

No-take Marine Reserves and Reef Fisheries Management in the Philippines: A New People Power Revolution

The marine-conservation and reef fisheries-management program that exists today in the Philippines had humble beginnings in the 1970s at Sumilon and Apo islands. These islands have produced some of the best evidence available that no-take reserves, protected and managed by local communities, can play a key role in biodiversity conservation and fisheries management. Perhaps more importantly, they served as models for an extraordinary expansion of no-take reserves nationally in the Philippines in the past 2 decades. This expansion contributed substantially to a major shift in national policy of management of marine resources. This policy shift partially devolved responsibility from a centralized government bureaucracy to local governments and local communities. Local governments now co-manage, along with the national government, marine resources out to 15 km from the coast. Giving some responsibility for management of marine resources to coastal people dependent upon those resources represents, in a very real sense, another “people power revolution” in the Philippines.

INTRODUCTION

The Philippines lies close to the center of tropical marine biodiversity and is home to some of the most complex and diverse ecosystems known (1). This biodiversity and these rich ecosystems are natural renewable resources that also support millions of people. Despite the productivity and richness of the natural resources of the Philippines, it is under substantial pressure from a rapidly growing human population (2.4% per annum) and widespread poverty (2–4). The resources are also under increased international market demand. One result of this demand is the rapid expansion of fisheries that export live reef fish to other Asian nations with expanding economies (5). Thus, the productive marine habitats of the country are being degraded, which poses a threat to the food security of the people (3).

Despite these substantial impacts on the marine resources of the Philippines, the ability of governments—national, regional, and local—to manage resource exploitation has, until recently, been limited at best (3, 6, 7). At all levels, governments generally lacked the funds, and often the political will, to put management practices into place to ensure sustainable use. Even if the funds and the will were present, the mechanisms of management were themselves problematic because they were largely foreign to most of the municipal fishers who are the main users of the coastal resources. In terms of fisheries on coral reefs, for example, the only regulations that exist are bans or limitations on certain types of fishing techniques that are destructive to benthic habitat (e.g., explosives, muro-ami drive-net fishing, and use of cyanide). No limits are imposed on catch, fishing effort, or sizes of fish landed—the traditional management mechanisms used in developed nations. Even where such mechanisms exist in the developed world, their record of success

in controlling overexploitation is less than impressive (8). On a global scale, overfishing is rife and results in massive, possibly irreversible, changes to marine ecosystems (8, 9). Are the most diverse coastal marine ecosystems on the planet facing the same fate?

One mechanism of marine conservation and fisheries management that has a proven record of acceptance among coastal peoples of the Philippines is the implementation of no-take marine reserves (4, 7, 10–14). A major reason for this acceptance is that no-take reserves can deliver, often rapidly, financial benefits to local fishing communities through enhanced tourism (4, 13–15). In fact, in the face of almost overwhelming pressures on marine resources, the Philippines is a modern-day success story (3, 4, 7, 14, 16, 17). Since the 1970s, more than 600 marine protected areas (MPAs), most with some no-take component, have been legally established in the Philippines (7, 17).

The southern Philippines was the cradle of a minirevolution in the way coastal marine resources are now managed across the entire country. In a practical sense, this “revolution” began in the early to middle 1970s at two small islands in the southern Philippines, Sumilon and Apo (10–13). In fact, December 2004 saw the 30th anniversary of the establishment of the Sumilon no-take reserve. These islands were the sites of the first, and still the best-known, no-take marine reserves in the Philippines. The success of these two small no-take reserves, and the programs of marine-resource management with which they are associated, served as templates for a widespread application of marine-conservation and reef fisheries-management programs across the entire Philippines.

Table 1 lists 23 key papers published in the mainstream scientific literature in the past decade that review community-based management of no-take marine reserves in the Philippines. This large number of reviews is testament to the recent rapid and substantial expansion of programs that establish community-based marine reserves in the Philippines. Many of the current projects are more impressive in scope and more holistic and comprehensive in approach than was early work on marine reserves in the country, often under the banner of integrated coastal management, or ICM (4, 7, 21, 23). Most of these larger projects have no-take marine reserves as a centerpiece of action (4, 23). Pajaro et al. (22) listed 439 no-take reserves in the Philippines in 1999. The vast majority of these projects are managed by local fishing communities and local government units, complemented by a national system of no-take marine reserves (7, 22). However, in 1999, Pajaro et al. (22) reported that only about 10% of reserves were fully enforced. Increased levels of both implementation and management success of no-take reserves have been reported more recently. For example, White et al. (17) surveyed management success of 156 MPAs in various parts of the Philippines and reported that 44.2% of these areas had good to excellent management. This finding suggests that levels of acceptance of no-take reserves by the people of the Philippines are increasing at a healthy pace.

Along the path from Sumilon Island to an extensive network of no-take reserves that stretches across the country, a funda-

Table 1. Key papers that review community-based management of no-take marine reserves in the Philippines.

