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Marine Protected Area Management Effectiveness: Progress and Lessons in the Philippines

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Quantifying progress in management of marine protected areas (MPAs) is crucial to marine conservation and fisheries management in the Philippines. This study compiles data on the status, occurrence, and management gaps of MPAs through coordination with multiple organizations supporting and guiding MPAs in the Philippines. MPA management effectiveness was measured using a MPA Rating System. Since 2002 the modal MPA rating levels increased from level 1 (initiated) to level 4 (sustained) in 2008/9. This upward trend is attributed to factors that promoted both the establishment and improved management of MPAs. Analysis indicated that: (1) most MPAs struggle with budgetary constraints or lack of sustainable financing and (2) overall the MPAs are being maintained and progressing with notable improvement in management despite a

The Marine Protected Coast, Reef and Management Database (MPA Database) initiated by CCE Foundation for monitoring and evaluation of MPAs was supported by the Pew Fellows Program. In 2008, the National Geographic Society funded the updating of the database through populating the database with levels of MPA effectiveness and geographical coordinates to determine the extent of MPAs in the country. The David and Lucille Packard Foundation supported of the Local Governance for Coastal Management Project (2002–2010) and USAID Philippines supported the CRMP (1996–2004). A key partner has been the University of the Philippines Marine Science Institute and the MPA Support Network for the Philippines. The Nature Conservancy with support from the Coral Triangle Support Partnership of USAID has provided support. We thank all other partners and collaborators from nongovernment organizations, academe, and local government bodies who contributed and shared their data. These include: LUZON: MPA Support Network, ENRO Office, Aurora Province, Dinalungan, Dipaculao, Dinalungan and San Luis, Albay, Malinao, Tabaco City, Tiwi and Bacacay, Albay, Provincial Agriculture Office, Oriental Mindoro; VISAYAS: Southern Leyte Province, GTZ, Tabogon, Liloan, Barili, Madridejos, Bantayan, Medellin, Sta. Fe, Cebu, Siquijor, SE Cebu and SW Cebu and San Remegio, Tuburan, Tabuelan (CCE Foundation Project sites), Project Seahorse, PADAYON – Bohol Marine Triangle Management Council (PADAYON- BMT), Bohol Environment Management Office (BEMO), Environment and Natural Resources Division (ENRD), Negros Oriental Province, DENR – Sagay; MINDANAO: Xavier University, Naawan University, Kulabugan, Dumalinao and Pagadian City, Zamboanga Sur, Dapitan City, Zamboanga del Norte, Save Nature Society, Sinacaban, Clarin and Plaridel, Misamis Occidental, CRMP of Camiguin-Mambaj

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range of difficulties encountered during the implementation process. For MPAs in the Visayan Region for which biophysical data were available, the MPA Rating System was used to assess the effectiveness of local government capacity building on MPA coral reef health. Our results suggest that MPAs with higher ratings are likely to have better reef health conditions.

Keywords effectiveness, marine protected area, MPA evaluation, resource management

Introduction

The Philippines is a global priority for marine conservation being located in the area of highest marine diversity as part of the Coral Triangle region (Roberts et al. 2002, Carpenter and Springer 2005). Thus, conservation of Philippine marine resources is critical to the maintenance of global marine diversity as well as maintaining the numerous benefits to coastal communities through fisheries and tourism among others (Lowry, White, and Christie 2009). The Philippines has provided leadership in the Coral Triangle region on how to set up and manage effective marine protected areas (MPAs) both through localized and national systems (White, Aliño, and Menesses 2006). Its experience thus offers relevant lessons to other tropical developing countries and areas.

