). Most respondents (97%) feel that the fishers can work together to fight illegal fishing while 93 percent believe that the government and the fishers can join hands in solving fishery problems. Overall, the attitudes toward collective action are positive.

Job Satisfaction. Given the chance to live their lives over, 90 percent of the respondents would still choose to become fishers. The difference between members and non-members is not statistically significant (100% versus 80%; $X^2 = 3.33$, $p > 0.05$).

Having no other income source/occupation emerged as the top reason (27%) for staying in fishing, followed by fishing as an easy source of food (17%). Others cited the associated advantages of the proximity of the workplace to their houses, the promising income in fishing, and the simplicity and lightness of the task (7% each). For some, having been used to this type of work is an important consideration, along with small capital requirements and the free food inherent in fishing (3% each). For the individuals who would not like to be fishers again, the reasons are associated with insufficient income to meet household needs (7%) and less fish catch (3%).

Given the same income in another occupation, most respondents (70%) still would not switch from fishing to another occupation. This is primarily due to the free food that goes with fishing (40%), perceived ease of fishing as a job (30%), and quick money from fishing (37%). Other considerations are related to the absence of a boss/ existence of free time, possibility of daily income, and easy source of income (10% each). Overall, the fishers of Buenavista are satisfied with their chosen occupation. Like other sites, the perceived rewards from fishing are not only economic but also psychological.

Ecological Knowledge. Among the characteristics of the sea that have a positive influence on the status of the resource, the respondents cited the abundance of mangrove trees (80%), presence of corals (50%), and existence of seaweeds/seagrasses (20%). Also mentioned were clean coastal water (10%) and presence of algae (3%). Multiple responses were allowed, explaining why the total percentage adds up to more than 100%.

For the 17 percent of the respondents who perceived the resource as better off today than 10 years ago, the improvement is attributed to the improvement in mangrove areas (7%), along with coastal resource protection, reduction of illegal fishing, and maintenance of fish catch (3% each). For the majority who perceived that the resource is worse off today (73%), the key reasons included declining fish catch (43%), increasing number of fishers (10%), and worsening fishing conditions due to longer fishing effort and varied fishing gears (10%).

In terms of the specific status of the resource, association members tended to be more positive than non-members. More members than non-members viewed the resource as better off and much better off today (combined responses of 33% versus 0%; Yates corrected X^2=3.840, p=0.05).

Impact Variables

To evaluate the present status of the project's intermediate objectives in terms of creating community-based organizations and implementing livelihood projects, the research team reviewed project reports, held interviews with present project staff, ex-project staff, and project beneficiaries, and directly observed activities in the barangay.

Material Aspects. Tangible material interventions like marine sanctuaries and other related activities are not covered at this stage because they have yet to be pursued by the DENR as part of the CEP's Phase II activities.

Institutional and Organizational Aspects. The desired end results of Phase I are functional community-based organizations that will serve as partners and stakeholders in the management of Ulugan Bay. Thus, preparing the ground for people's participation is a major activity. In this regard, the CEP has established *purok*-based livelihood associations in Buenavista and financed livelihood projects as initial venues for mobilizing collective action. However, the associations became inactive even before CEP completion.

Community Store. A livelihood association called the Madahon Community Store Association was formally organized in Buenavista in June 1994. The organization, which started with 13 members, now only has 8 members, representing a 38 percent reduction. The association has not given a patronage refund (e.g., discounts on actual purchases), despite an earlier agreement to distribute 10 percent of the net sales to the members after a year of operation. The plan was to use the fund to purchase shares in the proposed gasoline station project of the Ulugan Bay Resource Management Cooperative. To date, the plan has not yet materialized. The store ceased operations in June 1995, but the fund remains intact at the bank. The association stopped meeting in 1995.

Rice Trading. The Centro Rice Trading Association was set up in Buenavista in July 1994 with 12 founding members. At present, it has 11 inactive members. One member

left the association. The CEP, through the UBFI, provided seed funds of P8,000 which covered rice supplies, a weighing scale and other goods. Like the community store, the rice trading operation stopped after one year.

The Centro Rice Trading Association was troubled by lack of unity. One member put up his own rice trading enterprise and sold rice to the barangay residents at a lower price. Stiff competition adversely affected the profitability of the association's rice trading project. Moreover, the reported lack of financial transparency on the part of the officers and the inability to give a patronage refund dampened the enthusiasm of association members. Based on key informant interviews, the association stopped its rice trading operation and has not met since October 1995.

Goat-Raising. Similarly, the Morning Glory Goat-Raising Association was organized in mid-1994. Though it started with 8 members, only 7 members have remained. The goat-raising project, nonetheless, is still existent. The members continue to take turns in caring for the two goats given to the association, but goat reproduction and dispersal have yet to occur.

Based on the survey of 30 households in Buenavista, belonging to the CEP livelihood associations has certain benefits, namely: dividends, patronage refund, goat breeding, and credit availment. A fairly substantial proportion of the respondents, however, were unable to cite any benefit (50%).

Use Rights and Management Efforts. No CEP-related use rights and management efforts were uncovered in Buenavista which applied to coastal resources.

Perceived Impacts on the Coastal Ecosystem

Method. To assess the perceived impacts on the coastal ecosystem, the respondents were asked to provide evaluations of a number of aspects of this ecosystem for the pre-CEP and present periods. A self-anchoring, ladder-like diagram with 15 steps was used, where step 1 represents the worst possible situation and step 15 the best possible situation. The respondent was asked to indicate the step which best describes the situation for 10 impact indicators, namely: 1) overall well-being of the household; 2) overall well-being of the resource; 3) income; 4) access to resources; 5) control over resources; 6) ability to participate in community affairs; 7) ability to influence community affairs; 8) community conflict management; 9) community compliance with resource management; and 10) amount of traditionally harvested resource in the water.

Analysis. As an initial step in analyzing the results, a paired comparison t-test was computed to determine if differences between the means are statistically significant for the pre-program and present periods. Table 75 shows an increase in perceived levels of all indicators, except resource access, which is perceived as lower today than before the project. This reflects a lack of access to the sea, which may have been prompted by a crackdown on illegal fishing in Ulugan Bay. However, the difference is not

statistically significant in this regard. Significant differences (p<0.01) between the pre-CEP and present periods lie in the perceptions of the well-being of the household, well-being of the resource, participation in community affairs, influence over community affairs, community conflict management, and community compliance with resource management). Also significant was a perceived increase in resource control (p<0.05).

Table 75. Perceived pre-project to post-project changes in indicators.

	MEMBER				NON-MEMBER				ALL			
	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p
Access	9.73	11.07	-1.34	>.10	8.80	8.30	0.50	>.10	9.27	9.70	-0.43	>.10
Compliance	9.73	6.87	2.86	<.05	9.87	8.47	1.40	<.05	9.80	7.67	2.13	<.01
Conflict	6.53	5.60	0.93	>.10	5.87	5.13	0.74	<.01	6.20	5.37	0.83	<.01
Control	7.60	6.07	1.53	>.10	6.33	5.53	0.80	<.05	6.97	5.80	1.17	<.05
Harvest	9.40	8.67	0.73	>.10	8.47	7.93	0.54	>.10	8.93	8.30	0.63	>.10
Household	7.20	5.67	1.53	<.10	7.33	5.73	1.60	<.05	7.27	5.70	1.57	<.01
Income	7.33	5.73	1.60	<.10	6.33	6.00	0.33	>.10	6.83	5.87	0.96	<.10
Influence	9.60	7.73	1.87	<.10	8.00	7.13	0.87	<.05	8.80	7.43	1.37	<.01
Participate	8.33	7.07	1.26	<.05	7.27	6.67	0.60	<.10	7.80	6.87	0.93	<.01
Resource	9.73	6.80	2.93	<.05	8.67	7.07	1.60	<.01	9.20	6.93	2.27	<.01
N=30												

The second step in the analysis was to test if association members differed from non-members on perceived changes in the indicators. Table 76 indicates that there is no significant difference between members and non-members on perceived changes in the impact indicators (p > 0.05).

Table 76. Differences between members and non-members with respect to perceived changes.

	T2-T1 Member	T2-T1 Non-member	t-value	p
Access	-1.3	0.5	-1.37	0.183
Compliance	2.9	1.4	1.23	0.231
Conflict	0.9	0.7	0.33	0.742
Control	1.5	0.8	0.69	0.502
Harvest	0.7	0.5	0.19	0.851
Household	1.5	1.6	-0.07	0.945
Income	1.6	0.3	1.31	0.202
Influence	1.9	0.9	1.06	0.296
Participate	1.3	0.6	1.15	0.262
Resource	2.9	1.6	1.16	0.255
N	15	15		

The third step in the analysis was to look at the relationships between perceived changes in the indicators and other individual and household level variables. The results in Table 77 show that very few correlations emerged as significant. The perceived change in resource access is negatively associated with taxonomic knowledge ($p<0.01$). This implies that the higher the taxonomic knowledge, the lower is the perceived access to the marine resource. Taxonomic knowledge is a measure that is based on the number of types of locally important fishes that the respondent could name. Moreover, ecological knowledge is negatively associated with perceptions of the overall well-being of the households ($p<0.05$).

Table 77. Correlations between indicators and selected household/individual level variables.

	Age	Educ.	House Member	Resid.	Eco-Know.	Taxa. Know.
Access	-.08	.01	.05	.08	-.14	-.77***
Compliance	-.25	-.06	.01	-.14	-.01	.23
Conflict	-.07	-.09	.06	.15	-.19	.09
Control	-.11	-.06	.14	.04	-.31	.19
Harvest	-.30*	.03	.15	.11	-.22	-.27
Household	-.13	-.07	-.12	-.15	-.39**	-.20
Income	-.16	-.02	-.05	.06	-.26	-.08
Influence	-.09	-.08	.12	.12	-.30	.08
Participate	-.11	-.11	.05	-.05	-.15	.33*
Resource	-.12	-.02	-.09	.06	-.03	-.04

N=30 *=p<.10
***=p<.01 **=p<.05

The relationships between occupation and economic variables and of perceived changes in the impact indicators are presented in Table 78. These variables include important economic indicators such as boat ownership, income sources (e.g., non-fishing income, outside income or remittances from family members, and fishing as a primary income source) as well as occupation-related indicators (e.g., willingness to leave fishing and membership in a coastal user association). Households with non-fishing income tend to perceive an increase in the amount of harvest ($p<0.05$).

Table 78. Correlations between indicators and selected occupational and economic level variables.

	Boat Owner	Nonfish Income	Outside Income	Fish Primary	Leave Fishing	Member
Access	.24	-.10	-0.22	-.02	.24	-.25
Compliance	.27	.05	-.23	-.05	.11	.23
Conflict	.29	.10	-.26	-.06	-.07	.06
Control	.06	.21	-.06	-.24	.04	.13
Harvest	.18	.44**	-.05	-.16	.19	.04
Household	.22	-.09	-.05	-.09	-.12	-.01
Income	.26	.31*	-.06	-.10	.15	.24
Influence	.14	-.07	-.14	-.26	.08	.20
Participate	.23	-.12	-.14	.08	-.20	.21
Resource	.07	.15	-.15	-.23	.25	.21

N=30 **=p<.05
*=p<.10

The 10 impact indicators were subjected to a principal component analysis with varimax rotation. This analysis is useful in reducing the observed variables into fewer indicators that account for most of the variance in the data set. In interpreting the rotated factor pattern, an item was said to load on a given component if the factor loading was greater than or equal to 0.50 for that component.

Table 79 reflects that the two rotated components explain 67 percent of the variance in the set of indicators. Impact Component 1 consists of compliance with resource management, conflict management, participation, influence, control over resources, and well-being of the resource. Impact Component 2 includes well-being of the household, access to resources and income. The similarly in loadings for harvest on both components indicates that it can be considered as shared between components 1 and 2.

Table 79. Principal component analysis of impact indicators.

	Component	
	One	Two
Compliance	0.89**	0.06
Conflict	0.85**	0.16
Participate	0.84**	-0.15
Influence	0.78**	0.40
Control	0.76**	0.42
Harvest	0.58**	0.55**
Resource	0.54**	0.03
Household	0.11	0.77**
Access	-0.19	0.76**
Income	0.49	0.68**
Variance	50%	17%

Factor scores were computed for each component. To determine the set of independent variables that explained most of the variance in each component, step-wise multiple regression was used. The procedure used was similar to that of Calagcalag. The criterion for entry into the regression equation was alpha < 0.05.

None of the independent variables were significantly ($p<0.05$) correlated with Impact Component 1. For Impact Component 2, only taxonomic knowledge was entered into the regression equation. It accounted for 26 percent of the variance in the impact component ($R^2=0.262$). The negative regression coefficient, however, indicates that taxonomic knowledge has a negative influence on the impact component. The multiple regression equation is statistically significant ($p<0.01$).

Table 80. Regression analyses of impact components.

Dependent Variable: Impact Component Two

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Taxonomic knowledge	-0.538	-3.25	0.003

$R = 0.538$; $R^2 = 0.289$; Adjusted $R^2 = 0.262$
$N = 30$; $F = 10.565$; $p = 0.003$

Discussion

The experience of the Coastal Environment Program (CEP) in Buenavista may be regarded as less successful than Macarascas due to the inability of the livelihood associations in the barangay to sustain their operations and to cope with management problems. Moreover, association members did not differ significantly from non-members with respect to amount of perceived changes in the impact indicators. The fishers of Buenavista perceived statistically significant improvements in all indicators except access and harvest.

Cultural values associated with collective action favor a joint effort among fishers in fighting illegal fishing (97%) as well as a partnership between the government and fishers in solving fishery problems (93%). To a lesser extent, the people in the community feel that they can act collectively in addressing community problems (77%). The finding that perceived participation also increased is encouraging.

Non-fishing income showed a positive relationship with perceptions of changes in the amount of harvest and local income. Relating this to the finding that most fishers in the barangay (70%) would opt to stay in fishing even if an alternative job with the same income were available, the implication is that coastal resource management initiatives will still have to factor in material fishing interventions while encouraging the fishers to increasingly go into non-coastal dependent activities. A drastic shift will likely be unrealistic. Another strategy worth considering is to adopt a focused approach for the non-coastal dependent interventions that consciously targets fishers who are more inclined to leave fishing and those who are ambivalent about staying in fishing.

Looking back to the experience of the CEP in Buenavista, several elements can be found in the project process: 1) early participation of the beneficiaries in project planning; 2) beneficiary participation in project implementation, particularly in meetings, beneficiary training, and selection and management of livelihood projects; 3) presence of a core group; 4) conduct of training/capability-building; 5) coordination between groups involved; 6) project flexibility; 7) communication of defined objectives; and 8) part-time deployment of a community organizer.

The Phase I experience of the CEP in Buenavista met only one precondition for co-management — access to local conflict resolution mechanisms. The absence of direct coastal interventions during this phase precluded the operation of other preconditions, specifically those associated with use rights and management efforts, appropriateness of the rules, and user participation in rule making and enforcement. In the context of the CEP beneficiary associations, these associations are not nested (e.g., affiliated with regional and national organizations). The village residents of Buenavista, in addition, are heterogeneous in terms of ethnic grouping and occupation.

The CEP experience in Buenavista affirms that community organizing is not easy, particularly when residents have no tradition of collective action and have no homogeneous characteristics to bind them. The short-lived operation of the beneficiary associations in the

barangay may be partly attributed to the insufficient period allocated to the social preparation phase and to the lack of a resident community organizer in the area who could interact with the members of the young association on a day-to-day basis. The late fund releases from the CEP in 1994 and the non-renewal in 1995 of the contract of the non-government organization (NGO) for community organizing services have also adversely affected the momentum of field activities. In Buenavista, the start-up phase was relatively more difficult than in Macarascas and the barangay officials were reportedly not as supportive. Aggravating the social and management preparation of the beneficiaries in the succeeding years was the lack of continuity of NGO services at the site due to funding problems from the DENR side, which led to the untimely phase-out of the community organizer.

3.2.3 Honda Bay Resource Management Project (HBRMP)

The Honda Bay Resource Management Project (HBRMP) was prompted by the need to pilot action-oriented and high-impact projects within the context of the Strategic Environmental Plan (SEP) of Palawan. The unused portion of the grant from the European Economic Community for the first phase of the Palawan Integrated Area Development Project (PIADP) paved the way for the project office to conceptualize the HBRMP in 1988 and to implement it from mid-1989 to December 1990. The project sought to achieve four objectives (PIADPO 1991), namely:

1) Provide livelihood alternatives on land and sea;

2) Relieve the fishing grounds from extractive methods of fishing;

3) Enrich the natural breeding and feeding grounds of marine life; and

4) Strengthen community values of environmental protection, cooperativism and self-reliance.

To achieve these objectives, project components included mariculture development, multiple fishing gears, mangrove rehabilitation, training and extension services, community organization, and area management planning.

Project preparation involved a review of materials regarding the situation in the project area; evaluation of the project design against actual field conditions; establishment of linkages with institutions; and selection of specific project sites and beneficiaries. The HBRMP was anchored on the concept of community-based coastal resource management (CBCRM), which aimed to harness the communities in the proper use and protection of their coastal resources. The operational strategies associated with the HBRMP implementation (PIADPO 1991) were as follows:

1. Beneficiaries/cooperators were considered co-implementors, not mere recipients of inputs, and were organized into working groups or associations.