Authors (Year)	Title	Reference
Pomeroy (1994)	Community management and common property of coastal resources in Asia and the Pacific	2
White et al. (1994)	Collaborative and community-based management of coral reefs: Lessons from experience	18
Ferrer, Polotan-De laCruz, and Agoncillo-Domingo (1996)	Seeds of hope: A collection of case studies on community-based coastal resources management in the Philippines	19
Alcala (1997)	Role of community-based fisheries management and marine reserves in coastal fisheries	20
Christie and White (1997)	Trends in development of coastal area management in tropical countries: from central to community orientation.	6
Pomeroy and Carlos (1997)	Community-based coastal resource management in the Philippines: a review and evaluation of programs and projects, 1984–1994	21
Alcala (1998)	Community-based coastal resource management in the Philippines: a case study	15
Pajaro et al. (1999)	Inventory of marine protected areas in the Philippines	22
Russ and Alcala (1999)	Management histories of Sumilon and Apo marine reserves, Philippines, and their influence on national marine resource policy	13
Courtney and White (2000)	Integrated coastal management in the Philippines: testing new paradigms	23
Alcala and Russ (2000)	Role of socioeconomic factors in coral reef protection and management	24
Olsen and Christie (2000)	What are we learning from tropical coastal management experiences?	25
Uychiaoco, Alino, and Dantis (2000)	Initiatives in Philippine coastal management: an overview	26
White and Vogt (2000)	Philippine coral reefs under threat: lessons learned after 25 years of community-based reef conservation	27
Alcala (2001)	Marine reserves in the Philippines: Historical development, effects and influence on marine conservation policy	3
Pollnac, Crawford, and Gorospe (2001)	Discovering factors that influence the success of community-based marine protected areas in the Visayas, Philippines	28
Christie, White, and Deguit (2002)	Starting point or solution? Community-based marine protected areas in the Philippines	14
White, Salamanca, and Courtney (2002)	Experience with marine protected area planning and management in the Philippines	4
Christie et al. (2003)	Toward developing a complete understanding: a social science agenda for marine protected areas	16
Walmsley and White (2003)	Influence of social, management and enforcement factors on the long-term ecological effects of marine sanctuaries	29
Indab and Suarez (2004)	Community-based marine protected areas in the Bohol (Mindanao) Sea, Philippines	30
White et al. (in press)	Evolution and lessons from fisheries and coastal management in the Philippines	7
White et al. (in press)	Sustaining marine protected areas through continued monitoring and evaluation: the MPA report guide and management rating system	17

Note: The Table is indicative, rather than exhaustive. Many more such reviews appear in the “gray” literature and in many site-specific case studies, most of which are referred to in the papers listed in this Table.

mental change in the legal framework of management of coastal marine resources has occurred. One of the authors of this paper (ACA) still has vivid boyhood memories of pristine coral reefs in southern Negros during the 1930s. In those days, turtles swam unmolested over luxuriant coral gardens teeming with colorful fish. The reefs belonged to the people of the coasts then because they were the ones who depended upon the reefs for their existence. In fact, evidence suggests that before the Spanish colonization of the Philippines in the seventeenth century, traditional property rights over fishery resources resided at the barangay (village) level (21).

Over the centuries of colonial rule by both Spain and the United States, management of natural resources was “strongly centrally determined, top down and nonparticipatory” (21). After Philippine independence in 1945, the country entered a strong phase of nation building. In the 1960s, for example, the Fisheries Development Program emphasized expansion of fishery harvests (21). Under martial law in the 1970s, centralized control was enhanced, and development programs concentrated on “use orientation” of all natural resources (21). The term “use orientation” implies that policies tended to encourage greater use of natural resources by people. However, such centralized, use-oriented policies were gradually realized to result in rapid depletion of natural resources and deterioration of many habitats on which the exploited resources depended. Policy

needed to change from “use orientation” to “resource management” (21). Alternative methods of resource management were investigated, most notably community-based programs that involved participation and empowerment of local communities. Two examples were community-based management programs for use of water and for use of forests in the late 1960s and early 1970s (21).

One of the authors (ACA) was heavily influenced by these early community-based programs of management of agricultural and forest resources. Such programs existed at his institution (Silliman University) in the early 1970s (3). The first attempts at community-based management of no-take reserves on coral reefs at Sumilon and Apo islands (10–12) stem directly from these early terrestrial programs. During the 1960s, legal frameworks placed the responsibility for “management” of coral reefs with government bureaucracies, usually centralized in the bigger cities, such as Manila and Cebu. During the 1960s and 1970s, large commercial fishing companies that used highly destructive reef-fishing techniques such as muro-ami drive-net fishing expanded operations across the entire country. The centralized management agencies could do little to “manage” this expansion effectively. Local fishing communities felt disenfranchised from the process of protecting and managing the resources upon which they depended for their existence.

This paper documents how the local communities regained some control over that process.

The aim of this paper is to document the development of the current marine-conservation and reef fisheries-management programs in the Philippines. We describe the first attempts at establishment of marine-conservation programs, with particular emphasis on the establishment of no-take reserves in the 1970s. We draw heavily on the case histories of the two oldest, best-known and best-studied no-take reserves in the Philippines—Sumilon and Apo. The examples of Sumilon and Apo islands served as highly influential templates for a massive expansion of marine-conservation and reef fisheries-management programs in the Philippines (Table 1). They were influential largely because they produced convincing scientific, social, and economic examples of what could be achieved by local fishing communities. They contributed substantially to the shift of responsibility for management of marine resources from a centralized bureaucracy to a system of comanagement among local communities, local governments, and the national government. Power to manage coastal marine resources was returned to the people who are most dependent upon those resources for their livelihoods.