MPAs are popular tools used to address habitat degradation and declining fish stocks in the Philippines and elsewhere in the Coral Triangle (Russ 2002; Arceo, Aliño, and Gonzales 2008; TNC et al. 2008). To date, there are over 1000 MPAs established in the Philippines (PhilReefs 2008) with several well-reported community-based management successes (Alcala 1998; Pollnac, Crawford, and Gorospe 2001; Christie and White 2007) known for their effectiveness related to fisheries (Russ, Alcala, and Maypa 2003; Russ et al. 2004; Abesamis, Alcala, and Russ 2006). At the same time, there is a concern that the majority of the existing MPAs are not being managed or administered effectively (Christie, White, and Deguit 2002; White, Aliño, and Menesses 2006) and are generally not achieving the objectives of marine biodiversity conservation (Weeks et al. 2009), fisheries enhancement or other objectives (Maliao et al. 2009).

A few studies have examined factors associated with MPA effectiveness and success in the Coral Triangle (Philippines and Indonesia primarily), and more broadly through the work of Pomeroy, Parks, and Watson (2004) and the World Bank (Staub and Hatzioiols 2004). Management factors associated with improved fish density and biomass following establishment in the Philippines have been shown (Maliao et al. 2009) to be size and age of the MPA and particularly the level of enforcement of the regulatory mechanisms necessary for the MPA. Such regulations usually involve stopping fishing in at least a portion of the MPA and reducing or modifying fishing effort in either part of the MPA or immediately outside the MPA. It has also been concluded by Lowry, White, and Christie (2009) that common institutional processes and legal support, improved understanding of benefits from a network of MPAs can contribute to improved habitat conditions and fishery yields associated with MPAs. Such results are in turn associated with management success. MPAs implemented within the context of an integrated coastal management (ICM) regime with strong support from the local government have also been shown to be generally more effective (Balgos 2005; White, Aliño, and Menesses 2006; Aliño 2008; Eisma-Osorio et al. 2009).

Estimates of management effectiveness for Philippine MPAs in relation to their objectives of protecting coral reefs and associated ecosystems and enhancing fish biomass and other ecological parameters of these systems have been estimated at various times by different researchers who have generally indicated a relatively low level of effectiveness.

Kelleher, Bleakley, and Wells (1995) estimated that MPA effectiveness to be 10–15% from a sample of approximately 100 MPAs. Then Arceo, Aliño, and Gonzales (2008) suggested an improvement to 20–30% effective. This is concordant with the assessment of Alcalá, Bucol, and Nillos-Kleiven (2008) estimating 30% of the MPAs in the Visayas and Mindanao being effective.

Quantifying MPA management effectiveness as defined by Pomeroy, Parks, and Watson (2004) in the Philippines, and defining what that means in the eyes of MPA managers and stakeholders is crucial information to assist managers and planners to help MPAs meet their goals as numbers of MPAs increase. As new MPAs are established and implemented through local governments (Aliño et al. 2002; PhilReefs 2008; Weeks et al. 2009), it is important to determine the management and information gaps and to reverse the trends of inappropriate and weak implementation. Thus, this study used an existing MPA management effectiveness evaluation system (see Methods) to determine the overall status of MPAs, to what extent their management is improving and to isolate key factors that affect the success or failure of MPAs in the country.

Methods

Background

Several methods have emerged to measure MPA effectiveness and are being developed globally, with some for local use (e.g., Pomeroy, Parks, and Watson 2004; Carter, Soemodino, and White 2010; Staub and Hatzios 2004). In the Philippines, there has been a need to standardize and fine tune existing MPA evaluation measures to a more comprehensive, community friendly and culturally sensitive assessment system. Since 2001, the MPA Rating System¹ (White, Aliño, and Meneses 2006) developed by the Coastal Conservation and Education Foundation, Inc. (CCE Foundation) working with key organizational partners, has become a popular management effectiveness tool nationwide. It is an evaluation tool for MPA managers that helps assess the progress of a MPA over time in five levels (White, Aliño, and Meneses 2006) (Table 1) and includes a set of MPA management activities or criteria that serve as a checklist of past, present, and future projects for the enhancement of the MPA management. The MPA rating tool was first disseminated in coordination with the collaborators of CCE Foundation's MPA Project in 2003 and has since been adopted by members of the MPA Support Network (MSN) and the League of Municipalities of the Philippines (LMP).²