2. The technologies introduced were simple and complementary.

3. Technical assistance included the beneficiaries' secondary occupation such as farming, usually upland.

4. Aside from structured seminars/workshops, on-the-job trainings were carried out by the staff to maximize the participation of beneficiaries.

5. Inputs of other developmental institutions, i.e., Department of Agriculture (DA), Department of Environment and Natural Resources (DENR), and City

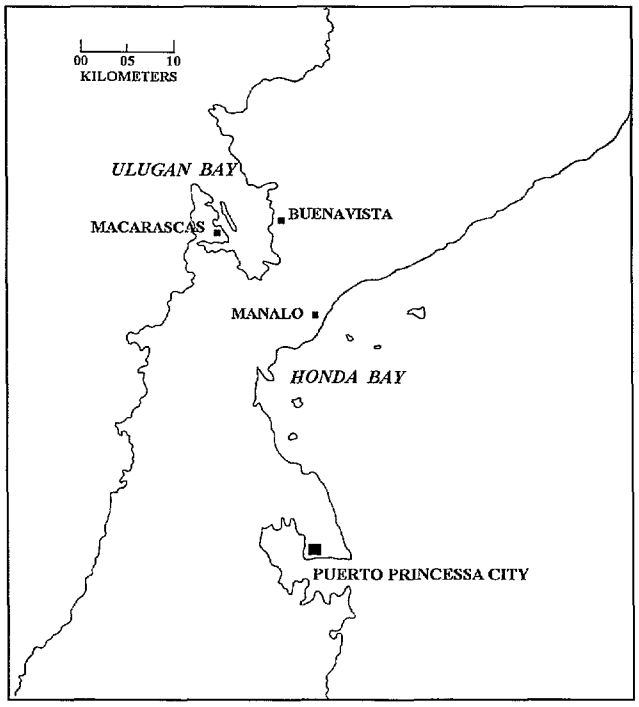
Government were harnessed and reinforced by starting where these agencies left off or coordinating/aligning activities with their on-going programs.

The HBRMP was implemented in three phases: 1) resource identification and mobilization, where a levelling of expectations took place between and among the prospective cooperators, the project staff and the institutions to determine the responsibility centers and the counterpart each group was willing to share; 2) installation of structures; and 3) operation and maintenance, which involved the production phase and measured project performance against plans.

The PIADP Office implemented the HBRMP in the two pilot barangays of Manalo and Sta. Cruz. Fifty-seven (57) households were involved in barangay Manalo while 10 families were involved in barangay Sta. Cruz.

The project interventions in Manalo included stationary lift nets, seaweed culture, fish paste/fish sauce, salt production, mangrove rehabilitation, hook and line fishing, gill-net fishing, crab culture and village market. Those in Sta. Cruz covered oyster and mussel nursery and artificial reefs/fish shelters. The EEC funded the HBRMP at P494,000 (or US $18,296) for 1.5 years only. (For purposes of this study, only Manalo is covered as a study site. The members of the beneficiary households in Sta. Cruz could no longer be surveyed because they were driven out of the barangay after the completion of the project by military personnel, who decided to occupy the area for private use. The research team was able to trace just one household in the barangay of Sta. Monica).

Reaching out to the beneficiaries meant collaborating with other government or non-government institutions operating in the area. The HBRMP was implemented by four agencies: Regional Fishermen's Training Center-DA, Environmental Management Bureau-DENR, the local governments (city and village) and the PIADP Office. Working arrangements between and among these entities were both formal and informal, governed either by a Memorandum of Agreement or a verbal understanding. The multi-institutional arrangement exposed the beneficiaries to linkages necessary for them to pursue new or similar alternatives. The synchronized activities at the top also enhanced project acceptance and allowed experience-sharing that guided project implementation (PIADPO 1991 and Sandalo 1991).



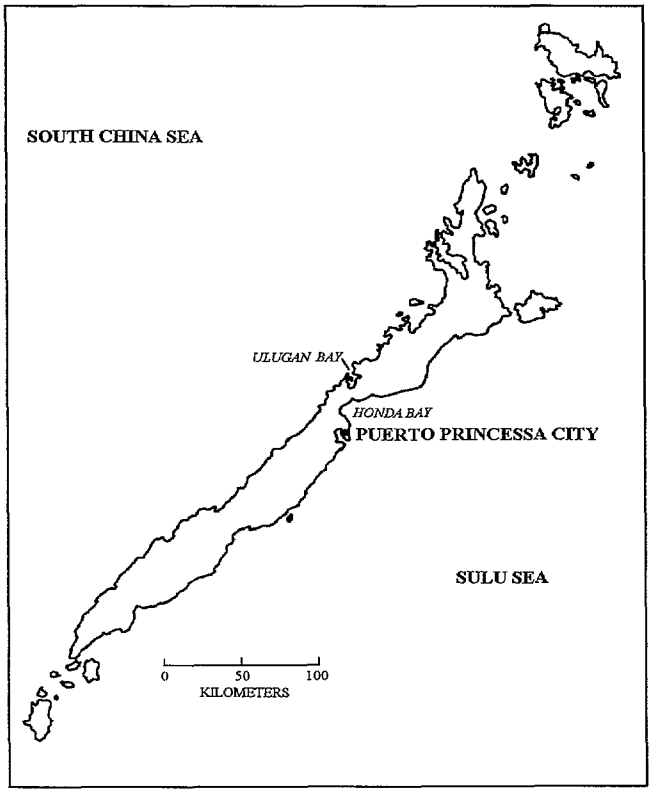


Figure 3. Location map of HBRMP site (Honda Bay).

3.2.3.1 Manalo, Puerto Princesa City

Site Description

Manalo is a coastal barangay of Puerto Princesa City, which lies along Honda Bay on the eastern coast of mainland Palawan. Honda Bay is large, approximately 28,000 hectares with 12 charted islands. Most islands are surrounded by extensive shallow coral reef platforms, sand cays and mangroves. In the early 1980s, an assessment of the bay showed a relatively good quality of coral reef, seagrass bed and mangrove ecosystem, reflecting good feeding, breeding and spawning grounds for fish and other marine life.

Over time, however, degradation has set in due to destructive fishing methods, use of trawls and mini-purse seines within nearshore waters, and destructive land-based activities such as logging and shifting cultivation. Though laws against illegal fishing practices exist, enforcement was relatively weak, particularly in the late 1980s. Fish catch per unit effort reportedly declined from 36.5 kgs in 1985 to 8.4 kgs in 1989 (Sandalo 1994).

The 5,599-hectare barangay of Manalo is approximately 48 kms from the city proper of Puerto Princesa. It is bounded by Maruyugon on the east, Salvacion on the west, Macarascas on the north, and Honda Bay on the south. Lining the edges of Manalo's white, sandy shoreline are clusters of old and young mangrove plants with varying heights. Several open areas designated for passage and landing are highly visible. The coastal scenery is typical, where boats are either anchored on the beach or secured near the houses of the fishers.

For most residents, the primary means of subsistence are fishing, farming, and raising swine, chickens and goats. Upland rice, coconut, mangoes, bananas, root crops and vegetables thrive in the barangay. The fishing grounds still yield demersal and pelagic species, but fish size has reportedly decreased from the late 1980s to the present. Fishing effort, moreover, has doubled.

Site Project Variables

Manalo is a showcase of the Honda Bay Resource Management Project (HBRMP). It has maintained and expanded its mangrove area by accessing new financial resources after the completion of the HBRMP in December 1990. At the forefront of this effort is the HBRMP-nurtured beneficiary organization called the Manalo Coastal Mangrove Development Association, Inc. (MCMDAI).

Before the implementation of the HBRMP in mid-1989, the delivery of CRM-related services to Manalo was limited to the Department of Agriculture (DA), particularly to the Regional Fishermen's Training Center (RFTC). The RFTC introduced a new fishing technology called *tangkal* or stationary lift net in 1987 through its Marine Fisheries

Project. A community organizer, technician and extension worker worked full time in the barangay and organized the MCMDAI as its beneficiary association.

House-to-house visits, immersion in social events, and friendly dialogues were conducted by project personnel to obtain project acceptance. In the first year of project implementation, the RFTC lent one stationary lift net to MCMDAI to demonstrate the new technology. Three (3) additional units followed in the succeeding year. Twenty (20) association members were involved, or 5 persons per lift net, who provided free labor as their project counterpart.

In 1989, a strong typhoon destroyed the four units of *tangkal.* Due to limited funds on the part of the RFTC, only two units were repaired. The Palawan Integrated Area Development Project Office (PIADPO) took over the management of the stationary lift nets in mid-1989, using grant funds from the European Economic Community (EEC). The PIADPO deployed a community organizer in Manalo who stayed in the site for 3 to 4 days a week and who worked closely with the existing MCMDAI. The project staff presented the HBRMP concept in an assembly meeting and asked the association members to form themselves into working teams, based on their interests and preferences.

The HBRMP provided training on various technologies, along with leadership training, association management, bookkeeping and accounting. A survey of 54 households (19 MCMDAI members and 35 non-members) indicated that 30 percent of the respondents attended various training sessions. More members than non-members attended the training activities (63% versus 11%; $X^2 = 15.80$, $p < 0.01$).

Project implementation was participatory. Based on the household survey, the residents of Manalo indicated that they were able to influence the project in terms of planning (74%) and initiating project changes after the project began (81%). Association members, however, felt a stronger influence on project planning than non-members (95% versus 63%), as shown in Table 81. The difference is statistically significant (Yates corrected $X^2 = 4.96$, $p < 0.05$). Project ideas which came from the beneficiaries included crab culture, fish paste/fish sauce production, and village market. More association members influenced project changes after the project began than non-members (100%) versus 71%). The difference is statistically significant (Yates corrected $X^2=4.90$, $p<0.05$).

Attendance at meetings where HBRMP objectives were discussed was also higher for the members than for non-members (79% versus 6%; $X^2=30.61$, $p<0.01$). In terms of the knowledge of project objectives, the majority of the respondents were aware of these objectives, particularly in the context of improving/protecting coastal resources and community welfare (72%).

There is a reported uptrend in the number of fish traders in Manalo since 1989, along with an increase in demand for fish due to population increase and growth of external markets like Metro Manila. The retail prices of fish also increased substantially since 1989. *Tanigue*, *suno* and *lapu-lapu* posted price increases of 75 to 200 percent while *maya-maya* (snapper), *danggit* (rabbitfish), *bisugo* (threadfin bream), *mulmol* (parrot fish), squid and octopus grew more slowly by 15 to 70 percent.

Supra-community Shocks to the System. Three successive typhoons hit Manalo in August, May and November 1990, damaging the stationary lift nets and washing away the seaweeds cultured by the HBRMP beneficiaries. No new technologies, other than the crab culture and salt-making by boiling method introduced by the project, have been used in the area since the project started.

Community Context

Perception of Trends in the Resource. Based on the survey of 54 households in Manalo, the status of the fishery resource at the time of HBRMP implementation was generally regarded as good (78%). The degree of variations in the responses ranged from 39 percent for good, to 28 percent for slightly good, to 11 percent for very good. Only a minority perceived the situation as bad (18%). The rest did not perceive any change. Between members and non-members, non-members tended to be more positive than members but the difference is not statistically significant (83% versus 69%; $X^2 = 1.48$, $p > 0.05$).

Comparing the condition of the nearshore fisheries today to the situation 10 years ago, the majority of the respondents (65%) expressed that the resource is better off today. Only 11 percent felt that the situation remained the same. The rest (24%) said that the resource was worse off. Between association members and non-members, slightly more members were inclined to think that the resource is worse off today (32% versus 20%; $X^2 = 0.90$, $p > 0.05$). Further details on the underlying reasons are discussed in the section on individual and household data.

Target Species Composition and Distribution. Interviews with key informants representative of the major fishing gear types revealed that the following types of fish are considered most important in terms of income:

1. *lapu-lapu* (grouper)
2. *suno* (grouper)
3. *mangagat* (snapper)
4. *maya-maya* (snapper)
5. *talakitok* (jack/trevally)
6. *banak* (mullet)
7. *apahap* (seaperch)

Table 81. Community participation in CBCRMP implementation.

	% Member	% Non-Member	% Total	X^2	p
Attend CBCRMP Training	63	11	30	15.80	0.000
Attend CBCRMP Meetings	79	6	32	30.61	0.000
Knowledge of Objectives	73	71	72	0.02	0.894
Influence Planning	95	63	74	4.96*	0.026
Influence Project Changes	100	71	81	4.90*	0.027

* Yates corrected; member n=19, non-member n=35.

The interventions of the HBRMP covered a short period of 1.5 years. These included mangrove rehabilitation, stationary lift nets, hook-and-line fishing, gill-net fishing, seaweed culture, crab culture, fish paste/fish sauce preparation, salt production using the boiling method, and village market.

Context Variables

Supra-community Context

Enabling Legislation. Manalo is governed by the Basic Fishery Ordinance of Puerto Princesa City (Ordinance No. PD 826-8-76) and its amended provisions as well as by the Strategic Environmental Plan of Palawan (R.A. 7611). These were discussed earlier under Macarascas.

Supra-community Institutions. Several external institutions have influenced coastal resource management in Manalo before, during and after HBRMP implementation. Before the HBRMP, the Department of Agriculture (DA) introduced seaweed culture through its Provincial Office as well as stationary lift nets through its RFTC. During the implementation of the HBRMP, several agencies extended services to the area aside from the DA. The Department of Environment and Natural Resources (DENR), through its PENRO (Provincial Environment and Natural Resources Office), provided technical services on mangrove reforestation as a partner of the PIADPO in HBRMP. The PIADPO was responsible for strengthening the existing coastal user association (i.e., MCMDAI) and for providing funds for beneficiary training and livelihood projects. The Honda Bay Foundation, a non-government organization, initiated a fish breeding project in Senorita Island in Honda Bay. After the completion of the HBRMP, the City Government of Puerto Princesa launched its Baywatch Program which patrolled various bays in the city and apprehended illegal fishers.

Supra-community Markets.The marketing of fresh fish in Manalo is basically directed at the Puerto Princesa Public Market, which absorbs 70 percent of the total fish catch in Manalo. Trading also takes place within the barangay, which absorbs the balance of 30 percent. First class fish such as *lapu-lapu* (grouper), *suno* (grouper) and *tanigue* (Spanish mackerel) are sold in the city proper while third class fish such as *mulmol* (parrot fish) and *baritos* (halfbeak) are absorbed by the barangay.

In terms of consumption, *danggit* (rabbitfish), *mulmol* (parrot fish) and *bisugo* (threadfish bream) are important, along with anchovy, squid and *samaral* (siganid/rabbit fish). A type of fish, known as *dalagang bukid* (caesio) has reportedly become rare now.

Environmental Features Influencing Boundary Definition. The coastline of Manalo is slightly irregular. It has a shallow beach area with a thick mangrove stand at the southern portion. Fishers are aware of the locations of reefs below the surface. Boundary delineation would be of medium difficulty due to the absence of natural boundaries. It would be necessary to put marker buoys to define a protected area.

Technologies Used in Coastal Area. Fishing is generally done from outrigger boats ranging from 2 meters to 6 meters. Most boats in Manalo are unmotorized, powered only by a paddle. Overall, there are 180 boats in the barangay, of which only 70 boats are motorized.

Among the existing fishing technologies, the gill net is the most frequently used (54%), followed by hook and line (33%). The nets include the drift net (*panti*), top set net (*palutang*) and bottom set net (*palubog*). The drift net is used during the day from 5 a.m. to 8 a.m. The bottom set net is used at early dawn and early evening. Several types of hook and line are also used in Manalo: long line (*kitang*) for catching large fish in offshore areas, single handline with varied hook sizes and line thickness, squid jigger and octopus jigger. Less commonly used are spear (*pana*), fish corral and lift net.

Level of Community Development. The level of community development is based on a checklist of items given below. The facilities which are in place are marked by bold print while those which are absent are presented in normal print.

1. Hospital
2. Medical Clinic
3. Resident Doctor
4. Resident Dentist
5. Secondary School
6. **Primary School**
7. Public Water Supply Piped to Homes
8. Sewage Pipes or Canal
9. Sewage Treatment Facility
10. Septic or Settling Tanks
11. Electric Service
12. Telephone Service
13. **Food Market (Village Market and Sari-Sari Stores)**
14. Drug Store
15. Hotel or Inn
16. Restaurant
17. Gas Station
18. **Public Transportation**

19. Hard Top Road Access
20. Banking Service
21. Television Reception
22. **Radio Reception**

Degree of Integration into National Economy and Political System. Manalo traders bring their iced fish and fish products by jeepney to the city proper of Puerto Princesa. Regular trips by jeepney and other vehicles on an unpaved road provide a medium market link to other areas. Communication links are low due to a total dependence on hand-held radios to communicate with other areas. Political links are high because of frequent visits from the City Mayor. Overall, the degree of integration of Manalo into the economic and political system may be classified as medium.

