THE BOLINAO COMMUNITY-BASED COASTAL RESOURCE MANAGEMENT PROJECT

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Introduction

Unlike similar projects oriented towards coastal resources management, the Bolinao Community-Based Coastal Resources Management (CBCRM) Project stands apart in terms of evolution, conceptualization and implementation. It was borne out of the independent research initiatives and development oriented community interaction of its collaborating institutions. The subsequent tripartite partnership between the Marine Science Institute (University of the Philippines), the College of Social Work and Community Development (University of the Philippines), and the Haribon Foundation, has provided a unique matrix of perspectives, experiences and expertise which now determines the manner in which the project evolves. Cognizant of the institutional and disciplinary filters which influence the interactions within and between the project and the Bolinao fishing communities, a conceptual framework has been articulated in an attempt to forge a holistic perspective and a broad framework for thought and action. This framework is continually refined by insights emerging from interactions internal to the project and with the local communities and institutions along various scales of governance. With this case study, the writers hope to provide an empirical model of CBCRM, which can significantly contribute towards a generic Philippine template in defining basic components and strategic approaches for the sustainable implementation of resource management at relevant hierarchies of governance.

Beginning Institutional Partnership

The research program of the UP Marine Science Institute (UPMSI), specifically those which pertain to resource and habitat assessment for coral reefs, seagrasses and mangroves, and those which focus on technology development for coastal aquaculture (e.g. seaweed farming and giant

clam and sea urchin culture) provide the milieu for its involvement in coastal management. Beginning 1976, it has embarked on the systematic survey of the status of coral reefs, and which to date, include the assessment of over 600 sites in the country. Starting 1985, through the ASEAN-Australia Living Coastal Resources Project, additional sites for habitat assessment included those of seagrass and mangrove systems. In 1986, MSI participated in the ASEAN-US Coastal Resources Management Project, which broadened its research interests to include resource management of the Lingayen Gulf, with special emphasis on the gulf's coral reefs located in the Bolinao-Anda shelf.

Research on habitat and resource assessment indicated the grave need for mitigating technologies which would allow for reseeding of grossly depleted populations and for production of commercially harvested organisms through coastal aquaculture. In the early 1980's, a project on the biology and culture of giant clams began and continued for eight years under the sponsorship of the Australian Center for International Agricultural Research (ACIAR). Through this project, a hatchery and ocean-based nursery for giant clams were established. The biology for extant species was studied and culture protocols were established.

In 1987, the Seaweeds Project was approved by the International Development Research Centre - Canada (IDRC) and was aimed primarily to provide information essential to the expansion and diversification of the seaweed industry and the management of seaweed resources in the country. Species of *Eucheuma, Kappaphycus, Caulerpa, Gelidiella and Sargassum* were included in this study. The project was conducted for four years.

In 1991, a follow-up project was approved to include not only seaweeds but also invertebrates in the research and technology development. The project was approved for three year-funding by the IDRC. For the seaweeds component, the major emphasis was on the refinement and transfer of the seaweed culture, and the development of management strategies for natural stocks of *Gracilaria*. For the invertebrates component, refinement and transfer of the giant clam culture, and the development of culture technologies for other macroinvertebates (e.g. *Tripneustes*), were the prime foci.

The limited success of the 1987-1991 Seaweed Project in transferring and sustaining seaweed farming activities underscored the need for a socio-economic study to complement the research of MSI. Initial attempts at transferring seaweed culture technology were met with apathy by local fishers, perhaps because of the lack of social preparation prior to technology development and transfer.

The University of the Philippines College of Social Work and Community Development (UP CSWCD) is a major research institution in the ASEAN-US Coastal Resources Management Project coordinated by the International Center for Living Aquatic Resources Management (ICLARM) from 1986 to 1989. It was responsible for the socio-economic and legal-institutional studies among municipal fishers in the Lingayen Gulf. The results of the above studies and other bio-physical studies became, among others, the bases for the formulation of the Lingayen Gulf Coastal Area Management Plan (LG-CAMP) which has since been adopted by the Regional Development Council of the National Economic and Development Authority (NEDA-Region I).

In early 1992, a team from the CSWCD in consultation with MSI worked together toward the conceptualization of a proposal on participatory action research for CBCRM which was later funded by IDRC. The team initially selected three barangays in the coastal town of Bolinao (Arnedo, Luciente I and Dewey) as preliminary study sites. These were selected on the basis of the following criteria: the diversity of resource and economic base, community support for CBCRM, resource use conflicts, and accessibility and size of the community.

A major objective of the IDRC-supported research project is "to develop a participatory process of generating knowledge and understanding of the coastal communities' resources and social system ..." Complementary to this is the objective "to develop, use and validate the application of research techniques and methods e.g., participatory rural appraisal or PRA, in coastal communities in understanding the resource system and social system."

To operationalize the objectives, a training exercise on PRA was conducted on November 13-15, 1992 at the UPMSI Bolinao Marine Laboratory and at the project site in Barangay Arnedo. The training was a hands on experience to allow the participants to apply and adapt the principles, methods and tools of PRA to coastal communities. The training was facilitated by consultants from the Institute of Environmental Studies and Management (IESAM) of University of the Philippines Los Banos (UPLB) and the Tambuyog Development Center, an NGO with experience in applying Rapid Rural Appraisal (RRA).

The research team adapted and refined the methodology as they later worked in Arnedo. Cycles of theoretical inputs, field practice, group discussions and synthesis were undertaken as the research progressed during two months of the data gathering. After an initial write up and popularization of the results these were presented in a community validation workshop. Subsequently, PRAs were undertaken in barangays Luciente I and Dewey.

Simultaneous with community organizing and capability building, the research team undertook in-depth studies of the cultural, legal/institutional and marketing/technology aspects of coastal resource management systems.