SUMILON AND APO NO-TAKE MARINE RESERVES

Sumilon Island is southeast of Cebu (9° 21' N, 123° 23' E), and Apo Island is southeast of Negros (9° 4' N, 123° 16' E) (Figs. 1 and 2). Sumilon Island had a no-take marine reserve established on its western side in December 1974 (10–13). Apo Island had a no-take marine reserve established on its southeastern side in late 1982 that became legally established in 1986 (10–13). Sumilon Island is a coralline island of 0.23 km², surrounded by a fringing coral reef of 0.5 km² to the 40-m isobath. Apo Island is a mainland island of 0.7 km², surrounded by 1.06 km² of fringing coral reef to the 60-m isobath (0.7 km² to the 20-m isobath). Local fishing communities use hook and line, traps, gill nets, and spears. Sumilon Island has no permanent residents but is fished regularly by about 100 municipal fishers from the nearby island of Cebu. Apo Island has about 700 permanent residents, with about 100 municipal fishers. The Sumilon reserve is a 0.75-km section (approximately 25% of the coral reef area) of the western side of the island (Fig. 2). The area of the reserve to 500 m from shore is 37.5 ha. The Apo reserve is a 0.45-km section (approximately 10% of the coral reef area) of

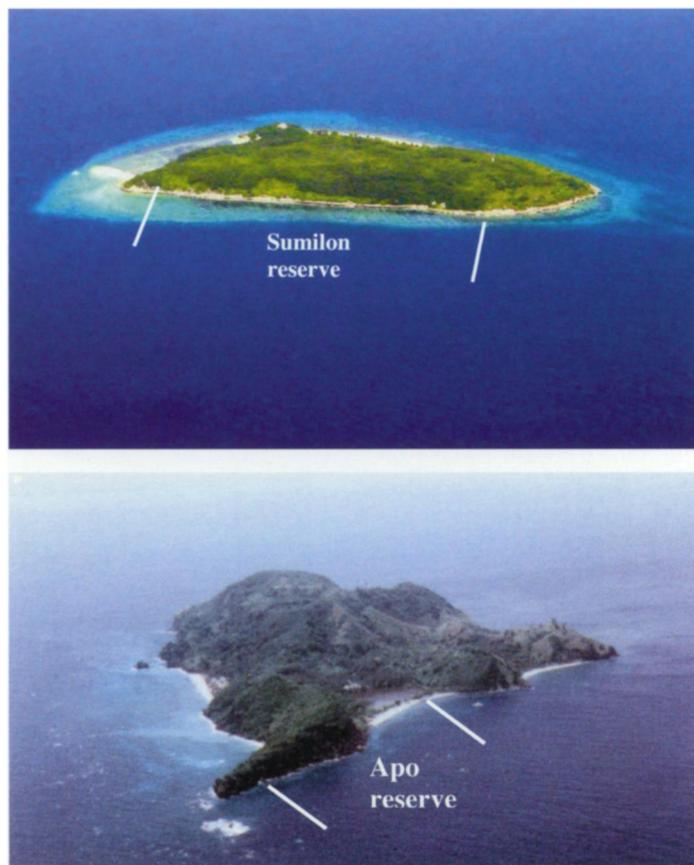


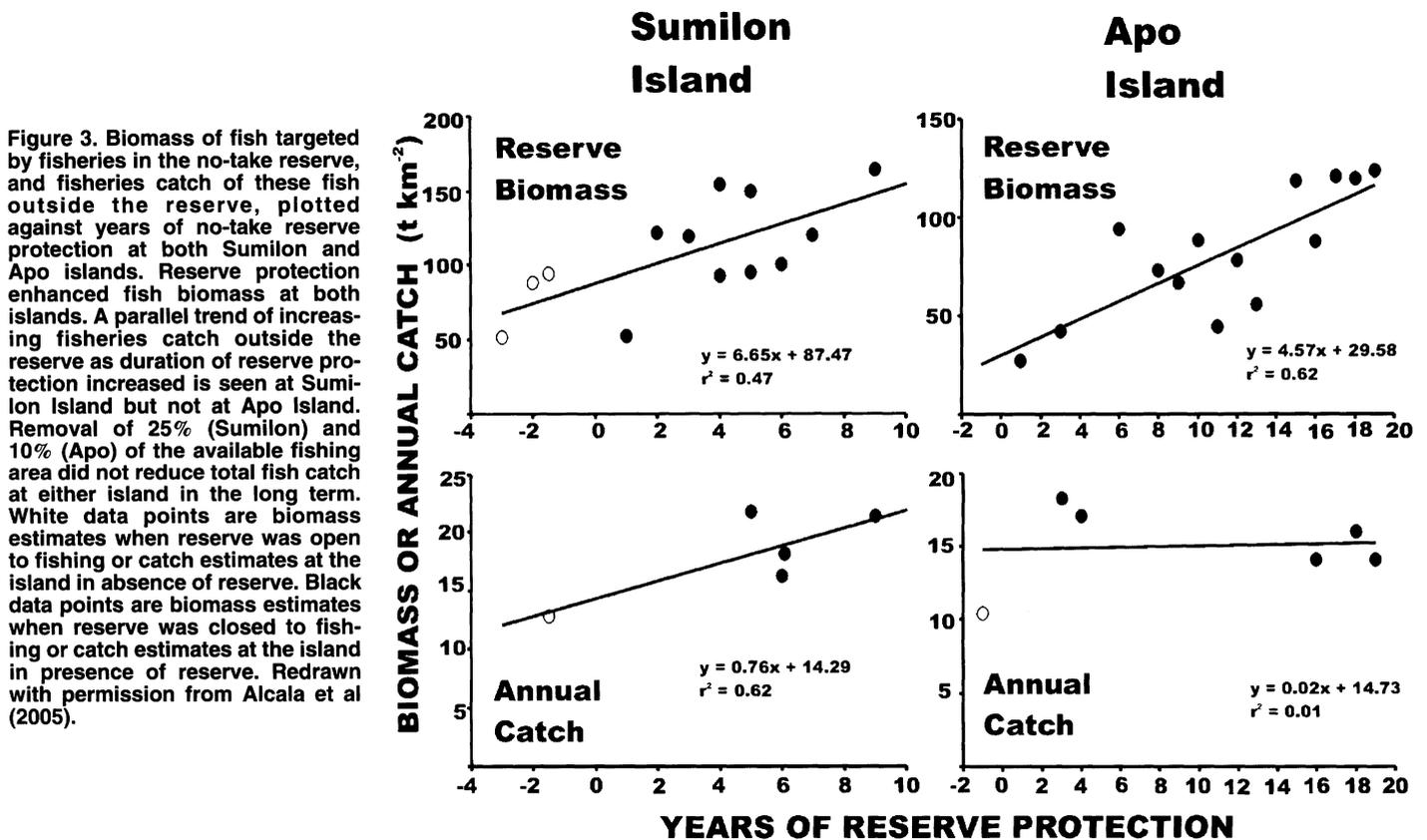
Figure 2. Aerial photographs of Sumilon (top) and Apo (bottom) islands in the southern Philippines. The positions of the no-take marine reserves at each island are shown. The reserve at Sumilon Island extends 750 m along the western side of the island. The reserve at Apo is 450 m long on the southeastern side of the island. Photo: Jasper Maypa.