Tradition of Cooperation and Collective Action. The longest surviving organization in Manalo is the 9-year old Manalo Coastal Mangrove Development Association, Inc. (MCMDAI). Its existence dates back to 1987 when the DA-RFTC organized the fishers in the barangay for fishery-related activities. Also organized by the DA is the Rural Improvement Club, which has been active for 5 years in mothers' classes and in food processing seminars. Another organization in Manalo is the Small Coconut Farmers' Association, which has existed for about 5 years now. It aims to improve coconut production in the barangay. A women's organization is also in place, called the Charity Women's Organization. Organized by the wife of the City Mayor in 1992, it has been engaged in cleanliness campaigns. Lastly, a Mutual Aid Association exists in Manalo, which assists members in times of death and illness.

Occupation Structure and Dependence on Coastal Resources. The only coastal-dependent occupation in Manalo is fishing (Table 82). Based on key informant interviews, barangay households rely more on farming for their survival (50%) than on fishing (23%). Professionals and government employees comprise 10 percent and 6 percent, respectively. Others are traders, charcoal makers, laborers, carpenters and drivers.

Table 82. Distribution of major occupations.

Occupation	Percent
Farmers	50
Fishers	23
Professionals	10
Government employees	6
Others (traders, drivers, carpenters, charcoal-makers and laborers)	11

Degree of Socio-Economic and Cultural Homogeneity. The residents of Manalo are relatively heterogeneous in terms of ethnic groups. The native *Cuyunins* comprise

about half of the total population, followed by *Cagayanos* (15%) and *Tagbanuas* (10%). The rest are migrants from Cebu, Iloilo and other provinces (25%). In terms of religion, the Roman Catholics constitute the majority (70%). The balance is accounted for by the members of the Iglesia ni Cristo, Baptists and other religions. Overall, the residents of Manalo may be regarded as fairly heterogeneous in terms of ethnic group, occupation, and to a lesser extent, religion.

Political Organization and Conflict Resolution. A Barangay Captain heads the Barangay Council, whose members consist of councilors, a secretary and a treasurer. A local committee, called the *Lupong Tagapamayapa*, is the formal mechanism for resolving conflicts which are not settled amicably at the level of the barangay captain. The City Court intervenes only if the *Lupon* is unable to resolve the conflict. So far, conflicts have revolved around land disputes, drunkenness and slight physical injuries. Informal mechanisms for conflict resolution also exist, involving tribal leaders and the barangay captain. In general, 95 percent of the cases are resolved at the barangay level.

Population and Population Changes. The population of Manalo grew from 914 persons in 1975, to 1,043 persons after a decade, and then to approximately 2,003 persons in 1995. Annual population growth tended to be more rapid during the 1985-1995 period (9.2% per year) than in the preceding decade (1.4% per year).

Coastal Resource Use Rights, Formal and Informal. Use rights are governed by national and local legislation. The national legislation, P.D. 704, restricts the capture of mother milkfish, sea turtles, dolphins and immature fish and regulates the use of chemicals in fishing, among others.

At the local level, formal use rights and rules are guided by city ordinances enacted by the Office of the *Sangguniang Panglungsod*. These rights, as discussed earlier for Macarascas, also apply to Manalo. The level of compliance is reported to be 80 percent.

Women. The women of Manalo are actively engaged in both fishery- and non-fishery based activities. Based on a household survey of 54 respondents, the majority are engaged in coastal-related activities (80%). These include fish vending (48%), gleaning shellfish and other marine products (20%), and fish drying (17%). To a certain extent, some women in Manalo also fish (6%) and make fish paste (2%). The length of time spent for these coastal-dependent activities varies from a mean of 7 hours for fishing, to 5 hours for fish vending and 5 hours for fish drying, to 3 hours for gleaning. In the case of fish vending, women from member-households tend to spend shorter hours than those from non-member households (2.7 hrs versus 5.1 hrs; t-value=-2.13, $p<0.05$). This suggests that women from member-households generally sell fish within Manalo and in neighboring barangays, not in the City Proper.

About 85 percent of the women are also engaged in non-fishery based activities. These include raising livestock and poultry (59%), nipa shingle-making (39%), and tending *sari-sari* stores (13%). Lower frequency responses include mat weaving, vegetable gardening, dressmaking, and buy and sell operations.

The mean income of women from coastal-dependent activities is around P864 per month while that from other sources is higher at P1,561 per month. Women from non-member households tend to earn more from coastal-dependent activities than women from member-households (P1,838 versus P947). The reverse pattern holds for non-coastal dependent activities (t-value=1.70, $p<0.10$).

In terms of the participation of women in the HBRMP, a fairly high percentage (85 percent) did not join project-related seminars and training sessions. Among those who participated, the most frequently attended activity was fish sauce preparation, followed by community organizing and mangrove reforestation. The benefits derived by the women respondents from project participation were obtaining additional income and gaining knowledge on livelihood improvement.

Among those who did not participate in the HBRMP activities, the reasons were attributed to preoccupation with other activities (30%), lack of information (7%), and inability to get along with others (2%). Between the member- and non-member households, the difference in women's participation is not statistically significant (X^2 = 3.279, $p > 0.05$).

Individual and Household Level Context

Characteristics of Sample Fisher Households. A random sample of 54 households were drawn from a population of households which are dependent on coastal resources. The sample comprised 19 members of the Manalo Coastal Mangrove Development Association, Inc. and 35 non-members. Table 83 shows that both members and non-members are similar in terms of mean age, length of residence in the barangay, household size, educational attainment, number of years in marine-related work, and engagement in marine-related occupations in the past. No significant statistical difference exists between the members and non-members. On the average, the respondents are in their late 30s/early 40s, have lived in the barangay for a little over 30 years, and have pursued marine-related occupations for 19 years. They have generally completed elementary schooling, but not secondary schooling, and have a household size of 6 to 7 members.

Table 83. Characteristics of sample.

Variable	Member	Non-Member	Total	t-value	p
Age	42.32	38.89	40.09	1.24	>.10
Education	6.26	7.26	6.91	1.43	>.10
Years residing in the area	35.26	30.83	32.39	1.12	>.10
Household size	6.32	6.57	6.48	-0.39	>.10
Years doing marine-related work	19.39	19.34	19.54	0.09	>.10
N	19	35	54		

Similar to other sites, relative income was evaluated based on assets — house structure, furnishings, and ownership of productive equipment. Table 84 shows that more members have minimal to low quality house structures than non-members but the difference is not statistically significant (84% versus 63%; X^2=2.69, p>0.05). Low quality house structures refer to houses with a combination of lumber and light housing materials while minimal quality structures refer to houses made of light materials such as bamboo and nipa. The house furnishings of members are likely to be characterized as low, with a few chairs and a table, to medium, with a sala set and a transistor radio (X^2=0.211, p>0.05). In terms of boat ownership, more non-members own boats (83% versus 63%), but the difference is not statistically significant (X^2 = 2.61, p > 0.05).

Table 84. Percent distribution of assets.

	% Member	% Non-Member	% Total	X^2	p
House structure				2.690	0.101
Minimal	26	17	20		
Low	58	46	50		
Medium	16	34	28		
High	00	03	02		
House furnishings				0.211	0.646
Minimal	05	03	04		
Low	26	23	24		
Medium	68	74	72		
Productive equipment				2.610	0.106
Boat ownership	63	83	76		
N	19	35	54		

Occupational Multiplicity and Dependence on Coastal Resources. When asked to state their current occupation, 96 percent of the respondents mentioned that they are engaged in fishing. In addition, 48 percent of the respondents are engaged in farming and 33 percent in charcoal-making. In the past, 31 percent of the respondents also

pursued other jobs such as laborers, carpenters, farmers, drivers, and forest guards. The primary reason for shifting to fishing is the perception of a better income from fishing.

In terms of income, 83 percent of all respondents ranked fishing as the most important source. Fishing provides more than half of the earnings for 78 percent of the households. Secondary income is derived from non-coastal dependent sources such as farming and nipa shingle-making. Only 5 percent of the respondents, all of whom are members, received remittances from family members working outside the barangay.

Fishing also provides more than half of the household's food requirements, particularly for 74 percent of the respondents. Members, however, have a slightly lower dependence on fishing as a source of food than non-members (58% versus 83%; $X^2 = 2.80$, $p > 0.05$).

Collective Action. Two indicators of collective action were examined as a part of the survey: association membership and attitudes towards cooperation (cultural values). It must be noted that the sample was stratified based on membership in MCMDAI in Manalo and that the population from which the sample was drawn included only those dependent on the nearshore fishery. Based on the survey results, the members of MCMDAI also belong to other organizations at present. These are the Small Coconut Farmers Association (21%) and Mutual Aid Association (5%). Non-members of the MCMDAI, on the other hand, have a lower percentage of affiliation at present even in other community organizations. The mean number of current affiliations is 1.32 for members and 0.48 for non-members. The difference between members and non-members in this regard is significant (t-value = 4.51, $p<0.01$). The members of the MCMDAI perceive that the purpose of their association is to rehabilitate the mangrove forest, improve fishery resources, and improve the well-being of fishers.

Cultural attitudes toward collective action strongly favor a collaborative effort between the government and fishers in solving fishery problems (100%). All the respondents (100%) feel that fishers can work together to fight illegal fishing. Ninety-six percent (96%) believe that people in the community can cooperate in solving community problems. For each of these aspects, the members had consistently posted a response of 100 percent relative to non-members.

Job Satisfaction. Given the chance to live their lives over, 100 percent of the respondents would still choose to become fishers. The ease in obtaining income from fishing emerged as the top reason for staying in fishing (33%). Others cited that their families are dependent on fishing for subsistence (18%). Still others mentioned that fishing is a light and simple job and that it offers free food (11% each). In addition, fishing is associated with better income (7%).

Given the same income in another occupation, most respondents (94%) still would not switch from fishing to another occupation. This is primarily due to the ease in earning

1990 and severely damaged the lift nets once again, prompting the beneficiaries to abandon the project and join other HBRMP activities instead (PIADPO 1991).

Hook-and-Line Fishing. The HBRMP provided hook-and-line materials to the beneficiaries to enable them to catch fish whenever the stationary lift nets could not be operated. The average catch for a five-hour fishing trip was 3-5 kgs of assorted fish.

Gill Net Fishing. In the later part of HBRMP, the fishermen suggested the operation of gill nets to maximize their time at sea while attending to the seaweeds, maintaining the mangrove plantation or drying the anchovies caught by the stationary lift nets. Three units of gill net, with mesh sizes 6, 7 and 9, were used to catch crabs, mullets, milkfish and slipmouth. The average production was 8 kgs per fishing trip, which lasted for 8-12 hours.

Seaweed Culture. A group of six beneficiaries planted seaweeds on a 2-hectare area within Snake Island, using the materials provided by the HBRMP. The beneficiaries themselves sought training from an external group to gain know-how on seaweed culture. A typhoon in May 1990, however, washed away the seaweeds, which were almost ready for harvest. What remained from the original crop (25 kgs) was replanted using the stake method. The growth of seaweeds, however, was stunted, apart from showing signs of grazing. This was due to unstable salinity and unfavorable water current in the seaweed area of the project. The volume of harvest discouraged the beneficiaries and compelled them to give up the area and move to a better site by joining a fisherman who was already engaged in the activity. In the end, seaweed culture proved to be labor-intensive. It took too much time away from other activities (PIADPO 1991).

Crab Culture. In keeping with the participatory approach of HBRMP, the project staff favorably responded to the suggestion of some beneficiaries to go into crab culture. Five beneficiaries constructed the pond and maintained the culture stock, using the aquasilviculture technology of DENR. The technology incorporated mangrove/nipa plantation with crab culture, which allowed shading as well as enrichment of the substrate due to organic litter. Supplemental feed, trash fish and chopped coconut meat were used to feed the crabs.

Fish Paste/Fish Sauce Production. This activity was identified and participated in by the wives of fishermen operating the stationary lift net. Normally, anchovies and trash fish from the net were dried to earn higher income. The quality of drying during the rainy season, however, was so poor that the prices of dried anchovies declined by more than half. Four housewives formed a group to process the anchovies into fish paste. After 2-3 months of fermentation, the beneficiaries were able to sell 1 barrel of fish paste or "*bagoong*" out of 7 barrels. The production of fish sauce or "*patis*" from the remaining 6 barrels, however, did not materialize in the next 6 months. Based on key informant interviews, the fish paste deteriorated due to non-compliance with the salt-fish ratio of 1:3 and to irregular product inspections by the beneficiaries.

Salt Production. As an offshoot of the stationary lift net and the fish paste production, three beneficiaries embarked on salt production to ensure a stable salt supply. Most of the salt at the time came from the province of Mindoro. The boiling method was introduced instead of the usual solar method since the critical period was the rainy season. Salt production was constrained by the difficulty of procuring firewood for boiling. The poor maintenance by the beneficiaries of evaporating sheets and other salt-making equipment also shortened the life span of the equipment, eventually leading to the stoppage of salt production after 7 months.

Mangrove Rehabilitation. Nineteen (19) beneficiaries established a 12-hectare mangrove plantation along the mudflats of Manalo. Replanting took place after a year along the seaward portion of the plantation to replace those that died, using resistant propagules from mother trees in the small islands in the bay. The survival rate of the mangrove plants was 75-80 percent.

Village Market. The village market was constructed through the initiative of the association in cooperation with village officials. The share of the PIADPO from the lift nets was used in installing the village market and in serving as seed capital for members engaged in buying and selling rice and fish. Based on key informant interviews, market operations lasted for about a year only because the capital-short vendors shifted to nipa shingle-making. In late December 1995, the village market resumed operations at the initiative of the incumbent Barangay Council.

Institutional and Organizational Aspects. The existence of the MCMDAI did not end with the completion of the HBRMP. In May 1992, it entered into a 3-year contract reforestation with DENR worth P1.16 million (or approximately US$ 44,615) with the assistance of a former HBRMP staff who provided technical support on an informal/unofficial capacity.

To date, 100 ha of tidal flat have been planted to mangrove, inclusive of the original 12 ha planted during the time of HBRMP. Replanting and maintenance were carried out by the officers and members of MCMDAI. The association hopes to turn over the mangrove plantation to DENR in 1996. After the DENR has inspected and accepted the mangrove plantation, the association expects to have access to approximately P150,000- P200,000 from the mangrove contract, which has been set aside earlier as a guarantee fund for ensuring the achievement of the desired survival rate. As part of the capital build-up, this amount could be used to finance new activities in the future.

The MCMDAI, nonetheless, had its own share of organizational struggles. From 57 members during HBRMP implementation, its members declined to 36 in 1991 and then to 29 at present. The reported financial mismanagement by some association officers, calamity-related problems, and preoccupation with other activities weakened the interest of some members. Despite these problems, the association survived.

Based on the household survey in Manalo, members perceive the benefits of belonging to the association as follows: 1) earnings/wages from mangrove reforestation (47%); 2) increased income/fish catch of members (11%); and 3) credit availment (11%). The survey also shows that even non-members were aware of these benefits. Only 17 percent of the non-members were unable to cite any benefit.

Use Rights and Management Efforts. No use rights were uncovered during the conduct of the research, not even for the 12-ha mangrove area planted by MCMDAI during the implementation of the HBRMP. In 1989, Palawan was considered a mangrove swamp forest reserve by virtue of Presidential Proclamation No. 2152. This precluded the issuance of 25-year stewardship contracts that would allow the mangrove planters to eventually harvest what they planted. The only available instrument was the 3-year mangrove reforestation contract, which compensated the planters for their labor and which required them to turn over the mangrove plantation to DENR after three years.

Perceived Impacts on the Coastal Ecosystem

Method. To determine perceived impacts on the coastal ecosystem, the respondents were asked to provide a comparative evaluation of a number of aspects of this ecosystem for the pre-project and present periods. A self-anchoring, ladder-like diagram with 15 steps was used, where step 1 represents the worst possible situation and step 15 the best possible situation. The respondent was asked to indicate the step which best describes the situation for 10 impact indicators, namely: 1) overall well-being of the household; 2) overall well-being of the resource; 3) income; 4) access to resources; 5) control over resources; 6) ability to participate in community affairs; 7) ability to influence community affairs; 8) community conflict management; 9) community compliance with resource management; and 10) amount of traditionally harvested resource in the water.

Analysis. As an initial step in analyzing the results, a paired comparison t-test was computed to test if differences between means are statistically significant for the pre-project and present periods. Table 85 shows an increase for the total sample in the perceived levels of impact indicators, particularly in the overall well-being of the resource and well-being of the household ($p<0.01$). Another perceived improvement is in income ($p<0.05$). Changes in all other variables were not statistically significant.

Table 85. Perceived pre-project to post-project changes in indicators.