Team Building

Although efforts to build an interdisciplinary working relationship began in 1992, the development of a functional common workplan for the two institutions did not materialize until the second half of 1993 since most of the MSI research activities were already programmed. For its part the CSWCD needed time to set up its program, train field staff, and conduct research on the application of participatory action research in coastal communities. Among the team building measures adopted include cross-discipline orientation sessions to develop mutual understanding of respective and discipline approaches to resources and communities.

By mid-1993, the importance of doing more intensive community organizing and mobilization was identified by the two institutions. Hence in October 1993, HARIBON (an environmental NGO) joined the project primarily to carry out community organizing in the project sites. A multi-institutional and multi-disciplinary base had then been formed for the development of CBCRM in Bolinao. Needless to say the participants from the three institutions had different orientations and experiences in working with other institutions. Thus, a staff workshop was conducted to allow some "leveling off" of expectations and to begin the arduous task of working towards an interdisciplinary framework that all would internalize.

Site Profile
Bolinao

The town of Bolinao is made up of 30 villages or barangays, 14 of which have coastlines. These coastal barangays host 59% of the municipal population. At present the CBCRM project is being implemented in four barangays, two mainland and two island barangays. The four sites are Arnedo and Balingasay (in the mainland) Binabalian and Pilar in Santiago Island. Around 21% of the town's population live in these villages.

Program Framework and Objectives

The Bolinao CBCRM project sets into motion an iterative and interactive research process of conceptualization, implementation, documentation and evaluation involving both the community and researchers in a dynamic partnership to realize coastal resource management. The project has five major components, namely: community organizing, environmental education, resource

management, livelihood development, and networking and advocacy. Throughout this process, the community and the researchers teach and learn from one another, allowing for the expression of the community's collective wisdom which will be focused, enhanced, and enriched within the framework of coastal resource management (CRM). Indicative of the community's level of maturity and commitment is the extent to which it can sustain this process on its own. The degree to which researchers can facilitate the community's attainment of self-reliance becomes the major index of their success.

The first step of this iterative approach is the conceptualization of issues, needs and solutions pertinent to CRM. The conduct of participatory rural appraisal allows the community and researchers to interact in systematically gathering and analyzing data about the former's environment and resources. Together, they identify critical problems and begin to formulate solutions. In this way, the community begins to focus on CRM issues and potential solutions as a collective body, gaining insights from their research partners about natural and social processes which they themselves have knowledge and experience. The researchers, through this close interaction with the community, obtain objective handles to determine how best to initiate community organizing, to prioritize what concepts need to be introduced in environmental education seminars, and to identify what resources and skills are important to livelihood development which community members have or need.

Based on priority problems, the community then identifies a suite of initial activities for implementation. The researchers use this as a basis for developing their workplans, which also address strategies that better enable a community to undertake the identified activities. A key preparatory strategy and one frequently used in community organizing is conflict management with respect to resource utilization. The community's problem solving skills is enhanced together with complimentary environmental education seminars to deepen the community's understanding of how living resources respond to harvest and habitat degradation. Leadership training seminars develop community leaders and lead to stronger community groups. At each step of the way, the researchers explain the purpose of capability-building strategies within the context of coastal resource management. During this process, needs for management strategies or options for technology development are evaluated and lead to research and development plans.

Identified activities are addressed by the Livelihood Development, Resource Management and Networking and Advocacy components. Each activity is subjected to evaluation by the

community groups affected. Activities are also anticipated based on PRAs as well as previous knowledge on the resource and environment situation in Bolinao.

The interest of a coastal community in CRM as a framework for addressing its environmental and livelihood problems is sustained with each small success achieved in conceptualizing and implementing activities, all of which build its capability as a collective coastal resource manager. Evaluation of each activity is done as a learning step and as an occasion for consolidation of the community. Assessing both the emerging strengths and remaining weaknesses of the group to implement collective action allows for redefining initial perceptions about goals and strategies to realize them. For communities, a meaningful assessment of their status as managers of their coastal resources determines the degree of commitment and level of decisive participation in subsequent activities. For researchers, an examination of the impact of activities in reorienting values, in skills training and in focusing indigenous knowledge allows for better facilitation of the CB-CRM process.

The strength of the general approach of this project is the partnership that is forged between the community and the research partners. The partnership seeks to propel the communities into self-reliance through capacity building in the crucial aspects of coastal resource management. Project phase-out is built into the process so that the communities are made aware of this from the inception of the partnership.

Project Objectives

In sum, the Bolinao CBCRM project framework is operationalized in the following objectives:

1. To develop interactive means to mobilize coastal communities toward collective coastal resource management through community organizing and environmental education.

2. To establish participatory mechanisms through which people's organizations at various levels are legitimized, institutionalized and strengthened, by society and by law.

3. To determine and evaluate appropriate coastal resource and environmental management strategies which will ensure a sustainable base of living resources in the coastal area.

4. To identify and develop culturally appropriate, gender-responsive and environment-friendly sustainable livelihoods that will address the need for food and cash, and which will alleviate direct harvest pressure on living coastal resources.

5. To devise networking mechanisms through which efforts on coastal resource management at the barangay and municipal levels are linked to provincial, regional and national levels of governance to achieve maximum viability and impact of the management program.

6. To document the process of evolution toward a community-based coastal resource management program through an interactive learning process between the community and research program, for use in evaluation, training, networking and application to other coastal communities.

Program Components

Community Organizing

Philippine experience in development work confirms the strategic role of community organizing in enhancing people's capability for self-governance - in empowering the people to manage their resources productively, equitably and sustainably. Previous studies strongly support the view that local organizations are a crucial factor in development work (Uphoff, et.al. 1979: 33). It is important that people have to be organized in order to participate on a substantive basis in development projects. Organization is essential in mobilizing and coordinating the human and material resources of the community and in fostering participation on a collective basis such that all members of the community can have equal access to decision-making and project benefits.

Community organizing is a problem-solving process whereby the community is empowered with the knowledge and skills to identify and prioritize their needs and problems, harness and mobilize their human and material resources to deal with these problems, and take action collectively. It stresses leadership formation and capability building hence it has also been referred to as a "learning process" approach.

