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# Community-based coastal resource management in the Philippines: a case study

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## 1. Introduction

In the Philippines, community developers concerned with agricultural resources used the community-based resource management approach as early as the 1950s. However, it was only in the mid-1970s when the approach was applied to the management of coastal resources, which began with the establishment of Sumilon Marine Reserve as a research facility by Silliman University [1]. Three main factors, in my view, helped bring about this development.

One was the considerable amount of underwater information gathered by marine scientists and other professional groups through the use of self-contained underwater breathing apparatus (SCUBA). This information tended to link directly decreased levels of fishery production to the destruction of coastal ecosystems, especially coral reefs. Direct observations on upland deforestation and on the disappearance of mangrove forests further increased people's general awareness of the critical service functions of the environment in maintaining fishery harvests.

The second factor was the perceived inability of government at local and national levels to stop the destruction of the marine ecosystems which provide direct ecological support to fisheries. For example, the destructive effect of the *muro-ami* fishing method on stony corals was reported to fishery authorities as early as the mid-1970s but was not banned until the early 1990s.

The third factor was the relative success of development projects in which communities participated. This fact stood in contrast to the failure of projects that did not provide for people's involvement in activities intended to improve the socioeconomic welfare of communities. Ferrer [2] has discussed the reasons for the failure of earlier community development efforts. A familiar example of a failed project is the Natural Resources Management Center (NRMC) project to establish protected coral reef areas to be regulated by government. The approach can be described as a top-down


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resource-oriented approach with no community participation. The basis for management was a plan prepared by technical teams to be implemented by government without the involvement of the stakeholders of the resource. The NRMC project did not work, and reef areas designated as marine parks/reserves continued to be ravaged by fishermen and other reef users employing resource-destructive extractive methods.

The 1980s saw the rapid acceptance of the community-approach to coastal resource management, especially by non-government organizations (NGOs) and academic institutions (see examples in [3]). Government agencies, in contrast, were slow to recognize and adopt it, with the exception of the Central Visayas Regional Project, which employed community organizers for community support. To date, a number of successful community-based coastal resource management (CBCRM) projects have been established throughout the country by the private sector and local government units. Two government national programs, Fisheries Sector Program, (started in 1990) and the Coastal Environment Program (initiated in 1993) incorporated community organizing.

## 2. Marine reserves

Marine reserves — which are areas of the marine environment protected from various forms of exploitation — are a key element of present day CBCRM projects in the country. Based on my knowledge, virtually all CBCRM projects include a provision for the establishment of marine reserves as a strategy to allow recovery of the environment (e.g. mangroves, coral reefs) and the resource (e.g. fishery) (see also [3]). The potential use of marine reserves in the management of coral reef fisheries, for example, includes the protection of a critical stock biomass to ensure recruitment supply via larval dispersal to areas that are fished and to maintain enhanced fish yields to areas adjacent to reserves through the movement of adult fish (see [4] for literature review). The establishment of reserves as part of CBCRM would, therefore, appear attractive, even reasonable, to stakeholder communities.

I shall briefly describe the results of our experiments and observations relating to the fishery of coral reefs (reserves and non-reserves) on two islands, Sumilon and Apo, in central Philippines during the past 20 years [1, 4–7]. Sumilon has an area of 23 ha and is surrounded by a 50 ha coral reef, of which 25% is a reserve. Apo has a land area of 70 ha and a coral reef of 100 ha, of which 10% is a reserve. As already defined above, a reserve is an area where there is no exploitation of resources; in the cases of Sumilon and Apo, no fishing was allowed in the reserves (Fig. 1). The non-reserves serve as fished areas. About 100 fishers using conventional gear were allowed to fish in the non-reserve of Sumilon and about 200 fishers in the Apo non-reserve.

At the Sumilon reserve, coral reef fishes existed in larger numbers (abundance) and in greater variety (species richness) than in non-reserve after a period of few (2–5) to several (5–10) years of protection, depending on the species. The large numbers of fish in the reserve would ensure the maintenance of a critical spawning biomass that will guard against recruitment overfishing [8].