	MEMBER				NON-MEMBER				ALL			
	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p	Today (T2)	Before (T1)	T2-T1	p
Access	8.68	8.42	0.28	>.10	8.71	8.97	-0.26	>.10	8.70	8.78	-0.08	>.10
Compliance	9.42	9.63	-0.21	>.10	9.57	9.20	0.37	>.10	9.52	9.35	0.17	>.10
Conflict	9.31	9.53	-0.22	>.10	9.20	9.23	-0.03	>.10	9.24	9.33	-0.09	>.10
Control	8.79	8.68	0.11	>.10	8.91	8.83	0.08	>.10	8.87	8.78	0.09	>.10
Harvest	9.58	9.95	-0.37	>.10	9.40	9.69	-0.29	>.10	9.46	9.78	-0.32	>.10
Household	7.47	5.89	1.58	<.01	8.26	7.09	1.17	<.01	7.98	6.67	1.31	<.01
Income	7.84	7.26	0.58	>.10	7.97	7.43	0.54	<.05	7.93	7.37	0.56	<.05
Influence	8.63	9.00	-0.37	>.10	9.23	9.29	-0.06	>.10	9.02	9.19	-0.17	>.10
Participate	8.42	8.42	0.00	>.10	8.60	8.80	-0.20	>.10	8.54	8.67	-0.13	>.10
Resource	9.37	7.53	1.84	<.01	9.43	8.03	1.40	<.01	9.41	7.85	1.56	<.01
N=54												

The second step in the analysis was to determine if association members differed significantly from non-members on perceived changes in the indicators. Table 86 indicates that non-members tended to perceive declines in 5 out of 10 indicators, except in the overall well-being of the household, well-being of the resource, resource control, compliance and income. The differences between members and non-members, however, are not statistically significant (p>0.05).

Table 86. Differences between members and non-members with respect to perceived changes.

	T2-T1 Member	T2-T1 Non-member	t-value	p
Access	-0.2	-0.3	1.05	0.300
Compliance	-0.2	0.4	-1.08	0.287
Conflict	-0.2	-0.03	-0.47	0.641
Control	0.1	0.1	0.05	0.959
Harvest	-0.4	-0.3	-0.18	0.858
Household	1.6	1.2	1.44	0.157
Income	0.6	0.5	0.07	0.941
Influence	-0.4	-0.1	-0.86	0.395
Participate	0.0	-0.2	0.56	0.578
Resource	1.8	1.4	1.07	0.289
N	19	35		

The third step in the analysis was to examine the relationships between perceived changes in the indicators and other individual and household level variables. The results in Table 87 show that perceived changes in the amount of harvested resource are positively correlated with age (p<0.05). The older the respondent, the higher is the

perceived amount of fish harvest. Perceived changes in resource access are positively correlated with educational attainment, implying that those who have higher education tend to perceive gains in resource access. Household size is positively linked with perception of community conflict resolution (p<0.05). In a small subsistence community where the residents depend on each other and where many are related by kinship, maintaining harmony is perceived as important particularly by larger households.

Table 87. Correlations between indicators and selected household/individual level variables.

	Age	Educ.	House Member	Resid.	Eco-Know.	Taxa. Know.
Access	.03	.29**	-.01	.11	.06	.08
Compliance	.14	-.07	.14	.14	-.09	.01
Conflict	.15	.05	.29**	.00	.27**	.40***
Control	.15	.25*	-.16	.05	.06	.19
Harvest	.28**	-.06	.07	.07	.18	.22
Household	-.16	.10	.09	-.23*	-.29**	-.26*
Income	.01	.21	-.14	-.05	-.28**	.05
Influence	.18	-.03	.05	-.02	.17	.16
Participate	.24*	.06	.19	.17	.06	.21
Resource	-.04	-.08	-.25*	-.29**	-.13	-.19

N=30 *=p<.10
**=p<.05 ***=p<.01

Perceived changes in the overall well-being of the resource are negatively correlated with the length of residence in the area (p<0.05). Ecological knowledge is associated with perceptions of positive changes in community conflict resolution but is negatively linked with perceptions of household well-being and income. This suggests that the higher the ecological knowledge/awareness, the lower is the perceived change associated with income and well-being of the household. Similarly, the perceived change in the overall well-being of the household is negatively linked to taxonomic knowledge. However, ecological and taxonomic knowledge are positively correlated with community conflict resolution. (Taxonomic knowledge is a measure that is based on the number of types of locally important fishes that the respondent could name).

The relationships between occupation and economic variables and perceived changes in the indicators are presented in Table 88. These variables include important economic indicators such as boat ownership, income sources (e.g., non-fishing income, outside income or remittances from family members, and fishing as a primary income source) as well as occupation-related indicators (e.g., willingness to leave fishing and membership in MCMDAI). For households with non-fishing income (i.e., from farming and other non-coastal dependent activities), the findings show a negative correlation with the overall well-being of the resource (p<0.05). Where fishing is a primary source of income, households tend to perceive a lower local income (p<0.05).

Table 88. Correlations between indicators and selected occupational and economic level variables.

	Boat Owner	Nonfish Income	Outside Income	Fish Primary	Leave Fishing	Member
Access	-.02	.00	.09	.01	-.12	.14
Compliance	.10	-.01	.13	-.01	-.19	-.15
Conflict	.03	.14	.22	-.03	.02	-.06
Control	-.06	-.11	.10	-.04	-.20	.01
Harvest	.05	.02	.11	.04	-.05	-.02
Household	.13	-.12	-.04	-.16	.17	.20
Income	-.10	.02	.04	-.33**	-.03	.01
Influence	.03	-.05	.13	.06	-.10	-.12
Participate	-.06	.03	.24*	.03	-.11	.01
Resource	.22	-.29**	.04	.07	-.09	.15

N=30 **=p<.05
*=p<.10

The 10 indicators were subjected to a principal component analysis with varimax rotation. This analysis is a powerful tool for reducing the observed variables into fewer indicators that account for most of the variance in the data set. In interpreting the rotated factor pattern, an item was said to load on a given component if the factor loading was greater than or equal to 0.50 for that component.

Table 89 indicates that the two rotated components explain 59 percent of the variance in the set of indicators. Impact Component 1 consists of conflict management, ability to participate in community affairs, influence, community compliance with resource management, amount of harvest and resource access. Component 2 includes well-being of the household, well-being of the resource and income.

Table 89. Principal component analysis of impact indicators.

	Component	
	One	Two
Conflict	0.84**	0.08
Participate	0.82**	0.03
Influence	0.78**	0.32
Compliance	0.78**	0.02
Harvest	0.75**	0.18
Access	0.73**	0.01
Household	-0.34	0.71**
Resource	0.12	0.66**
Income	0.31	0.64**
Control	0.48	0.44
Variance	44%	15%

Factor scores were created for each component. To determine the set of independent variables that explained most of the variance in each component, step-wise multiple regression was used. (The procedure was earlier discussed under Calagcalag). The criterion for entry into the regression equation was alpha<0.05.

None of the independent variables were significantly ($p<0.05$) correlated with Impact Component 1. For Impact Component 2, Table 90 shows that approximately 21 percent ($R^2=0.211$) of the variable in the impact component is explained by two variables which entered by the regression equation. These are the number of years in marine-related work and taxonomic knowledge. The multiple regression equation is significant ($p<0.01$).

Table 90. Regression analyses of impact components.

Dependent Variable: Impact Component Two

Independent Variables	Standardized Coefficient	t-value	Probability (2-tail)
Years in marine-related work	0.394	3.18	0.003
Taxonomic knowledge	0.260	2.10	0.041

$R = 0.492$; $R^2 = 0.242$; Adjusted $R^2 = 0.211$
$N = 54$; $F = 7.972$; $p = 0.001$

Discussion

The experience of the Honda Bay Resource Management Project (HBRMP) in Manalo was considered to be relatively successful. The beneficiary association did not disintegrate after the completion of the HBRMP. The membership may have declined, but the association survived despite its share of internal management problems and changes in leadership. It also moved on to a bigger, 3-year mangrove reforestation contract with the Department of Environment and Natural Resources (DENR) worth P1.16 million covering 100 hectares. Moreover, an evaluation of impact indicators indicates that Manalo fishers perceived statistically significant increases in household well-being, income, and overall well-being of the coastal resource.

The promotion of values associated with environmental protection and collective efforts has made an impact in Manalo, as manifested in very positive attitudes toward collective action at various levels -- at the level of the fishers (100%), the government and fishers (100%), and among the people themselves (96%). These views augur well for present and future collaborative efforts on coastal resource management. The finding that both members and non-members share these attitudes suggests that mobilizing the community for collective action will not be too formidable.

Notwithstanding the short-lived nature of most HBRMP interventions, the beneficiaries themselves perceived certain positive changes in material and non-material aspects. The participatory and flexible nature of the HBRMP alongside its capability-building efforts has, in some measure, helped the beneficiaries become more open to other alternatives or possibilities. Their experience with the 12-hectare mangrove reforestation area laid the ground for a much bigger mangrove reforestation project with the DENR after the completion of the HBRMP. Over the past three years, association members have carefully tended and guarded their mangrove area and have consciously complied with the provisions of their contract with the DENR.

Moreover, the participation of HBRMP beneficiaries in the decision-making process of the project concerning additional interventions that could be pursued and their exposure to implementation realities may have helped them become less critical of the project and have more of a sense of balance, acknowledging accomplishments as well as shortfalls. Though only one HBRMP intervention was sustained, members still perceived statistically significant gains in the overall well-being of the resource. This was attributed to improved fishing conditions, reduction of illegal fishing and presence of mangroves.

The findings also show that respondents who have lived longer in the barangay perceive a lower well-being of the household and of the marine resource. They are less positive than those who have a shorter length of residence in the area. This may be partly attributed to the experience of older residents with the teeming marine resources that existed in the earlier decades. As a long-time resident recounts, "In the 1960s, we could fully load our banca with

fish in 1 to 2 hours of fishing. Now, the situation has become a far cry from the earlier decades."

Nonetheless, most respondents expressed that they would still stay in fishing even if another job with an equal income were available. Thus, reducing the pressure on coastal resources means that the provision of viable, supplemental livelihoods is in order, rather than asking the respondents to give up fishing completely. More conscious efforts will have to be exerted to generate feasible options that are congruent with the prevailing occupational multiplicity in the area. The finding that households which are heavily dependent on fishing as a primary source of income perceive less improvement in income also suggests that further interventions are necessary in improving alternative income-generating activities, including those that are not coastal-dependent.

Another significant finding is the negative correlation between household size and perceptions of the overall well-being of the resource. Bigger households in impoverished rural areas are more likely to be confronted with pressing survival needs, which tend to lead to greater resource use and resource depletion. In barangay Manalo, the average population growth per year from 1985 to 1995 was estimated at 9.2 percent, which is far more rapid than the 1.4 percent growth rate experienced in the previous decade. In addition to the pressure from population increase, the external demand for fish from market centers such as Puerto Princesa City and Metro Manila carries serious implications for the well-being of the marine resource. To reduce pressure on the marine resource and ensure that future generations inherit a stable resource base, current and future development projects will also have to factor in sound population management in their action agendas to sustain long-term development. A comprehensive fishery management plan that takes this element into account will be more likely to safeguard the well-being of the marine resource.

Summing up the experience of the Honda Bay Resource Management Project, several important elements of project implementation were in place, which were crucial to the achievement of project objectives. These include the participation of the beneficiaries during project implementation, presence of a core group trained for leadership in resource management, training/capability-building, project flexibility, coordination with various groups involved, and communication of clearly defined objectives. A full-time community organizer, however, was not present.

In the context of the preconditions for co-management, project experience shows that 2 out of 9 preconditions were met: 1) access to local conflict resolution mechanisms, both formal and informal; and 2) provisions for user participation in monitoring and enforcement (e.g., guarding and maintenance of the mangrove area). However, 7 other preconditions were not fulfilled: 1) use rights in the case of mangrove reforestation; 2) appropriateness of the rules to local conditions; 3) nesting/federation of user organization; 4) multiplicity of the functions of the user organization; 5) regional scope and size of membership; 6) socio-economic and cultural homogeneity; and 7) distinct boundary delineation.

The absence of use rights for mangrove rehabilitation may be attributed to the classification of Palawan as a mangrove forest reserve by virtue of Presidential Proclamation No. 2152, which governed the entire province of Palawan at the time of HBRMP implementation. This precluded the issuance of 25-year stewardship contracts, which entitle mangrove planters to the right to eventually harvest the mangrove trees, and the formulation of appropriate local rules on use rights and management efforts. A 3-year mangrove reforestation contract, which compensated the mangrove planters for their labor, was the only available instrument to the planters.

The beneficiary association, Manalo Coastal Mangrove Development Association, Inc. has existed for nine years. However, it is basically a barangay-based organization, having no affiliation with regional and national organizations and having no link to sources of support at higher levels. Moreover, its present functions cannot be regarded as multiple functions, being confined to coastal-dependent activities.

Notwithstanding the generally short-lived interventions and limited project duration of the HBRMP (1.5 years), the project broadened the range of income opportunities in the barangay and brought beneficiaries into the socio-economic and institutional mainstream. This was achieved through the introduction of alternative technologies, both on-shore and off-shore, and through the forging of linkages with partner institutions, which awakened the beneficiaries to available services.

The ability of the MCMDAI to access new financial resources from the DENR after completion of the HBRMP was a positive factor in sustaining mangrove reforestation. This is a tribute to the earlier effort of the project to empower beneficiaries for collective action and to the commitment of the HBRMP staff, who made themselves available for technical and administrative assistance on an informal arrangement even after project completion. Above all, the HBRMP provided the springboard for an internally-driven initiative on the part of the coastal users to fulfill their role as partners and stakeholders in coastal resource management.

4. Integrated Analysis of the Case Study Sites

Integrated analysis of the data from all nine case study sites has been undertaken to generate results and lessons not obtained from the individual sites. Three separate analyses have been undertaken. The first utilizes correlation factor and regression analysis to evaluate perceived impacts on the coastal ecosystem. The second utilizes logit analysis to identify factors affecting participation in a community-based coastal resource management association. The third presents a matrix summarizing contextual variables at the nine sites.

4.1 PERCEIVED IMPACTS ON COASTAL ECOSYSTEMS

INTRODUCTION With respect to impact indicators, sustainability of a project is based in large part on participants' reactions to the project. In turn, these reactions are based on user perceptions of impacts, which are not always in accord with objective, quantifiable evidence; witness the number of people who continue to smoke cigarettes despite overwhelming evidence of their negative effects on health. Hence, if there is an interest in understanding the sustainability of community based coastal resource management projects, it is essential to understand perceptions of the present and possible future impacts of these projects. Perceptions of impacts may explain some of the variance in long-term, as well as short-term, project success.

As a means of determining perceived impacts on the coastal ecosystem, including both human and non-human elements, respondents were requested to provide evaluations of a number of aspects of this ecosystem for pre-project and present periods. The technique used involved a visual, self-anchoring, ladder-like scale which allowed for making relatively fine ordinal judgments, placed little demand on informant memory, and could be rapidly administered.[1] Using this technique, the respondent was shown a ladder-like diagram with 15 steps. The respondent was told that the first step represents the worst possible situation. For example, with respect to coastal resources, the subject was informed that the first step (1) indicates an area with no fish or other resources, that the water is so foul nothing could live in it. The highest step (15) was described as a rich, clean water, filled with fish and other wildlife. The subject was then asked where on the ladder the local area is today (the self-anchoring aspect of the scale). The subject was then asked to indicate where it was pre-CBCRM project. This was done for the following ten impact indicators:

[1] Details and rationales concerning measures are found in the first section of this report.

1. *Overall well-being of individual household (household).*
2. *Overall well-being of the resource (resource).*
3. *Local income (income).*
4. *Access to resources (access).*
5. *Control over resources (control).*
6. *Ability to participate in community affairs (participate).*
7. *Ability to influence community affairs (influence).*
8. *Community conflict (conflict).*
9. *Community compliance with resource management (compliance).*
10. *Amount of traditionally harvested resource in the water (harvest).*

The term in parentheses following each indicator is the abbreviated form which will be used in the tables and discussion in the analysis portion of this section of the report.

Analysis As a first step in the analysis, mean values for the difference between each indicator for today (T_2) and the pre-project time (T_1) period were calculated, and a paired comparison t-test was calculated to determine if the mean differences between the two time periods are statistically significant. The results of this analysis are in Table 91.

Table 91. Perceived pre-project to post-project changes in indicators.

	T2 - T1	S. D.	T-value	Probability
ACCESS	-0.44	4.45	- 1.73	> 0.05
COMPLIANCE	2.79	3.72	13.27	<0.001
CONFLICT	1.96	3.15	11.05	<0.001
CONTROL	1.86	4.01	8.20	<0.001
HARVEST	1.15	3.70	5.50	<0.001
HOUSEHOLD	2.07	2.54	14.43	<0.001
INCOME	1.77	3.16	9.94	<0.001
INFLUENCE	2.32	3.41	12.04	<0.001
PARTICIPATION	2.17	3.45	11.14	<0.001
RESOURCE	1.98	3.42	10.25	<0.001

N=313; D.F.=312

The results show a statistically significant increase in perceived levels of all indicators except for access. The sanctuaries, mangrove contracts, and exclusive access for members to artificial reef areas resulted in some perceiving decreased access which resulted in overall perceptions of no significant change. Similar analyses were conducted separately for association members and non-members. The results of these analyses can be found in Tables 92 and 93.

Table 92. Perceived pre-project to post-project changes in indicators for association members.