As the most basic component of CBCRM, community organizing lays the foundation for the other four components of the program. It is complemented by environmental education so that the community can begin to think about their economic and social needs and problems within an environmental framework.

The Community Organizing Process

Community organizing in the project sites is undertaken in identifiable phases viewed in a continuum but not necessarily as ladder-like distinct steps. These phases are 1) site selection 2) community entry and integration 3) community study through Participatory Rural Appraisal 4) issue selection and prioritization 5) contact building and spotting of potential local leaders 6) formation

and strengthening of a core group 7) education and mobilization and 8) setting up and consolidation of a community organization.

Site Selection. Many development agencies when preparing plans for development projects rarely have any idea of the particular community where the project is going to be implemented. But, for a community-based coastal resources management which is site-specific, the selection of the project site is a crucial phase. It may spell the initial success or failure of the project.

For the Bolinao CBCRM Project, six variables were taken into consideration in identifying the project sites. These are:

1. *Diversity of resource base* (in relation to available economic opportunities) - most coastal villages have hardly enough land for agricultural production, aside from fishing and other marine-based activities many coastal communities seem to have very few livelihood options thus, diversity of resource base is an important consideration;

2. *Willingness of the community to cooperate in laying down the foundation for CBCRM* - the community itself is considered the main player in resource management thus, only with the community's participation and cooperation can the CBCRM process proceed;

3. *Relative urgency to initiate CBCRM as a result of rapid environmental degradation and resource depletion* - fisheries in Bolinao and the Lingayen Gulf are threatened by degradation and stock depletion, the rapid rate at which these are taking place calls for immediate intervention to avert further damage;

4. *Accessibility and manageability of the community in terms of population size and geographical area* - maximum impact of intervention is an important consideration thus, the program has to be implemented in communities which hold more potential for rehabilitation, development and management;

5. *Peace and order situation* - where crime is prevalent the community and the development workers are distracted; the CBCRM process could be enhanced when the development workers don't have to worry about their security; and,

6. *Presence of development programs* - to avoid duplication of efforts which may only lead to confusion and inefficiency, new programs should avoid operating in communities where other programs are already operating.

Having these criteria in mind, the project team proceeded to select Barangay Arnedo together with Barangays Dewey and Binabalian as one of the first sites for community organizing. Later, two other barangays were added (Balingasay and Pilar).

Entry and Integration into the Community. In order to gain the confidence of the people and get a first hand knowledge of the community, it is important to immerse one's self among the people. As outsiders, the researchers/development workers can only learn of the local situation from the local people themselves; it is only the latter that can supply the most revealing picture of themselves and their community. However, the local people cannot be expected to open up with their problems and opinions to complete strangers - this can only take place after a process of integration.

Barangay Arnedo is one of the most populous barangays in Bolinao. In 1992 it has a population of 2,591 belonging to 543 households. It has a total land area of 361 hectares, of which 60% are agricultural lands, 30% are residential and the remaining 10% are institutional, pasture and forest land. Arnedo is bounded by the South China Sea in the north and northwest, by barangays Concordia and Liwa-Liwa in the east, and by barangay Balingasay in the south.

About 25% of Arnedo's population are dependent on the sea for their livelihood. Most of them are located in the sea-side sitios of Bareg, San Miguel, and Tinumrong. A 1994 survey shows Arnedo has 80 fisher families distributed as follows:

Sitio		No. of Fishers
Bareg	:	49 artisanal fishers, 10 deep sea fishers
San Miguel	:	21 artisanal fishers
Tinumrong	:	8 artisanal fishers
Quintin	:	10 artisanal fishers

Aside from fishers, Arnedo has farmers and livestock raisers (50%) constituting the majority of the population, employees and wage-earners (10%), business persons (7%), and laborers (8%).

Entry into Barangay Arnedo began with a courtesy call on the barangay captain - a retired woman-elementary school principal. This was followed by a formal meeting with the barangay council where the nature of the program, its objectives, components and process were elaborated. During this meeting the endorsement and support of the barangay leaders thru the barangay council was sought.

After the project obtained the endorsement of the barangay council the researchers/community workers conducted house to house visits to establish rapport with the community and develop contacts for the community study.

Community Study thru Participatory Rural Appraisal. Before any organizing can be done, an initial study of the community and its resources should first be undertaken. Such a study is

necessary to guide the efforts of the organizer in identifying the resources and potentials of the community, the issues and problems towards determining the type of approach/method to start the people moving.

The initial community study was done through Participatory Rural Appraisal (PRA). The PRA has evolved from Rapid Rural Appraisal (RRA), a research technique developed in the late 1970s and early 1980s by researchers in rural development work as an alternative and complement to conventional survey research. PRA is a way of learning from, and with community members to investigate, analyze and evaluate, and make informed and timely decisions regarding development projects. The approach of PRA owes more to anthropology and ethnographic research methods and as such gives emphasis to understanding the "people's own point of view."

The PRA in Arnedo was an initial effort towards understanding the rapid environmental change and degradation and the increasing deprivations of the people in the area. The research activity was meant to achieve a better understanding of the status of the coastal resources, the economic activities of the people, and the existing dynamics between the two.

During the initial stage of the PRA the researchers/community workers conducted "walkthroughs" to familiarize themselves with the community and develop contacts. They also gathered secondary data. Apart from the formal structures of leadership, non-formal leaders like school teachers, religious and civic leaders were also tapped as research partners.

The researchers workers initially engaged in "Patanong-tanong" or casual conversations. The team later on conducted semi-structured interviews (SSI) and focus group discussions (FGD) using guidelines formulated by them. The focus group discussions were conducted among farmers, fishers and women. They gathered data on the status of the resources, livelihood/income source, past and present development initiatives, issues and problems, and opportunities. To verify the data they were gathering, direct observations were also made.

To provide feedback and validate the PRA results a community validation workshop was conducted. Through this activity, the community members and the researchers/development workers collectively analyzed the data and determined causes of problems prevailing in the community. On the basis of the analysis and collective understanding, a plan of action was proposed and prioritized.