the southeastern side of the island (Fig. 2). The area of the reserve to 500 m from shore is 22.5 ha.

Detailed management histories up to 1998 of the Sumilon and Apo reserves, and the fished portions of these two islands, are given in Russ and Alcala (13). Both reserves were initially established under municipal government ordinance. Day-to-day



Figure 1. Map shows the location of the first two no-take marine reserves in the southern Philippines at Sumilon and Apo islands. The Sumilon Island reserve was established in 1974, and the Apo Island reserve was established in 1982. Base map from Reefbase World Map.



management was the responsibility of the local communities. However, the Sumilon reserve has had a complex history of management over the period 1974 to 2004 (3, 7, 10–13). In contrast, the no-take status of the Apo reserve has been maintained successfully from 1982 to 2004 because of strong, highly successful support from the organized and empowered local community (3, 7, 10–13). Management histories of both reserves are outlined below.

Sumilon and Apo No-take Marine Reserves: Templates for an Expanded Program of Marine Conservation and Fisheries Management

We have carried out regular scientific research at Sumilon Island since 1976 and at Apo Island since 1981. This long-term research has provided some of the best evidence available for the utility of no-take marine reserves as marine-conservation and fisheries-management tools. Abundance and diversity of fish, both targeted and not targeted by fisheries, have been monitored regularly inside and outside no-take reserves at each island for the past 21 years (31–35). We have also estimated total annual fishery yields eight times at Sumilon Island between 1976 and 2001 and eight times at Apo Island between 1981 and 2002 (10, 11, 34–38). The following provides a brief summary of the major effects of no-take marine reserves on a range of variates of interest to conservation and fisheries management.

Total Community Biomass, Species Richness, and Trophic Structure of Coral Reef Fish Assemblages. We showed that no-take marine reserve status affected total community biomass and species richness of coral reef fishes significantly at both Sumilon and Apo islands (31). We had access to a series of natural experiments that applied (Sumilon and Apo) and sometimes removed (Sumilon) no-take marine reserve status. These experiments demonstrated that the trophic structure of the reef-fish communities was very resilient, except when destructive fishing practices such as explosives and drive-net fishing were used. Such findings suggest a clear role for no-take reserves in biodiversity conservation.

The Biomass of Fish Targeted by Fisheries. Biomass of target fish increased inside the no-take reserves 3.1-fold over 9 years of no-take protection at Sumilon Island and 4.6-fold over 18 years of no-take protection at Apo Island (35) (Fig. 3). Biomass of these fish did not increase outside either reserve (but see *Spillover* below). Biomass of large predatory fish, highly favored targets of reef fisheries, increased almost 12-fold over 9 years of no-take protection at Sumilon Island and 17.3-fold over 18 years of no-take protection at Apo Island (32). Recent research at 15 small, no-take reserves (39) has shown that the positive long-term effects of no-take reserve protection at Sumilon and Apo islands on biomass of fish targeted by fisheries are likely to develop at many other reserves in the southern Philippines. These results demonstrate that no-take

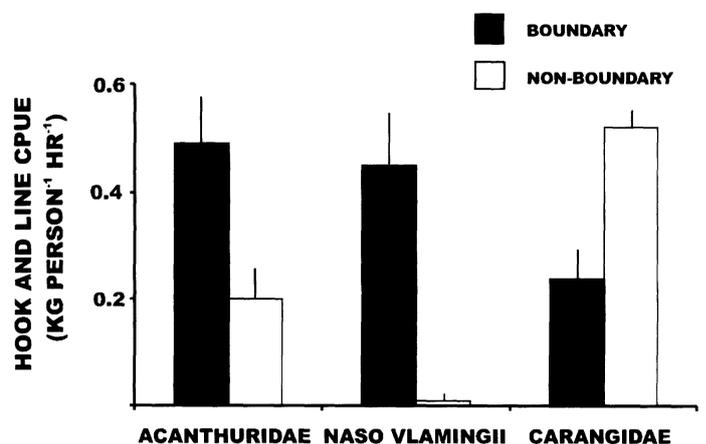


Figure 4. Hook-and-line catch per unit effort (CPUE) within 200 m either side of the Apo no-take marine reserve (black columns = boundary) and in all other fishing grounds around the island (white columns = nonboundary) in 2000 and 2001. The three target groups are Acanthuridae (surgeonfish), *Naso vlamingii* (a large, planktivorous surgeonfish), and Carangidae (jacks). CPUE of surgeonfish, but not jacks, was much higher near the reserve boundary after almost 20 years of reserve protection. Surgeonfish and jacks comprise 40% to 75% of the total fisheries yield at Apo Island. Redrawn with permission from Russ et al (2004) and Russ et al (2003).

reserves not only have a future but also have a significant role to play in sustaining biodiversity and fisheries on coral reefs in poor tropical countries (40).