	T2 - T1	S. D.	T-value	Probability
ACCESS	-0.43	4.70	- 1.10	>0.050
COMPLIANCE	3.04	3.71	9.97	<0.001
CONFLICT	2.03	3.27	7.54	<0.001
CONTROL	2.35	4.34	6.60	<0.001
HARVEST	1.47	3.58	5.01	<0.001
HOUSEHOLD	2.50	2.74	11.11	<0.001
INCOME	2.14	3.21	8.13	<0.001
INFLUENCE	2.80	3.80	8.99	<0.001
PARTICIPATION	2.66	3.74	8.63	<0.001
RESOURCE	2.51	3.58	8.54	<0.001

N=148; D.F.=147

Table 93. Perceived pre-project to post-project changes in indicators for non-members.

	T2 - T1	S. D.	T-value	Probability
ACCESS	-0.44	4.20	- 1.35	>0.050
COMPLIANCE	2.56	3.72	8.84	<0.001
CONFLICT	1.91	3.04	8.07	<0.001
CONTROL	1.41	3.64	4.98	<0.001
HARVEST	0.86	3.79	2.91	<0.005
HOUSEHOLD	1.69	2.29	9.47	<0.001
INCOME	1.45	3.09	6.02	<0.001
INFLUENCE	1.89	2.96	8.17	<0.001
PARTICIPATION	1.73	3.10	7.18	<0.001
RESOURCE	1.51	3.21	6.04	<0.001

N=165; D.F.=164

Tables 92 and 93 reflect statistically significant changes similar to those found in Table 91. In some cases, however, it seems that the positive changes perceived by association members (project cooperators) are larger than those perceived by non-members (non-cooperators). The next step in the analysis, therefore, was to determine if association members differed from non-members. This was accomplished by subtracting the pre-project evaluation from the today evaluation 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. The results of this analysis can be found in Table 94.

Table 94. Differences between members and non-members with respect to perceived changes.

	Members T2 - T1	Non-member T2 - T1	T-value	Probability
ACCESS	-0.43	-0.44	0.33	>0.050
COMPLIANCE	3.04	2.56	1.15	>0.050
CONFLICT	2.03	1.91	0.33	>0.050
CONTROL	2.35	1.41	2.08	0.038
HARVEST	1.47	0.86	1.47	>0.050
HOUSEHOLD	2.50	1.69	2.84	0.005
INCOME	2.14	1.45	1.95	>0.050
INFLUENCE	2.80	1.89	2.40	0.017
PARTICIPATION	2.66	1.73	2.38	0.018
RESOURCE	2.51	1.51	2.62	0.009

N=314; D.F.=311

The results in Table 94 indicate that association members perceive statistically significant larger positive changes with respect to control over the resource, influence and participation in community affairs, household well-being, and the overall condition of the resource.

The standard deviations in Tables 91 through 93 indicate that there is a fair amount of variability with respect to evaluation of indicators. Since people's behavior is based on their perceptions, it is important to determine the correlates of variability in perceptions to further our understanding of the factors which ultimately influence the sustainability of behaviors associated with community based coastal resource management projects. As part of the process of achieving this goal the next step in the analysis examines the relationship between the ten indicators and 19 variables identified in the first part of this report as potentially influencing CBCRM project success.

The independent variables, in the order listed in Tables 95 and 96, include basic social variables such as age, years formal education, household size, and years the respondent lived in the community (*years resident*). Job-related variables include years fishing experience, whether or not the respondent had a job other than fishing in the past (*other occupations*), and whether or not the respondent would change from fishing to another occupation which resulted in the same income if the opportunity were present (*change occupation*). Income-related variables include whether or not fishing was the only income source, the most important source among others, or provided over half the respondent's household income.

Table 95. Correlations between perceived changes in indicators and independent variables.

	INDICATORS				
INDEPENDENT VARIABLES	ACCESS	COMPLY	CONFLICT	CONTROL	HARVEST
AGE	.03	.07	.21**	.03	.11
EDUCATION	-.09	.03	-.04	.04	-.03
HOUSEHOLD SIZE	-.02	-.01	-.06	-.08	.03
YEARS RESIDENT	-.08	.01	.12*	.04	.04
YEARS FISHING	-.05	.13*	.12*	.02	.04
OTHER OCCUPATIONS	-.06	.18**	.12*	.09	.03
CHANGE OCCUPATION	.04	.04	.05	-.04	.09
FISHING NOT THE ONLY INCOME SOURCE	-.01	-.02	.04	.00	-.02
FISHING MOST IMPORTANT INCOME SOURCE	.12*	-.08	-.11	-.11	-.07
FISHING PROVIDES OVER ½ INCOME	.06	-.04	-.10	-.10	-.04
INCOME FROM OUTSIDE THE HOUSEHOLD	-.01	.14*	.17**	.08	.07
PERCEIVED PRE-PROJ. RESOURCE CRISIS	-.03	.05	-.02	-.14*	-.18**
ECOLOGICAL KNOWLEDGE	-.09	.02	.07	.07	.05
COMMUNITY CAN COOPERATE	.16**	.05	.07	-.00	.05
FISHERS CAN COOPERATE	.16**	.05	.08	-.03	.10
ASSOCIATION MEMBER	.00	.07	.02	.12*	.08
INFLUENCE PROJECT PLANNING	.00	.10	.02	.17**	.06
POST-IMPLEMENTATION INFLUENCE	.01	.04	-.00	.15**	.08
ATTEND PROJECT TRAINING	.01	.03	-.01	.14*	.07

*N = 313 ** = p < 0.01 * = p < 0.05 Note: correlations are rounded to two digits for the table, but probability is calculated on the basis of three digits.*

Another income variable was whether or not the household received income from someone living outside the household (e.g., remittances from abroad or from relatives living in the city). Resource-related variables include whether or not the respondent evaluated the resource as being in bad condition in the pre-project period (*perceived pre-project resource crisis*) and an estimate of their ecological knowledge, based on the number of factors they cited as contributing to a healthy marine resource. Cooperation-related variables include the respondent's evaluation of the potential for community members and fishers to work together to solve common problems (*community can cooperate* and *fishers can cooperate*, respectively) as well as whether or not the respondent is a member of the project sponsored association. Finally, project-related variables include whether or not the respondent felt he or she had an influence on project planning (*influence project planning*), post-implementation activities (*post-implementation influence*) and whether the respondent attended project training activities.

Table 96. Correlations between perceived changes in indicators and independent variables.

INDEPENDENT VARIABLES	INDICATORS				
	HOUSEH.	INCOME	INFLUEN.	PARTICIP.	RESOUR.
AGE	.08	.19**	.19**	.19**	.10
EDUCATION	.10	.01	.05	.00	.01
HOUSEHOLD SIZE	-.07	-.02	.02	-.06	-.06
YEARS RESIDENT	.01	.11*	.14*	.15**	.09
YEARS FISHING	.03	.09	.11*	.12*	.05
OTHER OCCUPATIONS	.06	.04	.05	.00	.04
CHANGE OCCUPATION	-.05	.02	-.05	-.02	-.06
FISHING NOT THE ONLY INCOME SOURCE	-.03	.05	-.00	-.03	-.00
FISHING MOST IMPORTANT INCOME SOURCE	-.05	-.04	-.04	-.04	-.01
FISHING PROVIDES OVER ½ INCOME	-.07	-.06	-.05	-.04	-.04
INCOME FROM OUTSIDE THE HOUSEHOLD	.01	.11*	.12*	.11	.08
PERCEIVED PRE-PROJECT RESOURCE CRISIS	-.16**	-.10	-.03	-.03	-.12*
ECOLOGICAL KNOWLEDGE	.01	-.07	.03	.05	.08
COMMUNITY CAN COOPERATE	.11	.10	.02	.04	.18**
FISHERS CAN COOPERATE	.06	.13*	.03	.01	.16**
ASSOCIATION MEMBER	.16**	.11	.14*	.13*	.15**
INFLUENCE PROJECT PLANNING	.10	.00	.09	.09	.10
POST-IMPLEMENTATION INFLUENCE	.08	.01	.03	-.01	.09
ATTEND PROJECT TRAINING	.14*	.05	.17**	.15**	.00

*N = 313 ** = p < 0.01 * = p < 0.05 Note: correlations are rounded to two digits for the table, but probability is calculated on the basis of three digits.*

Examination of Tables 95 and 96 indicates that 13 of the 19 independent variables manifest a statistically significant ($p<0.05$) relationship with perceived amount of change in at least one of the indicators. Respondent's age is related to perceived changes in four indicators: community conflict, income, and influence and participation in community affairs. It is important to note that years fishing and length of residence manifest a statistically significant relationship with these same indicators. This is due, in part, to the strong relationship between age and these two variables ($r = 0.57$ and 0.44 respectively; $p<0.001$). Association member and attend project trainings is another set of independent variables related to a number of indicators: control over the resource, household well-being, and influence and participation in community affairs. Membership and participation in project training are also significantly correlated ($r = .51$; $p<0.001$), accounting in part for their pairing with these variables.

Other correlations of note are those between perceived changes in the resource and the independent variables association membership and positive attitudes towards the abilities of community members and fishers to work together for the common good. It is also interesting to note that those who perceived a problem with the resource in the pre-project period are likely to perceive smaller positive

(or negative) changes in resource and household well-being, amount of harvest, and control over the resource.

As the next step in the analysis, the ten indicators were submitted to a principal component (with varimax rotation) analysis to determine if relationships between the indicators were such that they could be reduced to fewer, composite indicators for further analysis. Results of the principal component analysis are in Table 97.

Table 97. Principal component analysis of impact indicators

	COMPONENT 1	COMPONENT 2	COMPONENT 3
COMPLIANCE	**0.82**	0.12	0.07
CONFLICT	**0.78**	0.03	0.18
PARTICIPATION	**0.77**	0.13	0.29
INFLUENCE	**0.75**	0.22	0.34
CONTROL	**0.57**	0.40	0.12
ACCESS	-0.25	**0.72**	0.17
HARVEST	0.38	**0.66**	0.12
RESOURCE	0.39	**0.63**	0.02
INCOME	0.34	0.51	**0.55**
HOUSEHOLD	0.24	0.11	**0.90**
VARIANCE %	*33*	*19*	*14*

Number of components were selected on the basis of the scree-test. The three rotated components explain 66 percent of the variance in the set of indicators. Indicators loading highest on component one are perceived changes in community compliance with resource regulations, community conflict, participation in community affairs, influence in community affairs, and control over the resource. Indicators loading highest on component two are perceptions in changes in access to the resource, amount of traditionally harvested species, and overall well-being of the resource. Finally, Indicators loading highest on component three are perceived changes in income and household well-being.

The three components in the analysis can be interpreted in terms of relationships between indicators included. The first component includes indicators dealing with behavior of community members. The indicators loading highest on component two are related to the resource (access to the resource, overall well-being of the resource, and amount of harvest). Finally, component three includes household well-being related indicators. Indicators with relatively high loadings on more than one indicator can also be readily interpreted. For example, control over the resource is a human behavioral indicator (component one), but it also involves consideration of the resource (component two). Income loads highly on both components three (household well-being) and two

(resource). The resource is the major source of income which contributes to the household; hence, perceptions of resource well-being, which influences income, co-vary with at least part of the household well-being component. Indicators which load similarly on two components (e.g., income) contribute similarly to component scores associated with the involved components. This should be kept in mind when interpreting component scores.

Component scores were calculated for each respondent for each component. The component score is a combination of the respondent's perceived changes for each indicator, weighted by the indicator's component loading, and standardized. Hence, the score for component one would consist, for the most part, of perceived changes in the human behavioral indicators; component two, resource related changes; and component three, household and income related changes.

The next step in the analysis was to determine the relationships between the new composite measures of the indicators (the component scores) and the 19 independent variables listed in Tables 95 and 96. Independent variables significantly ($p<0.10$) related to any of the three components were selected to be used in a stepwise multiple regression analysis to determine the set of independent variables that explained most of the variance in each of the three components. The step-wise technique first enters the variable that explains the most variance in the dependent variable. Then, controlling for variance explained by the first entered variable, it selects from remaining independent variables the one that explains most of the remaining variance in the dependent variable (e.g., the one with the largest partial correlation). This procedure is continued until either all variables have been entered or until some criterion is reached. In this analysis the criteria 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 multicolinearity. Where there is reason to suspect multicolinearity (which can result in unstable regression coefficients), the offending variable is not used in the regression analysis. The results of the analysis are in Tables 98 through 100.

Table 98. Regression analysis of impact component one--Human Behavior.

Independent Variables	Standardized coefficient	t-test	Prob. 2-tail
Other occupations	0.105	1.84	0.067
Ecological knowledge	0.118	2.15	0.032
Fishing most important income source	-0.103	1.84	0.067
Years resident	0.105	1.75	0.081
Income from outside the household	0.108	1.85	0.065
Influence project planning	0.108	1.97	0.050
Years fishing	0.118	1.99	0.047
R=0.309; R^2=0.096; Adjusted R^2=0.075			
N=313; F=4.605; DF = 7 305: p<0.001			

Table 99. Regression analysis of impact component two--Resource.

Independent Variables	Standardized coefficient	t-test	Prob. 2-tail
Perceived pre-project resource crisis	-0.119	2.12	0.035
Fishers can cooperate	0.156	2.78	0.006
R=0.207; R^2=0.043; Adjusted R^2=0.037			
N=313; F=6.972; DF = 2 310; p = 0.001			

Table 100. Regression analysis of impact component three--Household Well-being.

Independent Variables	Standardized coefficient	t-test	Prob. 2-tail
Attend project training	0.134	2.38	0.018
Perceived pre-project resource crisis	-0.100	1.79	0.075
Community can cooperate	0.093	1.66	0.098
R=0.189; R^2=0.036; Adjusted R^2=0.026			
N=313; F=3.819; DF = 3 309; p = 0.010			

Although the results of the three regression analyses are statistically significant, the independent variables account for only a small amount of the variance in the dependent variables. For example, in the step-wise analysis of component one (Table 98), the first two variables entered in the equation (income from outside the household and years fishing) resulted in an R of 0.218 and an adjusted R^2 of 0.041 (F = 7.751; DF = 2 310; p = 0.001), more than one-half the total R^2 accounted for by the 7 independent variables in the model presented in Table 98.

As a final step in the analysis component scores for the three components were summed, resulting in an overall measure of perceived changes. This measure will be referred to as Total Perceived Impact. The correlations of Total Perceived Impact with the 19 independent variables were calculated, and variables manifesting significant correlations ($p<0.05$) with the dependent variable were selected to be used in a step-wise multiple regression analysis. Results of this analysis are in Table 101.

Table 101. Regression analysis of total perceived impact.

Independent Variables	Standardized coefficient	t-test	Prob. 2-tail
Age	0.154	2.77	0.006
Perceived pre-project resource crisis	-0.128	2.33	0.021
Association member	0.112	2.00	0.047
Community can cooperate	0.119	2.17	0.031
$R=0.280$; $R^2=0.078$; Adjusted $R^2=0.067$			
$N=313$; $F=6.558$; $DF = 4\ 308$; $p<0.001$			

The results of the multiple regression analysis in Table 101 indicate that age, being an association member, and believing that community members can cooperate to solve common problems are positively related to the amount of change perceived as reflected in the total perceived impact measure (TPI). Those who perceived that the pre-project resource was in bad condition, however, perceive smaller (or negative) increases in TPI.

DISCUSSION Overall, the analyses suggest that the community-based coastal resource management projects evaluated were successful despite partial or complete failure (or destruction by natural events) of some project objectives (e.g., artificial reefs, fish aggregating devices, shellfish culture, etc.). This highlights the fact that fishers and project staff may have completely different perceptions of success. When project staff-identified "successful" sites were compared with the "less successful" sites with respect to pre- to post-project changes for the ten indicator variables, there were no significant differences (all t-tests $p>0.05$; most t-tests $p>0.30$). It follows that the "successful" sites would also not differ from the "less successful" with regard to the component scores or the total perceived impact measure (all t-tests $p>0.30$). It appears that project staff were focussing more on easily observable impacts (e.g., functioning fishers' association, area of mangrove successfully replanted, number of artificial reefs remaining in operation, etc.). Evaluations of success by both project staff and beneficiaries are important, but it is important to understand that they may be based on different criteria, and it is evaluations by the community members,

themselves, that will influence their subsequent behavior; hence, the potential sustainability of the project.

The difference of means tests applied to the impact indicators indicates that project community members, association members as well as non-members, perceived positive and statistically significant improvements in all indicators except for access. The sanctuaries, mangrove contracts, and exclusive access for members to artificial reef areas resulted in some perceiving decreased access; thus, resulting in overall perceptions of no significant change. Association members, however, perceive statistically significant larger positive changes with respect to control over the resource, influence and participation in community affairs, household well-being, and the overall condition of the resource.

Association members were most intimately involved in discussions related to management measures, and they were also responsible for monitoring the resource through the *Bantay Dagat* and/or project supported organizations in some of the project communities. Further, they were recipients of mangrove area contracts and had exclusive rights to both artificial reefs and fish aggregating devices they installed as a part of project activities; hence, their greater perceptions of changes in control over the resource. The associations, themselves, also functioned to increase members' participation and influence in community affairs through training. One of the projects' goals concerning fisher organization was to empower members, and their greater perceptions of the changes that occurred in terms of participation and influence in the community suggests that this goal was achieved.