The PRA process proved helpful in constructing a comprehensive picture of the resource status and of the people's socio-economic conditions. It also generated awareness of the various possibilities and challenges for coastal resources management and served as initial focus for

mobilizing the leaders and members of the community. On the whole, the PRA became the stepping-stone for subsequent capability-building activities for CBCRM.

Issue Selection and Prioritization. After the initial community study comes the presentation to the people of the barangay's situation in a synthesized and popular form for validation, issue selection and prioritization. This activity usually comes in the form of a community validation workshop.

The community resource profile may serve as their mirror in understanding their community situation and may be used for generating discussions regarding the status of community resources, problems and needs. Hopefully the discussions generated may be directed toward making the people conscious of the need for an organization that will serve as their venue for solving their problems.

In the face of so many problems prioritization is needed. The degree of complexity of the problem and the organization's capability have to be taken into consideration. Simple problems are easier tackled first to ensure success of initial efforts. This way the organization helps to build the people's confidence in their ability to act collectively.

In Barangay Arnedo, participants in the Community Validation Workshop formulated a set of criteria for prioritizing the issues they raised. The criteria include:

1. Urgency of the problem
2. Gravity and seriousness of the problem
3. Number of people affected
4. Willingness of the people to act on the issue/s
5. Solvability of the problem

Using above criteria, they prioritized the following issues to be addressed by the barangay council:

1. Organizing of fishers in Sitio Bareg
2. Resource rehabilitation (e.g., mangroves)
3. Development of livelihood activities
4. Revival and strengthening of the maguey and cashew industry
5. Strict enforcement of ordinances against illegal fishing

Spotting of Potential Local Leaders and Core Group Building. The core group is the basic building block of any organization. The core group is formed from the initial contacts who have shown great

interest and concern by taking time to attend regularly and actively participate in meetings regularly and who are credible to other members of the barangay.

In Arnedo, the initial core group was organized around the introduction of seaweed (euchema) farming as a form of supplemental livelihood. Five farming and fishing households were organized into a techno-livelihood cell that then underwent leadership development sessions and technical training.

The seaweed farming was envisioned to be economically viable and self-sustaining. However, after three planting cycles, shortcomings in the technical, economic and social aspects of the project prevented it from flourishing as an economic activity.

Education and Mobilization. Educational and mobilizing activities should be undertaken at every phase of organizing. Direct observation through fishers exposure trips to other successful project sites effectively concretize abstract principles.

The failure of the seaweed project did not prevent the team from learning its lessons and utilizing the techno-economic cells as springboard for the transition from simple aquaculture to community-wide program of coastal resources management.

Beginning in mid-1994, the team focused its organizing efforts on the sitios where majority of the fishers reside. The goal is to establish a local organization of fishers who will take the lead in resource management along the principle of "resource-user-as-manager". Coupled with one-on-one discussion, small group and *purok*-level discussions on the environment and leadership development, these efforts led to the formation of the San Miguel Neighborhood Association and the Bareg Neighborhood Core Group.

By December 1994, several members of the techno-economic cells have joined the exposure trips to two relatively successful marine reserves in San Teodoro, Batangas and San Salvador Island, Masinloc, Zambales. These cross visits proved very effective in convincing the participants from Arnedo about the effectiveness of marine reserves as a resource management option. They came home totally convinced that it is possible to rehabilitate the degraded coastal resources in Arnedo. They exalt, "it can be done".

Environmental education modules formulated under the FAO-supported Integrated Coastal Fisheries Management Project of HARIBON was evaluated and further developed. These were the basis for environmental education sessions with the community organizations, local government officials and agencies, and school groups. An advanced course was designed for potential trainers at

the local level including training for environmental, para-legal and alternative harvest and production methods.

The environmental education and training program was integrated with community organizing and a resource specialist with training in environment was part of the field team in each barangay. In addition to the programmed activities the resource specialist was able to identify further needs and opportunities and work with the project scientists to respond with appropriate training and demonstration materials. These specialists also work with community groups as they develop new livelihood options and management strategies to incorporate environmental monitoring.

Setting Up the Organization - Samahang Pangkalikasan ng Arnedo (SAPA).

Beginning January 1995, the team in Arnedo has formulated a more integrated program: the setting up of a people's organization, the installation of a marine protected area and the piloting of a community-based enterprise.

During the first few months of the year, the community organizing process was rather slow and got sidetracked with the proposed setting up of a cement plant complex in Bolinao. Employing one-on-one education and information sharing proved helpful in raising the environmental consciousness of the core group, but did not immediately contribute to the program's thrust to attain critical mass of CBCRM advocates.

Several months later, a working committee composed of representatives of the neighborhood clusters was formed to prepare the establishment of a people's organization. The target was a broad barangay-level organization with fishers as leaders. The working committee assisted by the team began its work by conducting house-to-house calls on all the contacts it had made in the barangay during the last two years. It also began drafting a constitution and by-laws.

On June 25, 1995, the working committee called for a general assembly. It was attended by 64 people; out of around 80 old contacts of the program, only 35 attended the general assembly while the rest of the 29 participants were new contacts. The people's organization "Samahang Pangkalikasan ng Arnedo/Environmental Organization of Arnedo (SAPA)" was born at this assembly.

At the first assembly, eleven (11) leaders were elected. They were tasked to lay the groundwork for resource management, including the analysis of the biophysical, socio-economic and practical considerations; the identification of resource management options; the installation of a

legal/institutional instrument that entrusts collective management to the organization. The leaders were also mandated to finalize the constitution and by-laws of the organization, to prepare its registration papers with the government and to seek recognition from national government agencies (NGAs), local government units (LGUs), non-government organizations (NGOs) and other local organizations.

Organizational Consolidation/Institutionalization

Social acceptance provided a sustainable basis for legal recognition. Previous work of CSWCD has analyzed the local ordinances and legal structure for fisheries resource management such as means to allocate fishing concessions. HARIBON has had previous experience in working with municipalities in gazetting marine reserves. Based on this work this component worked with local government to pass village or municipal ordinances to endorse or legalize the status of the new organization and the management measures they proposed.