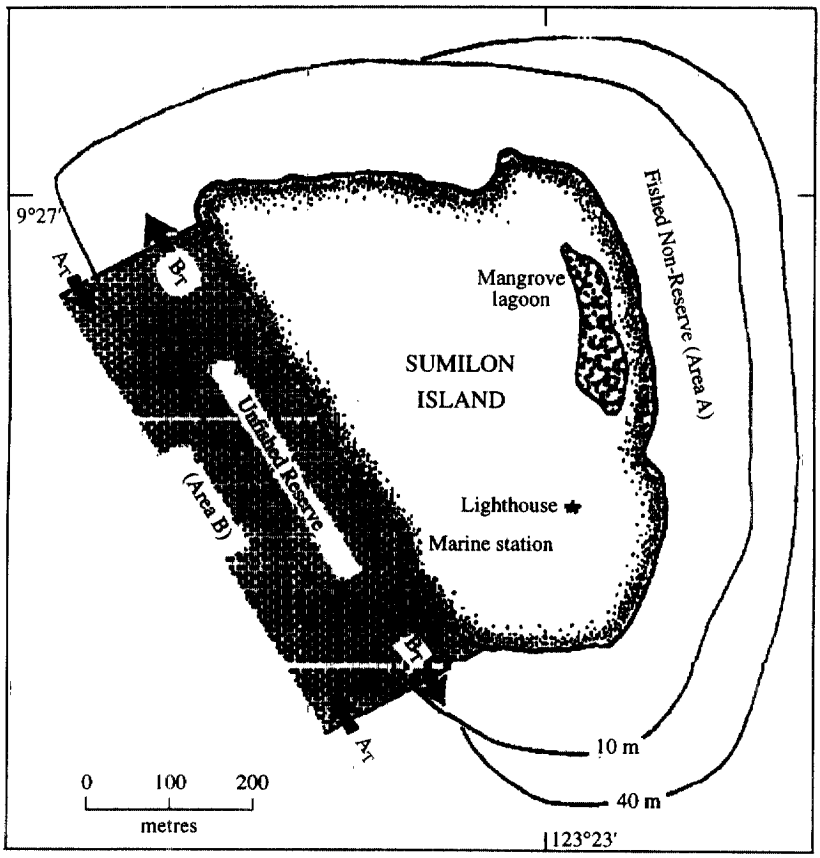


Fig. 1. Map of the Sumilon Marine Reserve, Central Visayas, Philippines. After Russ and Alcala [7].

Another finding was that the fish caught by fishermen from the non-reserve increased steadily during the period when the reserve was protected. For example, fish yields from traps in tons per $km^2$ per year increased from 9.7 in 1976 to 14.0 in 1977, 15.0 in 1978, 16.8 in 1979 to 14.4 in 1980 and 16.8 in 1983–1984. When protection stopped and fishing occurred in both reserve and non-reserve (that is, in 100% of the reef area) in 1984–1985, the fish yield from traps declined to 11.2 tons, and the total yield from three traditional types of fishing gear—traps, gill nets, and hand lines — which was 36.9 tons in May 1983 to April 1984 during period of protection, was reduced by 54%. The catch-per-unit-effort between 1983–1984 and 1985–1986 declined by 57% for hand lines, 58% for gill nets and 33% for traps.

Fish abundance in the reserve was also reduced during the breakdown of protection. When protection of the reserve was restored, fish abundance increased again.

Apparently, during periods of protection, fish in the reserve move out to the non-reserve, where they are caught by fishermen. Large numbers of fish in the reserve

would mean more fish moving out to the non-reserve, making more fish available to fishermen. Our evidence for this 'spillover' effect coming from our work in two marine reserves in central Philippines may be summarized as follows: At Sumilon Marine Reserve, we demonstrated a significant decline in catch rates and total catch for coral reef fish after the reserve that had been protected for 10 years was heavily fished, suggesting movement of adult fish from the reserve to the adjacent fished area. This movement enhanced fisheries yield [6,9]. Visual underwater observation using SCUBA also showed caesionids moving out of the reserve. Secondly, at Apo Marine Reserve we found significant positive correlation of both density and species richness of large predatory coral reef fish during the period of reserve protection in both reserve and non-reserve. During a period of 9 to 11 years of protection, there was a significantly higher density of these fish in the area closest to the reserve (200–300 m). Elsewhere, in Japan, Yamasaki and Kuwahara [10] provided evidence for the 'spillover' effect by demonstrating increased catch rates for snow crabs in a fished area surrounding a reserve that had been protected for 5 years.