Association members also perceived greater increases in household well-being. This might be related to their somewhat improved access to resources through the exclusive rights to replanted mangrove areas, fish aggregating devices, and artificial reefs. It may also be due to access to other minor project activities such as livestock improvement. Greater improvements in the overall well-being of the resource were also perceived by association members. This might be the result of either their more careful scrutiny of the coastal resource as a consequence of their involvement in resource improvement and conservation activities, or it could simply reflect a desire on their part to see some improvement resulting from their efforts.

Correlation analyses were conducted to determine relationships between changes in the ten indicator variables and 19 variables identified in previous descriptions and theoretical speculations concerning factors influencing success of community based coastal resource management projects. These analyses indicate that 13 of the variables manifest statistically significant, but relatively

weak relationships with at least one of the indicator variables. Age and related variables (years fishing and length of residence in the community) are related to perceived changes in four indicators: community conflict, income, and influence and participation in community affairs. This is probably the result of the increased status and influence that accompanies age and experience in the village setting. Association membership and attendance at project trainings is another set of independent variables related to a number of indicators: control over the resource, household well-being, and influence and participation in community affairs. Members are more likely to be involved in project training, and factors influencing the relationship between association membership and the four related indicators was discussed above.

Other correlations of note are those between perceived changes in the resource and the independent variables association membership and positive attitudes towards the abilities of community members and fishers to work together for the common good. Interestingly, there are no statistically significant relationships between association membership and attitudes towards the abilities of community members and fishers to work together for the common good ($r = 0.08$ and 0.06 respectively; $p > 0.05$). Association membership must influence perceptions of the resource independent of the other two variables. The reason why association membership is related to perceptions of changes in resource well-being was discussed above. It is difficult, however, to speculate on relationships between attitudes towards cooperation and positive perceptions of changes in resource well-being.

The negative relationship between perceiving a problem with the resource in the pre-project period and perceived amount of change in resource well-being was unexpected. Previous research leads one to expect that a perceived crisis in the resource is a favorable pre-condition to community based management. Perhaps those who perceive little or negative changes are more critical and less likely to let wishful thinking color their responses. This interpretation is somewhat supported by the fact that the same individuals are likely to perceive smaller positive (or negative) changes in household well-being, amount of harvest, and control over the resource. Turning the explanation around, it is possible that those who perceive little or negative changes in household well-being, control over the resource, and amount of harvest might blame these problems on the status of the resource.

The principal component analysis of changes in the impact indicators served to elucidate interrelationships between the indicators that could be explained on the basis of a few underlying factors--the factors being human behavior, the resource, and household well-being. Results of the stepwise regression analysis of the independent variables on the three components were rather disappointing

in terms of amount of variance explained, but they were statistically significant. When the component scores were summed to create a total perceived impact score, however, the regression analysis became more respectable ($R = 0.28$, $p < 0.001$), but still relatively modest in magnitude. The predictor variables in the final model indicate that older individuals, those who did not evaluate the resource as being in bad shape in the pre-project period, those who are optimistic about the ability of community members to work together, and those who are association members are more likely to perceive larger overall positive changes as measured by the total perceived impact score.

Several important points must be made considering this analysis. First, it is important, and significant, to note that perceived improvements were noted by both cooperator and non-cooperator fisher households. This is a desirable impact of a project--if benefits accrue only to cooperators, new social strata will be created in the beneficiary community, potentially resulting in conflict and weakening the ability of the community to work together for the common good. There were, however, some clearly positive impacts that accrued to the cooperators, that could have a long-term positive impact on the community and its resources.

The cooperators, overall, perceived a larger increase in their ability to participate in and influence community affairs. This is the result of the role their organizations played in community organizing, implementation of project improvements such as the artificial reefs, mangrove reforestation, and fish aggregating devices, as well as the management-related regulatory changes (e.g., the sanctuary, exclusive access, etc.) and associated surveillance and enforcement activities (e.g., the *Bantay Dagat*). The fact that cooperators perceived a greater increase in the overall health of the resource might be related to either greater knowledge and closer observation or self-deception associated with their activities and subsequent vested interest in the resource. Whatever, the sample as a whole perceived a positive change, and these perceptions, the stronger they are, in combination with a core group of empowered peers (the association members) will facilitate sustaining activities related to resource conservation.

An independent variable that was not related to any of the impact indicators bears discussion at this point. It is job satisfaction. It is a commonly held belief among development workers in the Philippines that fishing is the employment of last resort-when forced off the land by growing population or destruction of resources, the rural unemployed gravitate to fishing where, it is believed, the costs are minimal and the resource is open to all. We actually observed this process in the Municipality of Ayungon where upland population pressures and the destruction of the resource by slash and burn farming and clear cutting has

forced mountain dwellers to come to the coast where they become spear fishers, focusing on octopus. Because of this impression of fishing as the employment of last resort, an important component of many community-based coastal resource management projects has been development of alternative employment opportunities. But the big question is, "Do fishers like their occupation?"

Worldwide observation of fishers indicates that there are aspects of the occupation which are attractive to certain types of people. Many state that they prefer fishing to any other available occupation (cf. Pollnac and Poggie 1988); hence, despite beliefs to the contrary among development workers in the Philippines, we were not surprised to find that more than four-fifths (84 percent) of the sample said that they would not leave fishing if a job with comparable income were available. Various reasons were provided for the preference for fishing as an occupation (e.g., better income, flexibility in hours, no boss, etc.), and a great deal of research has related lack of job satisfaction to a host of social, psychological, and health problems (cf. Pollnac and Poggie 1988). Hence, while it may be desirable to reduce pressure on fishery resources through provision of alternative employment, perhaps it would be better to build on the already existing tradition of occupational multiplicity in rural coastal areas and develop supplemental income generating activities. These supplemental activities could be spread over a larger number of fishers, reducing, rather than eliminating their fishing activity, and probably having as great or greater effect than trying to attract (or force) fishers to some alternative form of employment. The interventions are also more likely to be sustainable since they would fit into what is already identified as a successful adaptive strategy--occupational multiplicity.

Generating alternative employment opportunities could also be part of the strategy, but it should be based on information which would allow targeting of individuals willing to leave fishing for some other occupation. Our preliminary analysis indicates that fishers willing to change occupation are more likely to have a source of income from outside the household (chi-square=4.88; phi=0.13; p=0.027), and less likely to receive over half their income from fishing (chi-square=6.02; phi=-0.14; p=0.014). Those willing to leave the occupation of fishing have also been involved in the occupation for less time than those unwilling to leave (mean years = 16.6 versus 20.9 respectively; t=1.97; d.f. 312; p=0.05). If carefully developed for different regions in the Philippines, information such as this could be used to target individuals most likely to change to another occupation, but more research is needed concerning this important variable.

It is important to stress that the first sentence of this discussion section stated that the analyses "...suggest that the community based coastal resource

management projects evaluated were successful." We say "suggest" because the evaluation was conducted without a control, and evaluations of natural resource conservation projects need a control, especially when evaluations of the resource are involved.

It is possible that perceived improvement of the resource is either the result of the project or some non-project factor such as a change in oceanographic conditions (temperature, salinity, levels of pollution, etc.) which facilitate fish reproduction and/or growth. Likewise, improvement to household well-being could either be the result of the project or some unrecognized improvements in the project community's context. This type of problem applies less to improvements in community participation, influence, and self-esteem; but would these improvement occur if the resource continued on its own downward slide to disaster? Finally, it is possible that positive evaluations were nothing more than false praise administered by respondents with the hope that a new project will come their way with benefits for all.

4.2 Determinants of Participation in CBCRM Project Associations

An important aspect in assessing the impact of CBCRM projects is to determine the factors affecting participation in a project association. Such analysis will enable us to identify the characteristics that differentiate members and nonmembers at CBCRM project sites. In addition, distinguishing features between successful and less successful sites may possibly be determined by a comparison across sites.

The variable of interest in this study is the decision by a fisher to participate or not participate in an association. The participation decision is normally represented by a dummy variable which is equal to one if participation occurs and zero otherwise. It can also be interpreted as the probability of participation whose value ranges from 0 to 1. This probability of participation may be explained by a dichotomous model.

The Participation Model

A fisher's membership in an association is unique because each fisher belongs to only one category (member or nonmember) which has specific participation characteristics. The probability of a fisher's being in one category rather than the other category was hypothesized to depend on a range of explanatory variables. These explanatory variables include independent variables subclassified as context variables and impact indicators which socio-economic research and theory suggest may be important determinants of participation. There is no hypothesized direction possible due to lack of apriori knowledge about the effect

Analytical Technique

Logistic regression analysis was used to identify the factors affecting fishers' decisions to participate in an association. A value of one was assigned to fishers who are association members and a value of zero to nonmembers. Next, a forward stepwise selection with maximum likelihood-ratio (LR) test criterion for variable selection was applied to determine the set of independent variables that explain most of the variance in the logit model. This technique proceeds the same as in multiple regression stepwise procedure, but a change in log likelihood is examined after estimating the model when each variable is either entered or deleted. At each step, the variable with the smallest significance level for the score statistics, provided it is less than the chosen cutoff value (default=0.05), is entered into the model. Similarly, variables with the largest significance level for the log likelihood ratio, provided it exceeds the cutoff value (default=0.10), is removed from the model. This continues until no more variables are eligible for entry and removal. Accordingly, tests for multicollinearity and goodness of fit were conducted to determine if there are highly correlated independent variables and assess how well the model fits the data, respectively. The estimated models contain only variables that were statistically significant ($p<0.10$).

The logit coefficients cannot be interpreted as the marginal effects on the probability of participation, however, the signs are indicative of their directions. They can only be interpreted as the change in the log odds of success associated with a one-unit change in the independent variable. The associated marginal probabilities explain the change in the probability of participation as the independent variable changes. Similar interpretations for elasticity can be made except that the change in the independent variables is expressed in terms of percentage at their mean values.

Empirical Results

<u>CVRP-1 and HBRMP</u>. The estimates of the logit models for the successful sites, less successful sites, and total samples of CVRP and HBRMP combined are presented in Table 103. The model chi-square (which is comparable to the overall F test for ordinary least squares) for successful sites (80,df=5), less successful sites (68,df=4), and the overall samples (131,df=5) are significant ($p<0.005$). The logit models correctly predicted about 82 percent of the observations for successful sites and 85% for less successful sites. Overall, about 82 percent of the total observations were predicted correctly by the fitted model.

The following explanatory variables were found to significantly influence fisher participation at successful sites of CVRP-1/HBRMP: (1) age, (2) knowledge of objectives, (3) attend CBCRM project meetings, (4) attend CBCRM project trainings, and (5) people's cultural attitudes towards collective action. The estimated surrogate R^2 (Maddala R^2) of 0.40 is considered relatively high for cross-sectional data indicating that 40% of the variation in the probability of participation can be accounted for by these five variables. Fisher participation at less successful sites were significantly influenced only by age and attendance in CBCRM project trainings which accounted for slightly over half (51%) of the variation in the probability of participation. For the total CVRP-1/HBRMP respondents, the same five variables identified at successful sites were also found to significantly affect the probability of participation with about 41 percent of the variation explained. Overall, the results are statistically satisfactory as indicated by signs and goodness of fit measures.

It is interesting to note that age of respondents and attendance in CBCRMP meetings appeared to be important determinant variables of participation for both successful and less successful sites of CVRP-1/HBRMP. The positive coefficient associated with on age indicates that the older the respondent the more likely he will participate in the association. For instance, a one year increase in the age of the respondent increases the probability of participation by 1 percent in successful sites and 3 percent in less successful sites. For the total respondents, the probability of participation increased by one percent. The results may be explained by the fact that older people are more responsible and willing to allocate more time for association activities.

Attendance in CBCRM project meetings where project objectives were discussed positively affects the likelihood of participation. The result is expected since respondents who attended meetings are presumably more aware of the project including the objectives and benefits of being a member. For the dummy variables, interpretation should be framed in terms of the sample rather than the individual respondent. For example, an increase in the mean of respondents attending CBCRM project meetings will increase the probability of participation by almost one-fifth (19 percent) in successful sites, 7 percent in less successful sites, and 20 percent for the total sample. It can be observed that successful sites have a greater marginal increase in the probability of participation compared to less successful sites.

Table 103. Logit regression estimates (maximum likelihood) of factors affecting participation in CBCRM association, CVRP-1/HBRMP, 1996.

EXPLANATORY VARIABLE	LESS SUCCESSFUL SITE				SUCCESFUL SITE				TOTAL			
	Coeff. (B)		Marginal Prob.	Elasticity at means	Coeff. (B)		Marginal Prob.	Elasticity at means	Coeff. (B)		Marginal Prob.	Elasticity at means
Constant	-11.951	***	-	-	-5.9083	***	-	-	-5.3525	***	-	-
Age	0.118	***	0.0294	2.6067	0.0374	**	0.0093	1.0523	0.0383	***	0.0096	1.0156
Knowledge of objectives	-		-	-	1.0872	*	0.2050	0.5254	1.1766	**	0.2119	0.5409
Attend CBCRMP meetings	3.9872	***	0.0713	1.1370	2.3107	***	0.1897	0.7414	2.2180	***	0.1963	0.7051
Attend CBCRMP trainings	-		-	-	1.1837	**	0.2124	0.3095	1.0624	**	0.2028	0.2818
People's cultural attitude towards collective action	-		-	-	1.5755	***	0.2238	0.7365	0.9571	**	0.1919	0.3700
Membership benefits	3.7978	***	0.0815	1.9420	-		-	-	-		-	-
Access to resources	-0.1666	**	-0.0414	0.0081	-		-	-	-		-	-
Likelihood Ratio (Model Chi-Square)	67.656				80.271				131.258			
Degrees of freedom	4				5				5			
Significance level	0.0000				0.0000				0.0000			
Maddala R-Square	0.506				0.400				0.405			
Percent Correct Prediction	85.420				82.170				81.820			
N	96				157				253			

*statistically significant at 10% level
**statistically significant at 5% level
***statistically significant at 1% level

The knowledge of project objectives, attendance in CBCRM project trainings, and perception of people's cultural attitudes towards collective action were found to be positively related to the probability of participation in an association at successful sites. A similar relationship was found in the aggregated model. This implies that when people are aware of project objectives, given adequate skills through attendance in training, and have high levels of cultural attitudes towards collective action they will manifest greater participation which, in turn, could possibly result in successful CBCRM project implementation.

However, knowledge of membership benefits and perceived change in access to resources were uniquely found to be related to the probability of participation in an association at less successful sites. A positive relationship between knowledge of benefits and probability of participation implies that a respondent is more likely to participate in an association when he is well-informed about the benefits of joining the association. The participation benefits did not affect the probability of participation at successful sites and the aggregated model because it was highly correlated to knowledge of objectives; hence, eliminated from consideration in the stepwise procedure after knowledge of objectives was entered. On the other hand, the probability of participation is inversely related to perceived change in access to resources. Hence, a decrease in perceived change in access to resources increases the probability of participation. Since association members have exclusive access to certain interventions, perhaps membership is stimulated by prior perceptions of decreased access.

Coastal Environment Program in Ulugan Bay. The results of the logit models and the associated marginal probabilities for CEP are reported in Table 104. As indicated by the goodness of fit measures, the logit models perform well in explaining variation between members and nonmembers in the three participation models, i.e., successful site, less successful site, and the aggregated model. The corresponding computed chi-square values (23, df=4 for successful site; 11,df=2 for less successful site, and 24,df=4 for total sample, respectively) are statistically significant ($p<0.005$). The models correctly predict about 87 percent and 77 percent of the observations in successful and less successful CEP sites, respectively. For the aggregated model, about 77 percent of the observations were correctly predicted by the logit model.

A total of four significant variables accounted for more than half (53%) of the variation in the probability of participation at the successful site while only two variables accounted about 30 percent of the variation at the less successful site. For the aggregated model, about one-third (33%) of the variation in the probability of participation was explained by four significant variables.

Table 104. Logit regression estimates (maximum likelihood) of factors affecting participation in CBCRMP association, CEP sites, 1996.