To evaluate the extent of legal and social institutionalization of newly formed groups, the community and their research partners assessed the following features:

a. cohesion within and among members and leaders of the new organization

b. cohesion between the new organization and the larger community

c. ability of the new organization to identify resource management issues and to formulate viable solutions

d. ability of the new group to network beyond the confines of its community

e. ability of the new group to upgrade the skills of its members and leaders

Resources Management

The resource management component is responsible for developing and evaluating resource use and management options which have been identified through participatory research in the project sites. These options include (but are not be limited to) community- based management of fisheries resources, aquaculture technologies, land based production systems and other community initiated land and coastal development plans. This component works closely with the Livelihood Development component in the evaluation of options and in their implementation.

The management of the coastal resources of Bolinao can best be done through the formation of resource management councils at the barangay level which are represented in the

municipal councils as provided by the Local Government Code. This component also assists in designing the scope of management areas and the management plans for specific areas or resources. The project strengthens these councils through various capability-building activities including environmental education. As partners in the better management of the coastal resources of Bolinao, the project staff continues to provide technical assistance for the amendment and formulation of municipal ordinances that regulate entry into the fishery, implement resources-specific management schemes and in general, develop a coastal zone development plan compatible with the principles of sustainable development.

In line with this component's function of providing technical assistance, biophysical research projects geared towards marine resources development management and enhancement are continuously undertaken. These studies address needs identified by the peoples organizations as well as previous research projects. Among the priority research areas are:

1. development of coastal aquaculture systems to enhance fishery production;

2. inventory and assessment of selected, locally important fishery resources and develop and evaluate resource management strategies for these resources; and,

3. monitoring of the impacts of management and other development interventions (i.e. fishery regulations, introduced alternative livelihoods, etc.).

The active participation of local cooperators in these activities is an important aspect at all phases of the research program. These activities are spearheaded by the project staff and short-term studies are subcontracted to appropriate experts as the need arise. In addition to these activities, the project facilitates the gathering of pertinent technical information to address resource management issues that may arise (e.g. impact of particular gears).

The project has not identified a specific technical research plan and budget although there is need for such. The priority research questions are evaluated by the Management Committee and the needed research are contracted accordingly. Most of the research activities under the Resource Management component involve scientists from MSI and CSWCD in the technical and socio-economic aspects respectively. Community involvement in the research process is enjoined to ensure that a participatory research process is used whenever possible.

Coastal Aquaculture. The potential of some aquaculture activities (e.g., seaweed, giant clam and sea urchin farming) in generating supplemental livelihood for coastal communities and

enhancing natural resource management is recognized by the project. Hence, pilot farms were launched in two communities where some local groups have expressed interest.

In Barangay Arnedo, eucheuma farming was introduced as a potential source of supplemental income. Unfortunately, results were not encouraging. In Barangay Dewey, three fishers took part in an experimental giant clams farming which at the end of six months provided them very modest supplemental income. The experience proved more valuable from an educational and ecological point of view. Integration of local-fishers' and researchers' knowledge was a principle that guided the entire process. Fishers helped identify the ideal site based on their indigenous knowledge. The researchers helped deepen their scientific understanding of the organism, e.g., its population dynamics, feeding practices, reproduction, etc. - thru the technical training conducted. Also in Dewey, culture of sea urchins in cages was conducted with local fisher collaborators.

To expand these aquaculture initiatives, integrated aquaculture technologies are still being developed and tested. A model for the integration of fisheries management and aquaculture is being developed in the Coastal Resources Research (CoRR) Network which can result to enhancement of nutrient recycling, controlling pests and directing more energy and nutrients towards harvestable food products. Integrated systems under local control for the production of food and products primarily for local markets is more sustainable from an ecological and social point of view.

The CBCRM project is working with the CoRR Network to develop components of an integrated system in cooperation with collaborators in Bolinao. The focus is on food production rather than marketable species now being cultured. This is compatible with suggestions from local cooperators to explore other options to expand their aquaculture efforts. Indigenous knowledge and marine science knowledge are being used to design an experimental plan to test species interactions in field units. This becomes marine equivalents of kitchen gardens in which small-scale production is maintained for household consumption. As this effort is focused on indigenous species, especially those of local food value, there is little risk for participants.

The appropriateness of coastal culture technologies must be assessed using the criteria of social acceptability, economic/marketing feasibility and the potential for instituting an acceptable limited use rights system favorable for coastal aquaculture for local food production as well as cash (e.g. export products).

Resource Assessment and Habitat Rehabilitation. Stock assessment of selected fishery resources (finfish, invertebrates, seaweeds) and integration of available technical information on these resources is being conducted to fill gaps in previous studies. Based on these, conceptual models for

the management of these resources can then be developed with the municipal resource management council. Among the priority target species identified from both the results of previous MSI investigations and community validation activities are: rabbitfish, indicator/major coral reef fish, strombus, anadara, caulerpa lentilifera, gracilaria and sargassum.

Reforestation of mangroves in areas previously identified by local communities has been started. Evaluation of coral transplantation and artificial seagrass to enhance fishery production will be conducted based on the results of ongoing UPMSI projects. If deemed of significant ecological importance, expansion of these activities may be undertaken in the future.

Development of rapid environmental appraisal systems is being undertaken with the primary goal of developing "local experts" who can undertake the regular monitoring of the status of the fishery resources in the area and monitor the impact of resource management and other development activities.

In subsequent years, project activities will contribute to the determination of the recruitment dynamics of target fishery species and simulation of larval dispersal patterns in the Bolinao reef flat with hydrographic modeling using various methodologies in which MSI researchers have extensive experience. This understanding will be critical in the design of marine reserve systems (e.g. location of entrainment systems) in the area and the region in general.