Duration of Protection Required for Full Recovery of Fish Biomass. One aspect of particular importance in these results from long-term monitoring is that the duration required for full recovery inside reserves may be considerable, probably on the scale of decades, depending on the life-history characteristics of the species (33). Such results contrast with those of a recent meta-analysis that suggests most of the recovery process in marine reserves may occur early (the first 1 to 3 years) in the life of reserves (41). They also emphasize the importance of community-based management systems. Such systems have good continuity over human generations and provide a distinct advantage over other governance regimes, which are characterized by frequent changes of personnel. For example, national elections in the Philippines are held every 3 years.

Spillover. Spillover is the net export of adult-fish biomass from marine reserves to adjacent fished areas (42). Large predatory fish, as well as surgeonfish and jacks, increased substantially (by factors of 17 and 3, respectively) inside the Apo reserve over 18 years of protection. Surgeonfish and jacks account for 40% to 75% of the fisheries yield at Apo Island (34, 37). Outside the reserve, biomass of these fish increased significantly closer to (200–250 m) than further away from (250–500 m) the reserve boundary over time (34, 43). Furthermore, hook-and-line catch rates (catch per unit effort, or CPUE) of surgeonfish were significantly higher closer to (within 200 m) than further away from the reserve boundary (34) (Fig. 4). In contrast, CPUE of Carangidae (jacks) was significantly higher away from the reserve (Fig. 4), which possibly reflected a local oceanographic effect and the traditional fishing practices of the fishers.

Hook-and-line catch records for the surgeonfish *Naso vlamingii* in 2000 and 2001 indicated that 63% of these fish were caught within 200 m of either side of the reserve, in just 11% of the reef-fishing area (44) (Fig. 4). Abesamis and Russ (45) have shown that aggressive interactions among adult *N. vlamingii* in 2004 were 3.7 times as frequent inside than outside the reserve, which suggests that density-dependent interactions were more intense inside the reserve. Furthermore, the mean size of adult *N. vlamingii* captured by experimental fishing decreased as one moved further away from the reserve boundary, an observation consistent with density-dependent spillover of this species from the reserve. Another potential indication of spillover was a decreased gradient of abundance of targeted fish as one moved away from the reserve boundary. Such a gradient has recently been quantified on the northern boundary of the Apo reserve (46).

This evidence, accumulated at Apo Island for more than 2 decades, is some of the best that indicates reserves can display spillover. We have argued for some time that such effects, even if they are small, are critical in helping to gain support for no-take reserves from local fishing communities because spillover can be detected by these communities (43). The critical question then becomes whether spillover can potentially influence local-fishery yields.

Local-Fishery Yields. At Sumilon Island, positive correlations occurred between years of reserve protection and both targeted-fish biomass in the reserve and catch outside the reserve, although the latter relation was not statistically significant (35) (Fig. 3). A strong positive relation was seen between years of reserve protection and targeted-fish biomass in the reserve but not between years of reserve protection and catch outside the reserve (35) (Fig. 3). These results, in combination with the evidence for spillover presented above, suggest that marine reserves may help to maintain or even

enhance long-term local-fishery yields. An unequivocal result from these studies is that the removal of 25% (Sumilon) and 10% (Apo) of the available fishing area did not reduce long-term total-fish yield at either island (35).

The maximum potential supplement to the fishery at Apo Island by spillover from the reserve has been estimated (38). Spatial patterns of fishing effort, catch, and CPUE of the fishery were quantified. Abesamis, Alcala, and Russ (38) concluded that the yield taken from fishing grounds close to the reserve comprised only 10% of the overall fishery yield at the island. The actual yield from spillover was probably much less than 10%. Thus, any supplement to the fishery from spillover was likely very limited. Nevertheless, such supplements are visible to the local fishers. In fact, both CPUE and income per unit effort (IPUE) were generally higher on the fishing grounds near the reserve. Such effects likely lead to the considerable psychological impact of enhancing support for reserves within the local fishing community. At the Apo Island reserve, a strong tendency to fish near the boundary of the reserve (“fishing the line”) has not developed. Possible reasons for low fishing effort near the reserve boundary include the traditional importance of other fishing grounds, weather patterns at the island, high variability of catch rates, and the often lower value of targeted species caught near the reserve, along with the desire of local fishers to avoid being accused of poaching when fishing near the reserve boundary (38).

Russ et al. (34) reported on the long-term (1980–2001) potential fishery effects of the no-take reserve and a 1986 marine-management plan at Apo Island. Effects included slightly higher catch of surgeonfish and jacks, increased hook-and-line catch rate, and a reduction in hook-and-line fishing effort.

Beyond potential fishery benefits, the reserve has played a critical role in enhancing tourism activities on the island. Tourism has been estimated to earn US\$100,000 annually for the community on Apo Island, with an additional US\$35,000 annual income in diver’s fees (3). This income from tourism has had a tremendous positive effect on the standard of living of the local community. These indirect effects of reserve establishment in the developing world are arguably as important as the direct fishery benefits of reserves.

The Role of Primary Stakeholders in the Establishment and Management of No-take Marine Reserves. The primary stakeholders are the local fisher communities and local governmental units. As indicated above, the Sumilon Island reserve has had a complex history of management over the period 1974 to 2004. During 1973, biologists and social scientists from Silliman University set up a marine-conservation and education program at the community level in the small towns of Oslob and Santander on the island of Cebu near Sumilon Island (10–13, 15). The initial approach involved social preparation, community organization, environmental education, and community empowerment (15). Initially, the university staff spent substantial time talking to the local community about basic marine ecological concepts and about managing their marine resources. The concept of a marine reserve evolved from this program. The scientists also discussed the potential benefits of increased fish yields in areas adjacent to the reserve (10–13).