EXPLANATORY VARIABLE	LESS SUCCESSFUL SITE				SUCCESFUL SITE				TOTAL			
	Coeff. (B)		Marginal Prob.	Elasticity at means	Coeff. (B)		Marginal Prob.	Elasticity at means	Coeff. (B)		Marginal Prob.	Elasticity at means
Constant	-0.7145		-	-	1.5193		-	-	-5.7570	***	-	-
Outside income	-2.8196	**	-0.1497	-0.2849	4.5932	*	0.0456	0.4841	-		-	-
Attend CBCRMP meetings	2.3584	**	0.1862	0.6354	4.8271	**	0.0381	1.6111	2.8600	***	0.1465	0.8279
Attend CBCRMP trainings	-		-	-	2.4952	*	0.1756	0.7014	-		-	-
People's cultural attitude towards collective action	-		-	-	-		-	-	2.1000	**	0.2041	0.8857
Household size	-		-	-	-1.2455	**	-0.2161	-3.6537	-		-	-
Fishing income primary	-		-	-	-		-		2.1520	**	0.2008	0.8718
Perceived change in overall well-being of the resource	-		-	-	-		-		0.3480	**	0.0844	0.2787
Likelihood Ratio (Model Chi-Square)	10.878				22.762				24.385			
Degrees of freedom	2				4				4			
Significance level	0.0043				0.0001				0.0001			
Maddala R-Square	0.304				0.532				0.334			
Percent Correct Prediction	76.670				86.670				76.670			
N	30				30				60			

*statistically significant at 10% level
**statistically significant at 5% level

Receiving money from outside the household significantly influences the probability of participation at both successful and less successful sites but in opposite directions. However, this variable was not important in the aggregated model. Fishers at the successful site who received income from outside tend to participate in the CBCRM project association while the opposite occurs for fishers at the less successful site. There are two possible explanations. First, participation is enhanced if additional income is received by the household from outside sources since this reduces daily survival activities giving the fisher more free time to participate in the association. Second, participation is impeded if additional income is received since the household can now better meet its subsistence requirements and, thus, the fishers' interest in managing and conserving the resource is decreased. Both explanations seem logical so it is difficult to choose between them.

Attendance in CBCRM project meetings was an important variable at both successful and less successful sites. This implies that a CBCRM project implementation strategy of conducting more meetings about the project and its objectives in the community may increase participation.

Attendance in CBCRMP trainings uniquely influenced community participation at the successful site in Ulugan Bay. A direct relationship exists between attendance in CBCRM project trainings and participation. This implies that the more fishers attend CBCRM project trainings, the greater is the likelihood for them to participate in the association and possibly resulting in successful CBCRM project implementation. However, household size is found to be negatively related to the probability of participation. Households with fewer household members were more likely to participate in the association.

For the aggregated model for CEP, three additional important factors significantly influenced participation in CBCRMP association. These include: (1) people's cultural attitude towards collective action; (2) fishing as primary source of income; and (3) perceived change in overall well-being of the resource. A high probability of participation is expected for respondents who have a positive attitude towards collective action. For instance, an optimistic fisher attitude towards collective action increased the probability of participation by 20 percent. This finding is important for community organizing activities since it implies that more success can be achieved by working with people who are predisposed towards collective action.

For the variable primary income source, the probability of participation is increased by 20 percent for fishers whose primary income is derived from fishing. This result is logical and self-explanatory, i.e., it is very reasonable for someone who is primarily dependent on coastal resources for subsistence to

want to be involved in an association promoting conservation and management activities.

Perceived change in overall well-being of the resource is positively associated with being an association member. Fishers who perceived a positive change in the overall well-being of the resource will be more likely to participate in the CBCRM project association. This implies that those who perceive an overall well-being of the resource will want to be members of the association so that they can manage and conserve the resource for continued and improved well-being.

4.3 Matrix of Contextual Variables

A summary matrix of contextual variables has been prepared to highlight some of the more important factors influencing CBCRM project success and similarities and differences at the nine sites (Table 105). The matrix includes selected contextual variables at the supra-community level, community level, and individual and household level.

In general, the respondents reported positive cultural attitudes toward collective action. Except, for Tiguib, Zaragosa and Malhiao, the majority of respondents at the other six sites felt that people could work together to solve problems in the community and that fishers could work together to solve problems in the fishery. At all nine sites, a majority of respondents felt that fishers and the government should work together to solve problems in the fishery. The communities did not have a long history of collective action; most had less than ten years of experience with fisher and livelihood associations. Most of the associations were established by the CBCRM project.

At all sites except Calagcalag, the majority of households relied on fishing as their primary source of income. While fishing may be the primary source of income, most of the fishers engage in another occupation such as farming. Thus, there is a high level of occupational multiplicity among the fishers. At all sites the fishers reported a very high level of job satisfaction. Women were highly involved in both coastal-dependent (e.g., gleaning and fish processing) and non-coastal dependent (e.g., farming and nipa shingle making) livelihood activities. Women provided both food and income to the household.

The fishers, both association members and non-members, were highly knowledgeable about the CBCRM project and the project material and organizational interventions. At all nine sites a majority of the fishers reported understanding the project objectives and the benefits of association membership. Most of the fishers at the nine sites also felt that they had influence on CBCRM project planning and project changes. A high percentage of fishers

in each community attended project meetings, although a smaller percentage, primarily association members, were actually involved in project training activities. The fishers were highly knowledgeable about use rights associated with fisher association-managed material interventions such as mangrove reforestation, fish sanctuaries, artificial reefs and fish aggregating devices.

Most of the communities had a medium integration into the national economy and political system through such links as markets, transportation, communication and government officials. In terms of educational attainment, fishers in the project sites have generally completed elementary schooling and one or two years of high school education. Their house structures are likely to be minimal to low, made of light materials such as bamboo and nipa or a combination of wood and light materials.

Table 105. Summary Matrix of Context Variables for CBCRM Project Sites

Variable	Calag-calag	Tiguib	Zaragosa	Malhiao	Palanas	Sta. Cruz	Macaras-cas	Buenavista	Manalo
1. Cultural values/attitudes toward collective action									
o People's level	65%	41%	37%	28%	86%	88%	93%	77%	96%
o Fishers' level	79%	47%	50%	41%	86%	88%	97%	97%	100%
o Fishers and government	79%	88%	97%	66%	70%	79%	83%	93%	100%
2. Tradition of collective action	10 yrs (FA)	9 yrs (FA)	8 yrs (FA)	4 yrs (FA)	20 yrs (CG) 10 yrs (FA)	20+ yrs (CG) 10 yrs (FA)	4 yrs (FA) 2 yrs (LA)	2 yrs (LA)	9 yrs (FA)
3. Socio-economic and cultural homogeneity	Hetero-geneous	Homo-geneous	Homo-geneous	Hetero-geneous	Homo-geneous	Homo-geneous	Hetero-geneous	Hetero-geneous	Hetero-geneous
4. Dependence on fishing as primary income source	38%	59%	94%	75%	86%	91%	57%	60%	78%
5. Perception of the resource (now vs. 10 yrs ago)									
o Better off	53%	6%	50%	44%	76%	48%	37%	17%	65%
o Worse off	38%	56%	47%	53%	24%	52%	53%	73%	24%
o Same	9%	38%	3%	3%	---	---	10%	10%	11%
6. Knowledge of benefits from association membership	75%	88%	91%	68%	70%	61%	87%	50%	87%
7. Issuance of CSCs * (Certificate of Stewardship Contracts)	Present	None	Present	Present	Present	None	None	None	None
8. Extent of women's involvement									
o Coastal-dependent activities (gleaning, fish trading, fish drying, fishing, etc.)	No survey data	No survey data	96%	97%	89%	85%	69%	53%	80%
o Non-coastal dependent (farming, livestock-raising, nipa shingle-making, etc.)			80%	70%	65%	70%	52%	93%	85%
9. Education	6 yrs	5 yrs	7 yrs	6 yrs	6 yrs	5.2 yrs	8 yrs	7 yrs	7 yrs

FA = fishermen's association CG = civic group LA = livelihood association

Table 105. Summary Matrix of Context Variables for CBCRM Project Sites

Variable	Calag-calag	Tiguib	Zaragosa	Malhiao	Palanas	Sta. Cruz	Macaras-cas	Buenavis-ta	Manalo
10. House structure 1/	Minimal to low	Minimal to low	Medium to high	Minimal to low	Minimal to low	Medium to high	Minimal to low	Minimal to low	Minimal to low
11. Job satisfaction 2/	High (88%)	High (97%)	High (94%)	High (91%)	High (100%)	High (100%)	High (90%)	High (90%)	High (98%)
12. Knowledge of use rights 2/	High (97%)	Medium (72%)	High (94%)	Medium (73%)	High (86%)	High (89%)	Not applicable (no coastal interven-tion in Phase 1 of the project)	Not applicablee (no coastal interven-tion in Phase 1 of the project)	Not applicable (no CSCs and artificial reefs at project site)
13. Occupational multiplicity 2/	Medium 91% of the sample are fishers. 56% are engagged in other occu-pations also.	High 100% of the sample are fishers. All are engaged in other occu-pations also.	High 100% of the sample are fishers. All are engaged in other occu-pations also.	High 100% of the sample are fishers. 84% are engaged in other occu-pations also.	Medium 100% of the sample are fishers. 57% are engaged in other occu-pations also.	Medium 100% of the sample are fishers. 72% are engaged in other occu-pations also.	Medium 97% of the sample are fishers. 54% are engaged in other occu-pations also.	High 93% of the sample are fishers. All are engaged in other occu-pations also.	High 96% of the sample are fishers. All are engaged in other occu-pations also
14. Boundary delineation	Medium difficulty	Medium difficulty	Medium difficulty	Medium difficulty	Medium difficulty	Medium difficulty	Medium difficulty	Medium difficulty	Medium difficulty
15. Integration into national economy and political system	Medium to high	Medium to high	Low to medium	Low to medium	Medium to high	Medium	Low to medium	Low to medium	Medium

1/ Minimal = made of bamboo, cogon/nipa Low = made of wood/lumber Medium = combination of lumber and concrete
High = concrete structure with galvanized roof

2/ Low = 50% and lower. Medium = 51-80% High = 81-100%

Table 105. Summary Matrix of Context Variables for CBCRM Project Sites

Variable	Calag-calag	Tiguib	Zaragosa	Malhiao	Palanas	Sta. Cruz	Macarascas	Buenavista	Manalo
16. Influence of village respondents over CBCRM project planning	74%	81%	91%	78%	68%	70%	100%	87%	74%
17. Influence of village respondents over CBCRM project changes	62%	75%	84%	78%	73%	70%	97%	93%	81%
18. Attendance of village respondents at project meetings	62%	69%	75%	34%	51%	79%	63%	53%	32%
19. Attendance of village Respondents at project training activities	41%	50%	66%	38%	41%	70%	53%	43%	30%
20. Knowledge of project objectives	53%	78%	97%	81%	84%	85%	80%	80%	72%

5. Lessons Learned

In conclusion, several important lessons have been learned, or confirmed, by the analysis of the nine community-based coastal resource management projects in the Philippines. The lessons presented here are meant to guide the planning and implementation of future CBCRM projects.

1. Evaluations of project success by project staff and beneficiaries vary because they may use different criteria. Both may be valid, in their own terms, but it is evaluations by the community members, themselves, that will influence their subsequent behavior; hence, the potential sustainability of the project. It appears that project staff were focusing more on easily observable impacts (e.g., functioning fishers' association, area of mangrove successfully replanted, number of artificial reefs remaining in operation, etc.). Despite the lack of sustainability of most project material interventions at the nine sites, the fishers generally perceived that the CBCRM project was a success. They felt a sense of empowerment, they had more information with which to make decisions and improve their life, they had more skills, and they felt more integrated into the economic and political mainstream.

2. Early and continuous participation of project beneficiaries in project planning and implementation is related to their positive evaluation of impacts. Not only does this type of involvement serve to adapt project activities to local needs, but participants also gain a better understanding of the problems involved in project implementation and a sense of empowerment.

Community level project objectives should be developed jointly by the cooperators and the project personnel. Objectives need to be clear, simple and achievable. The project itself and its staff must be flexible and adaptive to changing conditions and needs.

3. Positive cultural attitudes toward the efficacy of collective action were consistently related to perceptions of positive change. The project trainings in organizing and leadership enhanced these attitudes, as reflected in fishers' statements that they now know how to run meetings and get something accomplished. At several of the study sites, community organizers initially encountered either apathy or resistance from the fishers to the project. This was primarily due to neglect by the government of the community in the past or people's disenchantment with previous top-down government projects and programs. Thus, it is imperative for project staff to carefully analyze the prevailing dynamics in the community towards collective action and the project. Needs, attitudes, perceptions and experiences of people living in the community must be examined early in the project's life.

4. Mobilizing people for collective action is a time-consuming process that requires the presence of committed, competent and people-oriented project personnel and a shared understanding of project objectives by both the cooperators and the project personnel. The experiences of the nine sites affirm the need to carefully lay the building blocks for

collective action. Community organizing and consensus building is most often a laborious and time-consuming process, demanding the presence of people-oriented staff who are willing to spend long hours in the community in order to understand the needs and aspirations of the people. Community organizing is not easy, particularly when the people have no history of collective action or the social, cultural and economic conditions which foster collective action (such as community homogeneity or positive attitudes toward collective action) are not present. The inability to sustain project material and organizational interventions may be partly linked to the insufficient time allocated to the social preparation phase of the project and to rapport-building in the community. Cutting corners during the social preparation phase to yield to pressures to produce material accomplishments (e.g., planting mangroves, putting in artificial reefs) is likely to weaken the foundation for self-reliance in the community. Project cooperators must recognize an incentive(s) - economic, social and/or political - to participate in the project. Expected personal benefits from the project must outweigh the expected costs of participation. This is why it is critical to have a shared understanding of project objectives by both cooperators and project staff.

5. Capability-building efforts enhance the perception of empowerment and sense of confidence of project cooperators to undertake new tasks and to meet current and future challenges. While many of the material interventions of the projects failed, the fishers reported an increased perception of empowerment from participating in project meetings and trainings. The meetings and trainings provided the fishers with information and skills with which to improve the resource, their life and livelihood, and their community. This increased perception of empowerment was found to stay with the fishers after the completion of the project.

6. Project cooperators, as well as non-cooperators, perceive positive changes in the impact indicators, with little difference between the two groups. This "spread-effect" is probably the consequence of early, open involvement of all community members in the project and subsequent face-to-face interactions in the small community setting where everyone observes and talks about what is going on. This type of "spread" is essential to avoid divisive competition between haves and have-nots and its potentially negative impact on project sustainability and to maintain and enhance social equity in the community. If benefits accrue only to cooperators, new social strata will be created in the beneficiary community, potentially resulting in conflict and weakening the ability of the community to work together for the common good.

7. User rights to material interventions must be specified and enforced. These user rights - either individual or collective - should address the ownership of the resources, and define the mechanisms (economic, administrative, collective) and the structures required for allocating use rights to optimize use and ensure conservation of resources, and the means and procedures for enforcement. The experiences at the case study sites show that when user rights are specified and secure (such as with a mangrove certificate of stewardship contract), there is a change in the behavior and attitude of the fisher toward conservation and a much greater chance that the intervention will be

maintained. In addition, the case studies showed that government support through legislation, funding and enforcement is crucial to sustaining the intervention. In most cases, local initiatives require active collaboration with government to enforce user rights.

8. The data indicate that fishers like their occupation and would not necessarily change to another job, suggesting that the development of supplemental, rather than alternative, occupations may be the most effective strategy. These supplemental activities could be spread over a larger number of fishers, reducing, rather than eliminating their fishing activity, and probably having a great or greater effect than trying to attract (or force) fishers to some alternative form of employment.

Learning more about what fishers like about their occupation as well as characteristics of those who would like to leave the occupation would serve both to facilitate identification of appropriate alternative or supplemental occupations and to target them at the appropriate individuals. Future CBCRM projects should build on the already existing occupational multiplicity of most fishers and fishing households. The interventions are more likely to be sustainable since they would fit into the successful adaptive strategy of occupational multiplicity.

ANNEX A

List of Key Informants

Calagcalag, Ayungon, Negros Oriental

William Ablong	Resource Management Division (RMD) chief
Mercy Teves	Staff, Resource Management Division
Jeanette Villarubia	Staff, Resource Management Division
Lorenzo Dy	Municipal Mayor, Ayungon, Negros Oriental
Conrado Habel	Barangay Captain, Calagcalag, Ayungon
Demetrio Benlot	President, Calagcalag-Bakhawan Fishermen's Association
Francisco Deguit	Vice President, Calagcalag-Bakhawan Fishermen's Association
Emily Redulla	Community Organizer, RMD
Victorio Emperado	President, CASCOFA
Lindo Gonzales	Fisher
Ronnie Carpio	Fisher
Angelito Enduna	Fisher
Paulino Rosiana	Fisher
Editho Emberador	Fisher
Jose Chinggo	Fisher
Epifanio Chinggo	Fisher
Matam Ramirez	Fisher
Paz Pabor	Shell gatherer
Crisencia Rodriguez	Shell gatherer

Tiguib, Ayungon, Negros Oriental

Emilio Miot	Barangay Captain, Tiguib, Ayungon
Wilmer Sablada	Barangay Councilor, Tiguib, Ayungon
Danilo Vailoces	President, Tiguib Fishermen's Association
Bonifacio Sabanal	Fisher
Bonifacio Ampuni	Fisher
Manuel Elmaco	Fisher
Teotima Elmaco	Fisher
Eduardo Villones	Fisher
Rudy Almaro	Fisher
Manuel Taganile	Fisher
Luciano Taganile	Fisher
Nilo Amorganda	Fisher
Rogelio Miot	Fisher
Roque Abrasado	Fisher
Narciso Babor	Fisher
Sonny Mengoy	Fisher
Wilmo Tapales	Fisher
Ernesto Adalid	Fisher

Puerto Princesa City

Rudy Amurao	Provincial ENRO
Ramy Maigue	Regional Fishermen's Training Center staff
Jun Marcelo	Baywatch (Bantay Puerto) staff
Delia Eleazar	Former Community Organizer, HBRMP
Marivel Dygico	Former Project Manager, HBRMP
Rogelio Daquer	City ENRO
Atty. Lucas Licerio	President, Ulugan Bay Foundation, Inc.