The integration of culture and management contributes to resource enhancement through the establishment of mini-reserves which in the short term, serves as reproductive reserves to enhance local recruitment. In the longer term these help demonstrate impact of larger, more comprehensive reserves. An example is local sea urchin enhancement which is initially justified as a culture activity. However, since the sea urchin larval period is relatively short and larvae may be attracted to the presence of adults, strategic placement of these populations, based on local hydrography, could contribute to "natural" recruitment. The potential for other species is also being considered.

Marine Reserves. One of the potential interventions and possible means of resource management which has already been accepted in principle by several community groups is the establishment of marine reserves which will serve as protected areas and provide seedstock for surrounding marine areas. There has been some success with these in the Philippines but not in an area as large a community as Bolinao. Therefore a different approach is needed to reach consensus on the objectives and implementation of marine reserves.

Reserves have been discussed as a possible management tool in some of the barangays. The initiative either follows up on interest expressed by community groups or started with researchers evaluating resource use by the various fishing groups. Existing informal fishers organizations based on types of fishing gear which became the starting point for discussions. A series of exposure visits to the Marine Sanctuaries in San Salvador Island and Mabini, Batangas, complemented by environmental education activities helped drew the fishers attention to the role reserves have played in other places. Discussions with leaders and residents in the barangays visited helped to broaden their understanding of the resource situation and how the introduction of reserves might be done.

The Resource Management component drew together available information on the resources and the areas to determine from a biological and ecological perspective what the best approach was. The Livelihood Component examined the value of the resources involved in terms of both market value and family food impact as well as the legal implications of the reserves. Since the resource users have been involved in all of these analyses it also served as a learning process for them on how to evaluate and develop such a management intervention.

Though a marine reserve in a large area of Bolinao had been proposed by some researchers based on biological analysis of reef fish recruitment, the implementation was considered too difficult because of the difficulty of monitoring of the proposed site which is distant from the island barangays. The current plan is to start with smaller reserves which would be more manageable by the small communities. Through analysis of the species of concern (as identified through user evaluation), models for small-scale reserves are now being developed.

Trials are being designed with user group involvement in the affected barangay(s). The rules for management of the reserve will be agreed upon by the users and a means for monitoring compliance established. Resource monitoring by researchers and later by resource users will be conducted to assess the starting situation and means to evaluate effectiveness of the reserve. The impact of the reserve will be evaluated based on the status of the resource (species) within the reserve and the impact of fishery landings.

Livelihood Development

The rationale of livelihood development within the context of Community-Based Coastal Resources Management (CBCRM) is to reduce harvest pressure while the resource base is allowed to regenerate and a management scheme that respects the desirable level of “sustainable rent” is put in place. In relation to artisanal and subsistence fishers who are often unfairly blamed for the

tremendous pressure on the sea, "reducing extractive pressure" means lessening their total dependence on marine resources and on particular productive activities. 1) diversifying the livelihood options of marginalized families so that their basic needs are met through varied sources of income; and 2) facilitating their access to basic social services that can widen the range of socio-economic opportunities available to them attain this.

If CBCRM is to break the total dependence of fisher families on their already-degraded resource base, number two (2) is most important, especially regarding their ability to put their children through school so that poverty and the abuse of the natural environment can be addressed at their roots. Only sustained capability-building -- and the livelihood opportunities that go with it -- can empower poor families to break free from their oppressive dependence on their resource base and to participate meaningfully in economically productive endeavors. Only through education can the poor acquire capital that can never be taken away from them.

Studies show that sustenance fisher families are indeed among the poorest of the poor. Not only are they deprived of productive resources; their children are among the most malnourished, prone to disease, and unschooled. Needless to say, if their children were to grow up this way, the vicious cycle of poverty and environmental decay would perpetuate itself in more disastrous forms. Livelihood within CBCRM has to ultimately aim for a quality of life that affords education and other basic social services for all.

For these reasons, "food security" and "cash security" are the logical goals of a sustainable livelihood program worthy of its name. The former has to make sure that added income from any new activity is spent on basic needs while the latter goal aims for a level of sufficiency that can provide for education, health services, transportation, electricity, and the like.

Food security can be attained through food production that upgrades the quality of nutrition at the household level while cash security can be attained if a culture of savings and austerity is fostered among fisher families. Needless to say, a livelihood project that successfully increases household incomes but does not catalyze the formation of savings will still be unable to lift coastal families from poverty.

Certain types of livelihood programs are apt to meet both the goals of food security and cash security. Such is the case of integrated aquaculture still being developed in Bolinao, making use of scientific studies done by the UP Marine Science Institute on sea urchin ranching, seaweed farming, the rehabilitation of coral reefs, and the culture of giant clams, sargassum and others as starting

point. Such concept integrates both resource management and livelihood development in a single scheme that is also close to the experience and desires of coastal families.

Beginning in 1993, the project initiated pilot farming of a seaweed variety locally known as "tamsaw" (Eucheuma/Kappaphycus alvarezii) in Barangay Arnedo. Arnedo was chosen as a suitable site because of its good water quality and the people's previous experience in seaweed farming.

The seaweed has been studied extensively by UP-MSI for almost ten (10) years. Eucheuma is a red algae that grows on coral reefs and sandy bottoms of marine waters in intertidal and subtidal zones where the water is very salty, clear and fast moving. Eucheuma is source of processed carageenan, a gelling, thickening stabilizing, and emulsifying agent in both food and industrial products. Echeuma is farmed extensively by around 50,000 fishers in the Visayas, the Sulu archipelago and Palawan.

Seaweed farming can be considered both a form of resource management and livelihood development. It contributes to enhancement of marine habitats, for seaweed areas often serve as shelter, grazing and nursing grounds for various reef fishes. It is also a profitable activity. Dried eucheuma is purchased at P6 - P7 a kilo (1994 price level). About 10 kilos of fresh eucheuma make up a kilo of dried eucheuma with 38% moisture content. Growing eucheuma takes only about 1 to 1.5 months. Thus, multiple harvests can be done in a single year.