In December 1974, the Oslob Municipal Council passed a resolution (a local government ordinance) that established the Sumilon Island reserve. This resolution formalized an agreement between Silliman University and the Oslob Municipal Council. Full no-take (1974–1984, 1987–1991) and partial no-take (no fishing, except hook-and-line; 1995–2004) status were applied at Sumilon Island, under municipal law, in the hope of maintaining local fisheries and enhancing tourism at the island.



Figure 5. Map shows the location of 60 no-take marine reserves in the southern Philippines as of 2004. The Sumilon (number 1 on map) and Apo (number 6 on map) reserves served as templates for a substantial expansion of the no-take reserve approach to marine conservation and fisheries management in the Philippines. Base map from Reefbase World Map.

The establishment of the Sumilon Island no-take reserve predates the 1975 Great Barrier Reef Marine Park Act in Australia (3). No-take status at Sumilon Island was maintained over the period 1974 to 1984 under an agreement between the local municipal government, led by a conservation-minded mayor, and Silliman University. No-take status was removed when a new mayor was elected who did not support the reserve concept (1984–1985) (13). No-take status was also absent during a period when local mayors failed to communicate reserve objectives to fishers clearly (1992–1994) (13). Partial protection (all fishing techniques banned, except hook and line) of the reserve was reapplied from 1995 to 2004 (13).

In 1976, Silliman University initiated a marine-conservation and education program at Apo Island (11–13). The idea of a no-take “marine sanctuary” evolved in the course of this program. In 1982, an agreement was endorsed between Dauin Municipality and Silliman University to implement the sanctuary. A marine-management plan, part of which established the sanctuary, was set up under a local-government (municipality) legislation in 1986 (3–4, 11–13, 15). The Apo Island marine reserve was one of the first community-based marine reserves established in the country. The local fishers and the local governmental units (village and town) on Apo Island were informed through a series of programs that provided education on marine science and conservation. These programs helped to foster a desire within the communities on Apo Island to protect and manage their marine resources in the late 1970s and early 1980s (3). The Apo Island reserve is now a classic example of a highly successful, community-based coral reef fishery and marine-biodiversity conservation project (3, 4, 7, 13, 15). It

operates under the policy and legal framework of the Local Government Code (LGC) of 1991 and the Fisheries Code (FC) of 1998 (3, 7). It has also been placed into the national legal framework of the National Integrated Protected Area System (NIPAS) (3, 7). The success of the no-take reserve and marine-management plan is the result of the collaborative partnership among an organized fisher community, local governmental units, and a nongovernment organization (Silliman University) that serves primarily as technical and social facilitator-adviser (3, 4, 7, 13, 15).

Clearly, the local-stakeholder engagement in the process of establishment and management has not been as successful at Sumilon Island as at Apo Island. The greater success of management at Apo Island was the result of community support for the reserve concept being actively maintained for the past 22 years. Nevertheless, both case histories have had a profound effect on marine-resource management in the Philippines.

Sumilon and Apo Reserves: Templates for an Expanded Program of Conservation and Fisheries Management

The Sumilon and Apo no-take marine reserves, and the local legal framework under which they operate, have served as influential templates for the establishment of other no-take reserves in the Philippines. In the period from 1999 to 2003 alone, we successfully established 10 new MPAs in the southern Philippines, with a total coral reef area of 3000 ha of reserves (no-take areas) and nonreserves (adjacent fished areas). Local community organizations (people’s organizations) and local



Photo 1. Selling T-shirts at Apo Island. The Apo no-take reserve has generated considerable income from tourism for the local community. Photo: J. Maypa. Photo 2. A large group of tropical snappers (family Lutjanidae) in a Philippines no-take marine reserve. Photo: B. Stockwell. Photo 3. Weaving baskets for sale at Selinog Island. Many of the marine-conservation and fisheries-management programs at the community and local government level now include generation of alternative livelihoods. Photo: J. Maypa. Photo 4. A meeting of the local community with a social worker at Mantigue Island (off Camiguin Island), southern Philippines. Photo: J. Maypa.

governmental units jointly manage these reserves. In most cases, the success of the marine-management program at Apo Island was reported to other local communities and local governmental units directly by members of the Apo Island Marine Management Committee. This communication was achieved either when the Apo Island residents visited other communities or when members of other communities visited Apo Island.

A notable example of the pivotal role the experiences of the Apo Islanders have played in convincing other local fishing communities of the efficacy of no-take reserves is that of Selinog Island near Dapitan City, Mindanao. A no-take reserve was established successfully there in 2000 (3, 47). The process of establishing this reserve took just over 1 year compared with 2 to 4 years to convince local fishing communities on Sumilon and Apo islands to accept the reserve concept (3, 47). A key factor in speeding up the process was a visit to Apo Island by representatives of the people's organizations of Selinog (3). Another key factor was the placement of trained community organizers into the local community at Selinog to facilitate the processes of social preparation, community organization, environmental education, and community empowerment (47). Our work at Selinog also introduced alternative-livelihood programs (e.g., salt making and basket weaving) and family planning programs (47). Selinog represents an example of what can be achieved in marine conservation when the emphasis is on mobilization of the capabilities of the community (3). The people quickly realize that they have the power to make changes.

Currently, at least 60 no-take marine reserves exist in the 29,000-km² Bohol Sea area of the southern Philippines alone (Fig. 5), mostly established and maintained by local communities. An association of MPA managers in the Bohol Sea area has been established recently (30). An even more extensive network of MPA managers has been established across 11 Philippine provinces by application of the MPA management-rating system (17). This system currently links managers of over 170 no-take reserves. The majority of these reserves derive from the Sumilon Island and Apo Island community-based management models.