The finding that fishermen get more fish from 75% of the reef area during periods of protection than from 100% of the area when there is no protection appears contrary to common sense. Beverton and Holt [11] provide a theoretical explanation for the higher yields during times of protection: at high levels of fishing mortality, as in the case of Sumilon, closing certain areas to fishing as a regulatory measure can enhance yield per recruit.

Another result of reserve establishment is that fish grow to larger sizes in reserves. Large-sized fish produced more eggs and larvae, which are carried by ocean currents to reef areas tens or hundreds of kilometers from their natal reefs [8]. We have yet to assemble evidence for this from our study reefs, and no studies have as yet been made to determine the effects of larval transport [12].

This brings us to the need for establishing networks of reserves (e.g. coral reefs, mangroves, seagrasses) if we are to prevent fishery collapse and to protect marine biodiversity. Here we make use of the findings of marine biologists and oceanographers as a basis for the establishment of these reserves [13–15]. A marine reserve acts both as source of fish larvae for export to other areas and as recipient of larvae from upcurrent sources. These larvae settle down and metamorphose after few to several weeks of pelagic life to juveniles and later to adults, which contribute to the harvestable fish and the spawning stock of recipient reserves.

## 3. Community-based coastal resource management (CBCRM) in the Philippines

CBCRM projects, as practiced in the Philippines, generally have the following components in common: (1) social preparation and community organizing; (2) environmental education and capacity building; (3) resource management planning, including protective management; (4) support activities for livelihood and financial resources mobilization; (5) research and monitoring; and (6) networking activities. The effort and duration of time allocated to these activities by project implementors differ from project to project, but in general social preparation, community organizing and

environmental education are given priority and much importance in the early stages of project implementation. This is so because it is through these activities that a community is given the opportunity to identify its own needs and the problems it must solve in order to improve the socioeconomic well-being of the people through cooperation of all its members. A result of community organizing is the formation of viable people's organizations that would plan and implement identified development projects. So crucial is community organizing to the success of CBCRM projects that when this activity becomes virtually impossible to pursue because of serious conflicts (usually political in nature), project initiators have no alternative but to withdraw from the project area (pers. observ.). Environmental education is also of utmost importance during the early stages of CBCRM. The community needs to be convinced of the need to protect and manage their own resources. In this connection, ecological relationships, e.g. roles of healthy environments in sustainable marine productivity, need to be demonstrated to the community [16]. In addition, the economic values of tropical ecosystems, such as coral reefs and mangroves ([1, 17] for coral reef fish production and [18] for mangrove values) should be made known to the stakeholders of the resource.

The CBCRM approach requires at least one partner organization, which is usually an academic institution or an NGO. Partner organizations act as catalyst for development, providing initiative, direction, technical advice and funding. During the period of partnership, they serve as co-managers of projects, but since the goal of CBCRM is to empower and enable the communities to protect and manage their own resources, partner agencies have to withdraw from project areas after a certain period of time [16]. The time frame required to complete the various CBCRM activities is usually 2 to 3 years, but in our experience often extends to 4 or 5 years. However, it is not unusual for partner organizations to maintain their links to organized communities long after their withdrawal.

During the past 20 years (1970s–1990s), there have been about 20 fisheries — or coastal resource-related programs and projects that either incorporate various degrees of community participation or are fully community-based in character (pers. observ.). Some of these are small projects, limited to specific localities, while others are large, being regional or national in coverage. Funding is provided by external agencies. Three are government programs — Central Visayas Regional Project, Fisheries Sector Program and Coastal Environment Program [3]. Most of the small CBCRM projects have been initiated by either academic institutions or NGOs, but in all cases, to my knowledge, have been conducted in cooperation or partnership with local government units. Only one project with a community component was directly under a town mayor — the Carbin Reef Marine Reserve in Sagay, Negros Occidental.

Newkirk and Rivera [19] listed eight essential features of CBCRM based on the nine projects they reviewed. These are: community participation, integration, partnership with government, institutionalization, capacity building, education, impact demonstration, livelihood improvement, conducive policy environment, and power against poverty. For purposes of this paper, however, I shall adapt another set of criteria essential for success of CBCRM projects. A highly successful

community-based project may thus be characterized by the establishment of (1) viable organization or organizations in the community; (2) a working marine reserve protected by the community; (3) sources of livelihood based on coastal (fishery) resources; (4) networking arrangements with government and international agencies, and NGOs; and (5) a capacity-building program. These criteria should ensure the sustainability of projects.