Eucheuma is grown on rafts made of bamboo measuring 5 x 8 meters. There are two methods used, namely: the long line method and the raft method. Each raft can be planted with 300 seedlings weighing 100 grams each and can produce as much as one (1) ton of fresh eucheuma (1,000 kilos) after two months.

Earlier in 1991-92, the Bolinao Farmers and Fishermen's Multi-Purpose Cooperative (BFFMPC) ventured into eucheuma production with technical assistance from UP-MSI. The project did not last long, principally because the level of production could not meet the actual market demand. For big-time buyers to purchase eucheuma at the farm-gate, the harvest has to be eight (8) tons of dried eucheuma, meaning 80 tons of fresh eucheuma (80,000 kilos). This could only be attained if there are 96 rafts tended by about 16 families, with each family taking care of 6 rafts and producing 6 tons of fresh eucheuma.

The failure of the earlier project was also attributed to the fact that the Bolinao Multi-Purpose Cooperative lacked social preparation prior to the technology transfer from MSI, plus the fact that many of the people involved in the project were not even fishers. But on the whole, the

root problems were really those of marketing and the lack of capital necessary to expand to a commercially viable scale.

The new attempt at seaweed farming in 1993-94 learned a few lessons from the previous experiment. The project concept was for five (5) cooperator families to pilot seaweed culture using the raft method. Three (3) more cooperators -- all artisanal fishers -- were to follow suit using the long line method. A total of seventeen (17) rafts would initially be set-up, to be increased to 40 rafts per hectare once successful. There would be five cropping in a year, with the produce packed into 50-kilo sacks for marketing. The feasibility study of a 40-raft hectare of seaweed farm expects an annual yield of almost eight (8) tons of dried eucheuma, or P 54,521 worth of sales annually, which translates into a net profit of P 5,663 after materials, labor cost, and marketing expenses have been fully paid. If proven successful, more families would subsequently be involved in the project.

The pilot cooperators were organized into a "techno-cell" or livelihood cluster. Selection of pilot cooperators used the following criteria: they had to belong to the fishing/farming sector, they had to come from the lowest income group, familiar and interested in the technology, recognize women's involvement in production and in community affairs, etc. Despite such, only two (2) of the five cooperators were full-time fishers, and one cooperator was economically well off compared to the other four.

Social preparation of the cooperators was adequate. Capability building and orientation were sufficient. Education focused on the environmental situation, on leadership skills and team building. System-oriented ness was emphasized, relating the seaweed project to the whole concept of resource management and relating techno-cell to an envisioned broad CBCRM organization. Lines of responsibility and accountability were clarified. Tasking was done at all phases of the project, from construction of raft, planting of seedlings, weeding, crop monitoring, cleaning, drying, etc. Organizational mechanisms put in place included periodic and collective planning, updating, monitoring and evaluation. Complementation from the professional staff was rather on the heavy side, with two community development workers, one marketing/livelihood specialist and one fisheries specialist working with a small cluster of cooperators.

Due to the professional staff's aversion to dole-out, financing relied heavily on the resources of the techno-cell. Since only one of the cooperators was rather well off, his family volunteered to finance the acquisition of farm materials and devices, to be paid from the sales of the first harvest. The seedstocks for planting was loaned by UP-MSI to be returned after the cooperators have produced enough seedstock. The overall sharing scheme was that 50% of harvest would be the

cooperator's share while the other 50% will be returned to UP-MSI as payment for seedstock, until the original quantity is fully repaid. No interest would be charged on all loans (in kind). If the crops are destroyed, the cooperators are under no obligation to halve the harvest.

The harvest of the seaweed farm did not turn out well as expected. The first cropping from December 1993 to April 1994 was harvested prematurely because of a series of typhoons. This netted only ___ kilos. Replanting had to be done mid-stream because of the damage wrought by typhoons causing 30% loss of seedstocks. Disease also struck the eucheuma, such as "ice-ice" or white spots resulting from too much heat and intensity of sunlight. Growth was poor, largely because of the grazing done by *siganids*, the effect of epiphytes, the appearance of *balu-balulang* (hydroclathrus clathratus) and nutritional deficiency due to the close placement of rafts that affected distribution of nutrients among the plants. It was later concluded that the fact that the seedlings were imported from Cebu and Bohol might have partly contributed to their failure to adapt to numerous biophysical factors.

Despite the poor production output of the first trial, the cooperators pushed on with the project. The results of the second harvest in early November 1994 were better. It netted 10,195 kilos from 10 rafts, or approximately one ton per raft.

A third cropping from November 1994 to February 1995 also had dismal harvest because of disease, grazing and fluctuations in water temperature. Only four cooperators participated in this last effort.

After a thorough evaluation in early 1995, eucheuma farming was discontinued beginning March 1995. The original investment has not been fully recovered, and the cooperators remain indebted to UP-MSI and to their volunteer financier although both have presumably written off the losses.

The failure of eucheuma farming was not only due to biophysical factors mentioned above that constantly plagued the crops. Many past lessons were not learned both on the economic side and social aspect. Production was not consistent with the specifications of market demand. The desired volume of marketable production was not attained. The quantity of harvest was simply not enough to be marketable. Very micro-scale projects would not be competitive and viable especially if their market is a broad one. If they remain micro, they are limited to the local market which for certain products does not offer prices commensurate to the production cost.

Thus, particular projects to be profitable have to first ascertain the scale at which they can viably operate. A project that aspires to enter into the export market cannot but operate on a commercially viable manner with the implicit commercial-level capitalization and investment.

Even though CBCRM often stresses self-help and reliance on local resources, inputs from outside cannot be always ruled out. Outside help is at times necessary to spur growth and multiply gains. The question therefore is not whether outside inputs should be used at all but how these inputs are wisely and efficiently used to generate new resources that can then substitute for the infusion of outside capital. Self-reliance is not an issue of whether outside help is used at all, but whether such use has created a relationship of dependency.