However, the Sumilon Island and Apo Island case histories have had a much wider impact than simply being the first of a network of hundreds of new no-take reserves across the country. The case histories had substantial influence in the formulation of the LGC of 1991. This law gave joint jurisdiction to Philippine coastal municipalities and the national government to manage the exploitation of marine resources out to 15 km from the coast. The specific fishery aspects of the LGC of 1991 were strengthened and clarified with the passing of the FC of 1998. These legislations meant that every coastal municipality in the Philippines now had a say in how their marine resources were managed.

We note two ironies about the influence of the Sumilon Island and Apo Island histories on national marine-resource policy in the Philippines. First, in 1980, the national government unsuccessfully tried to override the original 1974 municipal ordinance that established the Sumilon Island reserve. The national government passed the Bureau of Fisheries and Aquatic Resources Administrative Order No. 128 of 1980, which imposed national control over the Sumilon Island reserve. The lack of long-term success of this national control over a small municipal reserve served to highlight the need for local (municipal and community) control. This case, therefore, had considerable influence in the formulation of the LGC in 1991 (3). Thus, in a strange twist of fate, the Sumilon Island case history helped convince legislators that municipal (local government) control of marine resources was a more workable solution than attempts at centralized control.

Second, the Apo Island reserve, arguably the world's most successful community-based marine-management program, faced a considerable challenge when, in 1994, it was placed back under national government control (3, 7, 13). On 9 August 1994, the whole of Apo Island was declared a protected landscape and seascape by Presidential Proclamation No. 438 under the NAPIS legislation (RA 7586 of 1 June 1992). This law was implemented by the (national) Department of Environment and Natural Resources (DENR), via Administrative Order 25, Series of 1992. Protected landscapes and seascapes are managed by a protected area management board (PAMB). This board consisted of various national, provincial, local, and barangay (village) government representatives, plus representatives from

nongovernment organizations (NGOs) and community and people's organizations (3). The irony here is that most successful community-managed, no-take marine reserve became so successful that it was put back under national government control. Although this national government takeover initially caused some concern within the Apo Island community, so far the PAMB has been wise enough to recognize and generally maintain role of the local community in the management process. In a replay of the Apo Island story, the local governments of barangay Selinog and Dapitan City approved resolutions to set up the Selinog no-take reserve via an ordinance under the LGC. Just before this ordinance was passed, the president of the Philippines proclaimed Selinog Island as a protected landscape and seascape under the National Integrated Protected Areas System legislation in 2000 (3, 47).

Pajaro et al. (22), in 1999, listed 439 no-take reserves that covered a total area of approximately 50 km². Recently, White et al. (17) indicated that more than 600 MPAs now exist in the Philippines. The majority (91%) of these reserves are comanaged by local governmental units and fisher communities, and most of these comanaged reserves have a no-take component (a reserve or sanctuary) (17). Like the Apo Island and Sumilon Island reserves, these no-take reserves operate under the policy and legal framework of the LGC of 1991 and the FC of 1998. The other 9% of MPAs consist of the nationally protected network established under NIPAS in 1992 (17).

Numerically, the vast majority of MPAs in the Philippines include a no-take component (91%). For 44.2% of these MPAs, management success is good or better (17). On an area basis, NIPAS protects about 12 000 km² of MPAs, but much of this area is not no-take reserves. The approximate area of no-take reserves in the country established by local governmental units and NIPAS that is effectively protected is about 500 km² (7). A management-rating system has recently been established to determine the success of management of MPAs in the Philippines (7, 17).

Levels of Acceptance by Filipinos of Marine Reserves and the New Policy Framework

A considerable amount of evidence indicates that Filipinos have a high level of satisfaction with the use of no-take marine reserves as fisheries-management tools and with the new policy framework of the LGC and the FC. Much of this evidence comes from surveys of the people themselves and of the levels of implementation of reserves under this legislation across the country. Fishers at Apo Island were asked, in formal surveys in 1986, 1992, and 2000, whether their fish catch had changed since the establishment of the no-take marine reserve. A very high percentage (67%–100%) of fishers believed that fish catch at Apo Island had increased since the reserve was implemented (29, 34). Surveys of the effectiveness of management of 47 no-take reserves in the Bohol Sea (Fig. 5) indicate that 72% (34 of 47) (Alcala, unpublished data) are effectively protected by local communities, which indicates strong acceptance of reserves in the southern Philippines. White et al. (17) used a reserve-management rating system to assess the performance of management of 156 MPAs across 11 provinces of the Philippines. Most of these no-take areas were implemented under the LCC (1991) and the FC (1998). They reported that 44.2% had good, very good, or excellent management. This finding again indicates a growing acceptance of no-take reserves and the legislations (LGC and FC) under which they were established. We note that the level of acceptance of no-take reserves, as judged by the success of implementation and management, appears to be higher in the southern Philippines

(72%) than across a wider area of the country (44.2%). Thus, levels of acceptance and satisfaction are higher where the original studies of Sumilon and Apo islands were made. White et al. (17) also report that of more than 600 MPAs in the Philippines, 91% have been established under local ordinances. This finding provides strong evidence of acceptance by the people of no-take reserves set up under the LGC and the FC.

DISCUSSION

Our aim in this paper was to document the pioneering, pivotal role played by the Sumilon Island and Apo Island no-take marine reserves in influencing change in the framework of management of marine resources in the Philippines. Specifically, the transition from centralized, nonparticipatory management structures to management structures that begin with local participation and input and eventually end in empowerment of local communities on the coasts. This journey raises some general points, many worthy of discussion for their ironies and poignancy.