Based on these criteria, it may be asked what proportion of the 20 CBCRM projects and programs may be considered successful. As they have not been formally evaluated, only a rough estimate based on my personal observations is offered. Such an estimate would put success at about 50%. Although not all community-based projects have been successful [3], the most successful ones are community-based. There is always a certain probability of failure, as the CBCRM approach is dependent on a number of social factors that are difficult to control. Furthermore, as Scura and co-workers [20] have pointed out, there are a number of prerequisites to successful CBCRM, including the existence of a legislative framework and the acquisition of organizational and technical skills by communities.

The critical role of community organizations and partner organizations in the management and protection of coastal ecosystems and fisheries has been widely recognized by governments and multilateral agencies. CBCRM has therefore become a popular strategy to address the issue of depletion of open-access resources, such as fisheries. These resources, unlike most land resources, are not covered by appropriate tenurial instruments as legal basis of ownership. This is especially true of coral reefs. (Mangroves are now leased under a certificate of stewardship for 25 years, renewable for another 25 years.) Under the open-access situation, there are no property rights, only possession or actual use. This has been blamed for the unrestricted exploitation of fisheries, resulting in resource depletion. What the CBCRM provides to resource users or stakeholders is the sense of being proprietors and claimants of a resource [21].

In brief, if coastal communities are to be effective in coastal resource protection and management, they must be recognized and empowered as the day-to-day managers of coastal resources, such as coastal fisheries.

## 4. Sustainability of CBCRM projects

Among several issues in CBCRM, that of sustainability stands out prominently. It is argued that local governments and local communities usually cannot adequately manage coastal ecosystems because of their limited area of jurisdiction, limited research capacity, budget constraints, and the dominance of parochial interests in local politics [22]. The consequences of these limitations are that either management projects cannot take off at all or they cannot be sustained in the long term.

It is confirmed that, based on my experience, parochial or even selfish interests on the part of local politicians have been one of the major reasons for failure of some projects. Under conditions of unresolved political conflicts, community developers had to leave their project areas. Fortunately, this does not happen frequently.

The limitations in research capacity and in area jurisdiction though real are not insolvable. They have been overcome by training, capacity building, and networking with NGOs and academic institutions in a number of examples, resulting in relatively successful projects.

In my experience, what matters most is the budget limitation. Generally, partner organizations that initiate CBCRM projects are prepared to support these projects financially for only 2 or 3 years, whereas 4 to 5 years are usually required for a community to establish viable organizations that are capable of formulating and implementing development plans. It also takes about the same duration of time to place communities on a solid footing in terms of provision of livelihood opportunities. By coincidence, 4 years are needed for plankton-feeding fish (but 8 to 10 years for carnivores) to spill over from coral reef reserves to fishing areas, thereby increasing fish catches of fishermen [4, 6, 7]. These time frames are important guides to partner organizations concerned in demonstrating the impact of protected areas on the fishfood supply of communities. As Newkirk and Rivera [19] state '... concrete gains in a project are the most effective mechanism to convince people about the relevance of CRM'.

It is important that before outside financial support to communities is terminated, all arrangements should be in place to ensure that people are engaged in livelihood activities on a sustainable basis. This is true of one of the most successful CBCRM projects in the Philippines — the Apo Island Marine Conservation Project in Central Visayas. The project began in 1981 and its marine reserve (10% of coral reef area) was established in 1982 and community organizing intensified in 1985–1986 [4, 16, 23]. The organized community of 500 people has successfully managed and protected the reserve with little help from the partner agency (Silliman University) for 9 years, since 1987. The fishermen now report that their fish catches from the non-reserve have substantially increased, and they attribute this increase to the establishment of the reserve. They are happy because the reserve now brings more income to them through increased fish yield, tourism and SCUBA diving. It may be said that one objective, as far as CBCRM is concerned, is to establish protected marine areas like Apo Island.

## 5. Summary

This paper presents a summary of information on the effects of protected area management by local communities, with special reference to coral reefs in the Philippines, to achieve increased fish yields in adjacent areas and to promote other benefits to communities. The community-based approach to coastal resource management is briefly described and the essential features of this mode of management are identified.

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