Eucheuma farming in Arnedo was not devoid of any gain. Organizationally, the pilot techno-cells later became building blocks of a broader CBCRM organization in the barangay. The pilot cooperators became key persons in the dissemination of environmental awareness and in the promotion of the CBCRM vision. Eucheuma farmers, because of their intensive interaction with a five-member professional team, were solidly equipped for organizational work, such that they were easily spotted and hailed as leaders when the barangay-wide CBCRM organization was set up in June 1995. To date, they remain the most reliable local partners of the CBCRM program.

While the eucheuma experiment had few concrete economic gains to offer to grassroot communities except that it hastened the transition from simple aquaculture towards a broader perspective of CBCRM, much learning can be gleaned from this attempt.

1. An interdisciplinary approach using a multi-disciplinary team of natural science specialists, social science specialists and NGO practitioners can work. Such effort entails much hard work in leveling off perspective and expectations but it can be fruitful.

2. The process of technology transfer has to be a dialogic process between the scientist and the people. The old style of scientists-driven technology transfer has proved to be ineffective and unsustainable because of the alienation of the people. Technology-transfer itself has to be constantly adapted to social conditions as the scientist learns from his/her interaction with the people.

3. The "cash in the rush" manner of livelihood projects which immediately target the export market by shortcutting the basic steps in livelihood development can prove to be disastrous. This is as much true in the overnight creation of cooperatives as it is in our unrealistic desire to produce cash crops that can immediately corner a foreign market. We Filipinos say *"kung matayog and lipad, malakas din ang bagsak" (The higher you fly, the harder you fall).* There is wisdom to be learned from the sages of old. There can be no substitute for plodding work in livelihood development -- step by step,

from simple to complex, from small to big. Didn't we all grow up that way? Didn't nature in its beauty develop this way?

Networking and Advocacy

Networking is the establishment of linkages with other groups and agencies working for a common goal such as coastal resources management. Advocacy is a mechanism through which organized groups and communities institutionalize their goals in policies and laws of other groups and higher levels of governance such as the national government. Networking is therefore a prerequisite of advocacy. In both phases, an organized community reaches beyond its confines to help and learn from other communities and groups and together effect significant policy changes as an ultimate expression of a collective evolution toward self-determination. In the case of coastal resources management, the Local Government Code already provides for the legal rights of municipalities to manage their coastal resources. The Code also recognizes the role of people's and non-governmental organizations as key partners in the development of local communities. However, a major lack of policies with respect to conflicts between national development initiatives and natural resource-based economies on the matter of pollutive industries, among other policy gaps, remains an important target of networking and advocacy.

As indicated earlier, the community has begun establishing linkages with other groups even in the early phase of community organizing. The first major link to be established and strengthened was between the community and the municipal government. The CBCRM research program considers the municipal government as a priority group to be trained in the concepts and tools of coastal resources management. Thus, in all the components of the research program, the local government has been identified as one of the major research partners. A dialogue between the Municipal Council, local community leaders and the researchers has been initiated and will be sustained throughout the duration of the project. Major points of deliberation include coastal zone use planning, legal infrastructure for utilization, processing and distribution of coastal resources, livelihood development for fishers, and a comprehensive development plan for the town, among others. Specific issues which have been identified and analyzed include the use of illegal fishing gear, the use of fishing gear considered potentially destructive, the current and potential fishing and trading monopolies, and access of fishers organizations to fishing grounds and fishing rights.

Because the concerns of coastal resource management go beyond local communities and townships, working relationships between provincial and regional development councils has been established. Currently, representatives from both levels have participated in two coastal resources

management fora which were held in 1992 and 1994, which provided opportunities for a loose network to be formed among GOs, POs, and development-oriented NGOs in Bolinao. At the national level, interaction with the Philippine Council for Sustainable Development has been initiated. Along the three levels of development councils, a major theme for interaction and idea exchange is appropriate development paradigm/s for coastal communities. Such development models are needed to provide a broader context for coastal resource management at all levels of governance. As the network tightens, these development paradigms will be expressed in comprehensive policies with sufficient legal and financial support in order to be effectively implemented.

While the network is driven by major advocacy issues, information exchange for environmental education and for coastal resource management is the main sustaining activities. Among communities, exchange of teaching materials and personnel, inter-site visits, and conferences are conducted to disseminate lessons in coastal resource management. Experiences in conflict resolution, and capital and personnel mobilization for livelihood development, among many examples, are shared using popular media. In the end, the impact of networking shall be gauged by the commitment of coastal communities to collectively manage their resources as they learn from and teach one another. For advocacy, a major impact will be the level of political will at all levels of governance (village, town, province, region, and nation) that implements coastal resource management as a major component of a development paradigm for coastal communities.

Project Organization

The organizational structure of the Bolinao CBCRM Programme was designed to operationalize the participatory and interactive nature of the research process within and among the five components of the project. Majority of the research staff is in residence in the four study sites. Each site had a community organizer as a full-time resident (20 days of each month), a resource specialist (half-time resident in each of two sites), and a livelihood specialist (also half-time resident in each of two sites). Thus, a total of 10 field personnel (5 COs, 2.5 RS, 2.5 LS) are on-site residents in the four study areas to directly facilitate community organizing, environmental education, resource management, livelihood development and networking and advocacy. The community organizers act as the site team leaders and the two site specialists reported to this person.

To facilitate and conduct technical studies, two resource and two livelihood specialists are based in Bolinao. All of the time of these four people and half the time of one resource specialist

and one livelihood specialist resident in the barangays are spent working directly with the coordinators of the Resource Management and the Livelihood Development components. As the research progresses, with the development of participatory method in resource assessment and livelihood development, community members who could serve as resource and livelihood specialists are identified to assist in carrying out the technical studies.

Overall research coordination is provided by a Management Committee headed by Project Coordinator. The Management Committee is composed of the three research component coordinators and the Project Coordinator. To provide external evaluation to the research staff, Advisory Council was formed and is composed of heads of participating institutions, advisors of funding agency/ies, and external experts. On the side of communities, evaluation is provided through the Coastal Resources Management Network, which include members from various POs, NGOs, and GOs with development and management interests in Bolinao.