Macarascas, Puerto Princesa City

Divine Sibal	Former Exec. Director, UBFI
Romia Labrador	Barangay Captain, Macarascas, Puerto Princesa City
Maxima Tupaz	Store Manager, Macarascas Community Store
Nancy Francisco	Store Manager, Macarascas Rice Trading Store (Sitio Masaya)
Girlie Labrador	Community Organizer, UBFI
Jose Ching	Fishing boat operator
Vivian Acuña	Fish trader
Sebastian Labrador	Former President, MACDAI
Val Villarin	Fisher
Francisco Sembilla Sr.	Fisher
Miguel Colandres, Sr.	Fisher
Bayani Caisip	Fish trader
Marcela Patricio	Fish trader
Celina Lopez	Fish trader
Sergio Roxas	Fish trader
Susana Roxas	Fish trader

Buenavista, Puerto Princesa City

Ester Arzaga	Barangay Secretary, Buenavista, Puerto Princesa City
Segundo Arzaga, Jr.	Chairman, Goat raising project
Flocerfina Canalita	Member, Goat raising project
Frederick Arzaga	Member, Goat raising project
Glicerio Aguilar	Chairman., Community store
Satur Padua	Member, Rice Trading project
Romy Samaniego	Member, Rice Trading project
Fe Capin	Fishing boat operator / Fish trader
Zenaida Bayuga	Fishing boat operator
Hermogenes Canalita	Fisher
Roger Blanco	Fisher
Reynaldo Moreno	Fisher
Edilberto Moreno	Fisher
Allan Daganta	Fisher
Gil Ocfemia	Fisher
Francisco Ronco	Fisher
Edilberto Bayuga	Fisher
Delia Mozo	Fish trader

Manalo, Puerto Princesa City

Rafael Ibañez	Barangay Captain, Manalo, Puerto Princesa City
Romeo dela Cruz	President, Manalo Fishermen's Association (MFA)
Maximiano Bundal	Vice President, Fishermen's Association / Barangay Councilor
Castor Namuco	Barangay Councilor
Lilia Padon	Member, Patis making group
Wilfredo Malacad	Fisher
Marcelo Conde	Fisher
Rolando Padon	Fisher
Severino Batoon	Fisher
Menancio Bonbon	Fisher
Celso Natividad	Fisher
Merle Rengel	Fish trader
Lorna Malacad	Fish trader
Carolina Dalumpines	Fish trader / Barangay Councilor

Cebu

Jesus Alix	Executive Director, CVRP-1
May Elizabeth Ybañez	CVRP-1
Andy Amejan	CVRP-1 staff
Teofisto Narandan	CVRP-1 staff
Camilo Cimagala	CVRP-1 staff
Anne Cabigas	CVRP-1 staff
Raul Arambulo	CVRP-1 staff
Ernesto delos Angeles	CVRP-1 staff

Zaragosa, Badian, Cebu

Danilo Torino	President, ZBMPCI
Leonardo Cui	Former Vice President, Fishermen's Association
Pedro Valparaiso Jr.	Member, Fishermen's Association
Severiano Torino, Sr.	Former President Fishermen's Association
Nemesio Borromeo	Member, Fishermen's Association
Jesus Catibod	Member, Fishermen's Association
Carlos Elegino	Member, Fishermen's Association
Teofilo Catibod	Member, Fishermen's Association
Melchor Elegino	Member, Fishermen's Association
Dionesio Caballero	President, Mangrove Planters Association
Maria Cathal	Manager / Owner, Eurasia Hotel
Hartwig Schlotz	Owner, Eurasia Hotel
Jesusa Costanella	Former Barangay Captain, Zaragosa-Badian
Sofronio Laurel	Fisher
Miguel Ejercito	Fisher
Marico Perolino	Fisher
Leonardo Sario	Fisher
Florencio Valparaiso	Fisher
Elias Manico	Fisher
Remedios Borromeo	Fish trader
Flora Sario	Fish trader
Flora Buena	Fish trader
Ignacia Fabracuer	Fish trader

Malhiao, Badian, Cebu

Florante Taboada	Barangay Captain
Margarito Taboada	Former Barangay Captain
Eulalio Raboy	President, Malhiao Fishermen's Association
Demetrio Arances	Member, Fishermen's Association
Celestino Arances	Member, Fishermen's Association
Rolando Arances	Member, Fishermen's Association
Floro Raboy	Member, Fishermen's Association
Vivencia Acegorado	Member, Fishermen's Association
Jesus Odiong	Member, Fishermen's Association
Francisco Raboy	President, Mangrove Planters Association
Filoteo Salukot Jr.	Fisher
Rogelio Lisondra	Fisher
Raymundo Espanol	Fisher
Mario Calabroso	Fisher
Rogelio Lisondra	Fisher
Leticia Arances	Fish Trader
Paz Eyac	Fish Trader
Julie Merencillo	Fish Trader

Palanas, Ronda, Cebu

Leocadio Jerusalem	Barangay Captain, Palanas, Ronda
Victoria Blanco	Municipal Mayor, Ronda, Cebu
Magdaleno Mendez	Former Barangay Captain
Ponciano Irasan	President, Palanas Fishermen's Association
Loreto Ypanto	Former Pres., Palanas Fishermen's Association
Constantino Carreon	Barangay And Fishermen's Association Secretary
Claudio Aquino	Member, Fishermen's Association
Paulino Carreon	Member, Fishermen's Association
Paulino Satina	Member, Fishermen's Association
Domingo Sumampong	Fisher
Aniceto Reblinca	Fisher
Limpiro Villagonzalo	Fisher
Odelion Pisalvon	Fisher
Jose Satina, Jr.	Fisher
Margarito Satina	Fisher
Lucio Gemoros	Fisher
Helen Sumampong	Fish Trader

Sta. Cruz, Ronda, Cebu

Patrocinio Maribao	Barangay Captain
Loreto Cereño	President, Sta. Cruz Fishermen's Association
Tertuliano Bucog	Secretary, Sta. Cruz Fishermen's Association
Jorge Alcordo	Owner, Kasadya Beach Resort
Edgar Ugbaniel	Fisher
Meleton Marabiles	Fisher
Rodrigo Avenido	Fisher
Simplicio Gabatan	Fisher
Roberto Rio	Fisher
Victorio Belucora	Fisher
Filomena Diana	Fish Trader
Claudita Diana	Fish Trader
Aniceta Dorig	Fish Trader
Gerarda Gonzalo	Fish Trader
Tolomea Dalpatan	Fish Trader

ANNEX B

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A REVIEW AND EVALUATION OF COMMUNITY-BASED COASTAL RESOURCE MANAGEMENT PROJECTS IN THE PHILIPPINES

INTERVIEW SCHEDULE
(Household/Fisherfolk)

Respondent #:_____[ ] Member [ ] Non-member
Name of Respondent: _____
Interviewer:_____
Barangay:_____
Municipality/Province:_____

Date:_____
Time started: _____
Time ended:_____

A. Contextual Variables

1. Resource User's Ecological Knowledge
   a. What are the characteristics of the sea and coast that help the fish to grow and be healthy?
   _____
   _____
   Why? _____
   _____
   b. Is the resource (e.g. amount of fish, crabs in the mangroves, etc) better off, worse off, or about the same as it has been over the past ten years? _____
   c. Is it (1=much worse off, 2=worse off, 3=little worse off, 4=neither, 5=little better off, 6=better off, 7=much better off). _____ Why? _____
   d. What are the different types of resource (appropriate, highly differentiated type of fish) that you know?

2. Perceived crisis in resource depletion.
   At the time of project implementation the fish, shellfish and other sea life were in (1=very bad, 2=bad, 3=little bad, 4=neither, 5=little good, 6=good, or 7=very good) shape? _____
   Why?_____

3. Respondent's Experience:
   a. What is your current occupation? _____
   b. How many years have you done this type of work? _____
   c. Have you done any other types of work? [ ] yes [ ] no
   For each previous occupation, how many years in each?
   d. If you have done other work in the past, why have you changed to your present occupation?

4. Job satisfaction
   a. If you had your life to live over, would you still become a (fisher, fish farmer, etc.)?_____
   [ ] yes, why? _____
   [ ] no, why? _____
   b. What do you like about (fishing, fish farming, etc.) in comparison to other jobs you could do?_____
   _____
   c. If you could make the same income in an occupation other than (fisher, fish farmer, etc.) would you change you job? [ ] yes [ ] no

5. Occupational multiplicity
   a. Does your household have any sources of income other than (fishing, fish farming, other coastal resource related principal occupation? [ ] yes [ ] no If yes, what? _____
   b. Does your household receive money from anyone living outside the household (e.g., in the city, abroad, etc.)? [ ] yes [ ] no
   c. In terms of income, which of these activities (or sources; e.g., remittances from overseas would not be an activity, it would be a source of income and should be described here) is the most important? Second most important? Third most important? Do any of these activities provide over half your income?

   d. In terms of food, does your household have any sources of food other than what you buy or bring home from (fishing, fish farming, other coastal resource related principal occupation)?
      [ ] yes [ ] no If yes, what? _____
   e. In terms of food, which of these activities is the most important? Second most important? Third most important? Do any of these activities provide more than half your food?

6. Size and scope of operation
   a. Number of units (boats, ponds, cages, rafts, etc.) and ownership [owner, co-owner, group ownership (describe), none]
   b. Size of each unit (length:_____; width:_____; passenger:_____).
   c. Number of workers (e.g., crew size) _____

   d. Estimated Annual Production:
      For fishers:
      Average daily catch _____ (kg)
      Trips per week _____ (day/week)
      Weeks fished per month _____ (week/month)
      Months fished per year _____ (month/year)

      For aquaculturalist:
      Average harvest per season _____ (kg)
      No. of seasons per year _____ (season/year)

7. Technology employed

   a. If a fisher: Motor type: _____ HP: _____
      Gear type: _____ Deployment method_____
   b. If aquaculturalist:
      Water transfer method: [ ] pumps [ ] gravity [ ] others, specify _____
      Aeration method: _____
      Do you use fertilizer? [ ] yes [ ] no
      Do you use pesticides? [ ] yes [ ] no

   c. Others: descriptions analogous to the above two.

8. Assets (thru visual inspection)
   a. Ownership of productive equipment (refer to q# 6a)
   b. House structure (please check appropriate category)
      [ ] minimal (made up of light materials, e.g. bamboo, cogon/nipa)
      [ ] low (made up of light materials with little of wood/lumber)
      [ ] medium (made up of combined lumber and concrete with nipa roofing)
      [ ] high (made up of conrete and well-finished structure with galvanized roof)

   c. Furnishings (please check appropriate category)

[ ] minimal (no chairs & tables, only bench is present)
[ ] low (presence of few chairs and tables)
[ ] medium (presence of at least sala set and transistor radio)
[ ] high (presence of adequate furnitures and fixtures)

9. Cultural Values
   a. Do you think that the people in this community can work together to solve community problems (for example, digging a well, clearing a road, etc)? [ ] yes [ ] no
   b. Do you think fishermen could work together to solve a problem in the fishery such as illegal fishing (blast fishing, use of poisons, etc)? [ ] yes [ ] no
   c. Should the government, the fishers, or both work together to solve a problem in the fishery?
   [ ] government [ ] fishers [ ] both

10. Institutional and Organizational Aspects
   a. Do you presently belong to some sort of group or association? [ ] yes [ ] no
   If yes: What? _____
   What is the purpose of the group? _____
   How long have you belonged? _____
   If no: Did you ever belong to some sort of group or association? [ ] yes [ ] no
   If yes, what? What was the purpose? Why did you leave the association?

Type	Purpose	Reason

   b. What are the benefits of belonging to the [_____] association?

   c. Why is there a rule....? (fill in with regulation developed as a part of the CBCRMP. Repeat for each CBCRMP developed resource management regulation).

Rule Code:	Reason for creating such rules/regulations
_____	_____
_____	_____
_____	_____
_____	_____

B. Project Variables

11. What were the project objectives?

_____
_____
_____
_____

12. Do you feel that you or any of the other (users, e.g., local fishers) had any influence on planning (aspect of project)? [ ] yes [ ] no

13. Do you feel that you or any of the other (users) could influence changes in (aspect of project) after it began?
[ ] yes [ ] no

14. If training was part of the project, did you attend any training sessions? [ ] yes [ ] no
If yes, what was the topic and length of training? Did you complete training attended?

Topic	Length (days)	Completed	
_____	_____	[ ] yes	[ ] no
_____	_____	[ ] yes	[ ] no
_____	_____	[ ] yes	[ ] no
_____	_____	[ ] yes	[ ] no

15. Did you attend any meetings where the project were discussed? [ ] yes [ ] no
If yes, how many? _____

***Note to enumerators*: Questions #16-17 are for female and wife of male household head respondents only:**

16. Are you involved in any coastal resource-related activities, e.g., gleaning, vending/selling fish, drying fish, goes out to sea to fish, etc.? [ ] yes [ ] no
    a. If yes, what coastal resource-related work do you do? On the average how many hours do you spent daily for coastal resources related activities?

    _____
    _____
    _____

    b. Do you have other income-generating activities, e.g. livestock raising, food vending, vegetable gardening, sewing, etc.? [ ] yes [ ] no
    If yes, what non-coastal resource dependent income-generating activities do you do?

    _____
    _____
    _____

17. Did you participate in any aspects of the completed CBCRM project (e.g. meeting, training, etc.)?
[ ] yes [ ] no
If yes: (a) What specific aspect or activity of the project have you participated? _____
_____
(b) What benefits did you gain, if any, from your participation? _____
_____

If no: (c) why you didn't participate?_____

18. On the average, how much monthly income do you earn from:
    a. Coastal resource-related activities? _____ (P/month)
    b. Non-coastal resource dependent income generating activities? _____ (P/month)

C. Valuation of Project Benefits

19. Suppose similar project which requires concerted efforts of all households in [_____] will be implemented, are you willing to participate and give your share? [ ] yes [ ] no

If yes, in terms of fish or other fishery products, how many kilograms are you willing to contribute per year?

Types of fishery products	Quantity/year
_____	_____
_____	_____
_____	_____

D. Impacts on the Coastal Ecosystem

The ladder diagram will be applied to an appropriately worded description of each of the following indicators. The respondent will be requested to evaluate pre-project, today, and five years in the future.

20. Overall well-being of individual household.
The first step indicates the worst possible existence, little or no food, inadequate furnishings and shelter, and sickness. The highest step indicates the best possible house, fully furnished, more than enough food, and everyone healthy.
Today_____ Before CBCRMP_____ Future_____

If better off or worse off today, why? _____

21. Overall well-being of the resource.
The first step indicates an area with no fish or other resources, that the water is so foul nothing could live in it. The highest step is described as a rich, clean water, filled with fish and other wildlife.
Today_____ Before CBCRMP_____ Future_____

If better off or worse off today, why? _____

22. Your local income.
The first step indicates no income at all. The highest step indicates the best possible income you can imagine.
Today_____ Before CBCRMP_____ Future_____

23. Access to resources.
The first step indicates a situation where you are not allowed to fish in the waters at all. The highest step is complete freedom to fish where, when, and how you please.
Today_____ Before CBCRMP_____ Future_____

24. Control over resources.
The first step indicates a situation where you have no influence over who fishes where, how, and for how much. The highest step indicates a situation where you can control who fishes where, how, and for how much.
Today_____ Before CBCRMP_____ Future_____

25. Ability to participate in community affairs.
The first step indicates a situation where you cannot attend or speak at community affairs such as meetings concerning community activities. The highest step indicates a situation where you can attend all meetings and say what you want.
Today_____ Before CBCRMP_____ Future_____

26. Ability to influence community affairs.
The first step indicates a situation where whatever you say or do it makes no difference with respect to activities in the community. The highest step indicates a situation where your opinion has influence on community activities.
Today_____ Before CBCRMP_____ Future_____

27. Community conflict.
The first step indicates a situation where people in the community are always arguing and fighting. They cannot get along with one another. The highest step is a situation where everyone is friendly, helping one another, living together like one big family.
Today_____ Before CBCRMP_____ Future_____

28. Community compliance with resource management.
The first step indicates a situation where no one obeys the rules, they fish where and how they want, using illegal methods. The highest step indicates a situation where everyone obeys the rules.
Today_____ Before CBCRMP_____ Future_____

29. Amount of traditionally harvested resource in the water.
The first step indicates a situation where there are no fish. The highest step indicates a situation where there are so many fish that you can rapidly fill your boat with as much as you want.
Today_____ Before CBCRMP_____ Future_____

E. Socio-Demographic Characteristics (Contextual Variables)

30. What is your age (as of last birthday, years):_____
31. How long have you lived in this area? _____
32. Sex: [ ] Male [ ] Female
33. Household size: _____
34. Years of formal education: _____
35. Trainings attended other than project trainings (e.g., short courses, technical school, etc. describe type and duration).

THANK YOU FOR YOUR COOPERATION