The work that began with social preparation, community organization, environmental education, and capacity building at Sumilon and Apo islands in the 1970s (3, 7, 10–12) has acted as a major impetus for larger, more holistic and coordinated programs (many reviewed in references in Table 1). These new programs often come under the banners of community-based coastal-resource management (CBCRM) (6, 21) and, more recently, integrated coastal management (ICM) (7, 23). Many people have recognized that protection of small pockets of biodiversity and portions of exploited fish stocks in small, community-managed, no-take reserves will not be enough on its own to ensure maintenance of biodiversity and to sustain fisheries nationally in the Philippines (4, 6, 14, 15). The CBCRM and ICM programs, correctly, aim to manage use of coastal marine resources more holistically, by identification of all aspects of resource use and the impacts of these resources and by putting into place mechanisms both inside and outside no-take reserves to ensure sustainable use of marine resources. A major challenge is that most local governmental units that share management responsibility with the national government generally lack the personnel, skills, and money to implement local management programs. Most of the ICM programs stress the need for integration of efforts at the local level, networking, institution building, and sharing of information (7, 23).

A major lesson from 30 years of establishing no-take marine reserves in the Philippines is that one must initially devolve decision-making power down, and then spend enormous amounts of effort, time, and money in large-scale ICM programs that integrate up again. The first step is to devolve decision-making power from centralized government control to local control. This step is essential to permit adequate participation and empowerment of coastal communities, but its implementation creates a major challenge for tackling problems on a national scale, where ICM argues that they must be tackled. This challenge is integration and coordination of the actions of large numbers of local governmental units (e.g., 832 coastal municipalities that border 18 000 km of the Philippine coastline). Coastal communities must participate in coastal management at the local level if management is to be successful. The need for this participation is now accepted as necessary by development agencies such as the World Bank. Yet the problems are national.

Statements within ICM frameworks to the effect that we must reduce fishing pressure to sustainable levels lack gravity in the absence of specific new mechanisms by which such reductions will be achieved. Thus, another general irony to us

in the CBCRM and ICM approaches is that, although a substantial literature is available on these topics that deals specifically with the Philippines (Table 1), it is remarkably deficient in suggestions for specific new mechanisms to alleviate problems of management of coastal resources. Most of the specific mechanisms on which ICM will operate have been suggested many times before (3). For example, in reef fisheries management, these mechanisms include banning destructive fishing techniques, no-take reserves, fisheries-monitoring programs, protection of critical habitats, marine tenure to local communities, alternative livelihoods, and family planning. One notable exception to the dearth of new ideas is the suggestion by Christie, White, and Deguit (14) for fishing-effort reduction by the introduction of fishing licences at the municipal (local government) level. Such an introduction would then open the way for licence limitations and reductions (14). However, the concept of fishing licences is very foreign to subsistence fishers. We suggest that the real-world challenges of implementing licences for municipal fishers, let alone licence reduction, will be considerable.

Another general issue is the critical need to consider social and political contexts during all phases of implementation of MPAs, including no-take reserves. Although this issue has been recognized for a long time (11, 12, 18, 48, 49), it has received particular emphasis recently (16, 50–52). Christie et al. (16) stress the need for a social science agenda for MPAs. They point to the fact that social science research is often conducted too late in the design process to influence policies, even though the need for such an approach is clear. We agree, and note that social scientists were used to facilitate social preparation and community organization as the initial phases of implementation of the Sumilon reserve in 1973 (10, 11) and the Apo reserve as early as 1976 (11–13). These efforts are probably some of the first examples of the use of social scientists in the process of implementing marine reserves in the world. We also agree with the suggestion (4, 14, 16) that more emphasis on social preparation and community organization in the implementation of no-take reserves, the starting point for the Sumilon and Apo stories, is required in the large number of programs that are establishing such reserves in the Philippines now (Table 1). In the establishment of the Selinog no-take reserve, for example, one of the first steps in the process was placement into the community of trained community facilitators to begin the process of social preparation and community organization (47).

The partial devolution of responsibility for management of marine resources from a centralized, national government bureaucracy to local governments and communities in the Philippines is clearly a major shift in policy. A similar major policy shift has occurred in Chile in recent decades, driven by the early success of small-scale, no-take marine reserves (53, 54). These changes in policy also parallel a revival of community-based resource management in many Pacific island nations, with traditional marine-tenure systems receiving increased legal recognition (55). The devolution of the responsibility for management of marine resources to the people who depend upon those resources represents, in a very real sense, a “people power revolution” in the Philippines. Our use of the term “people power revolution” in the Philippine context has a poignant applicability. It was the Philippines, ousting an unpopular leader by a largely peaceful uprising of the people in 1986, that gave the world one of its most memorable applications of the expression in modern times. An added poignancy was that this ousted leader was the one, under martial law, who championed centralized “use orientation” so effectively.

CONCLUSIONS

The successful marine-conservation and reef fisheries-management program that exists today in the Philippines had very humble beginnings in the 1970s at Sumilon and Apo islands. The long-term vision was simple but challenging. The vision was to set up marine-conservation and education programs at the community level. To empower the local fishing communities by giving them some say in how the marine resources on their doorsteps could and should be managed. An important part of this process was establishment of no-take marine reserves. The challenge was considerable. In the early 1970s, destructive fishing practices, often organized by large commercial fishing companies, were rampant, and management of reef fisheries was virtually nonexistent.

The examples of Sumilon and Apo islands served as highly influential templates for expansion of marine-conservation and reef fisheries-management programs in the Philippines. They were influential largely because they produced convincing scientific, social, and economic examples of what could be achieved by local fishing communities. They have contributed to a “sea change” in policy on how exploitation of marine resources in the Philippines is managed. Responsibility for management was shifted from a centralized bureaucracy to comanagement among local communities, local governments, and the national government. Responsibility for management of marine resources was devolved to the people who depended upon those resources the most. Giving power back to the local fishers at Sumilon and Apo islands eventually gave it back to all coastal fishing communities in the Philippines.

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