Using the 2008 version of the MPA Rating System which is a point achievement system (Table 1) similar to the World Bank scorecard approach (Staub and Hatzios 2004), we measured progress toward management effectiveness in Philippine MPAs by assessing MPA levels as determined by applying a checklist of actions or prerequisites for MPA management enhancement (White, Aliño, and Meneses 2006). We also identified management gaps and priorities in meeting goals. Finally, a subset of comprehensive biophysical data for MPAs in the Visayan region (not available nationally) was analyzed in relation to the MPA Rating System to measure impacts of local government capacity-building efforts (or governance) on MPA coral reef health. This additional analysis constitutes a "case study" for the Central Visayas, an area that has benefitted from the operation of several coastal resource management projects that has increased the capacity of municipal governments in the area to support MPAs and fisheries management (Eisma-Osorio et al. 2009; Bendijo

Table 1

MPA rating levels with the corresponding criterion and points used to establish rating levels from the complete rating guide (White, Aliño, and Menesses 2006)

Rating	Phase	Management performance	Description
Level 1	Initiated	Passing	MPA establishment activities are in progress (6 pts, 1 year since establishment)
Level 2	Established	Fair	MPA is legalized and management activities have started. (16 pts., 1–2 years since establishment)
Level 3	Enforced	Good	MPA regulations are implemented and management activities are maintained for 2 years or more. (24 pts., only applies for 2 years old and more)
Level 4	Sustained	Very good	MPA is well-enforced over the years; participation and support from the LGU and community is consistent. (30 pts., only applies for 3 years old and more)
Level 5	Institution-alized	Excellent	Management and enforcement is consistently maintained and is assured by additional legal support. (40 pts., applies for 4 years and more)

et al. 2004). The various projects starting in 1996 help explain the preponderance of MPAs in this region of the Philippines.

Data Collection and the MPA Rating Process

Structured and open questionnaires were used to evaluate the rating of 551 MPAs nationwide along with other information such as: MPA name, Province, Municipality, GPS coordinates, priority management concerns, assisting organizations, and other related issues. Secondary information was also gathered from “Philippine Reefs Through Time” (PhilReefs 2008) organized by the MPA Support Network (MSN). MSN and the League of Municipalities of the Philippines also facilitated some data collection.

MPAs were rated by persons directly involved in the management through a structured process whereby a facilitator from CCE Foundation or from another assisting technical organization convened the participants and facilitated the rating process following a set rating questionnaire (MPA rating scale: 1 = initiated, 2 = established, 3 = enforced, 4 = sustained, 5 = institutionalized) (Table 1). Collaborators from the local government, academe, and partner nongovernment organizations (NGOs) assisted in the rating process. A user-friendly guideline was developed on how to rate a MPA using the MPA Rating tool of CCE Foundation as portrayed by White, Aliño, and Menesses (2006).

Data Analyses

The MPA data was analyzed mostly through a process of compilation to determine trends in the status of MPAs nationwide. In addition, a Spearman's Rho correlation was used to test for correlations between the following factors: MPA rating, age, size, region, and priority concerns. Only the topmost priority concerns were included in this analysis and classified into eight categories: (1) lack of budget and/or financial sustainability mechanism, (2) lack of supplemental and alternative livelihood, (3) lack of community awareness and/or support, (4) lack of enforcement equipment or communication facilities, (5) management capacity development, (6) the need for coastal law enforcement training, (7) politics/multiple resource use conflict, and (8) need for strengthening a women's group. However, we resorted to presenting only the percentages of the priority concerns per MPA rating level since the results from Spearman's Rho Correlation yielded no significant values. Originally, a multiple regression test was performed to test the association between age, size, region and priority concerns but no significant association was found ($R^2 = 8.2\%$). Only MPAs with complete data for years 2007 and 2008 were used in this analysis ($n = 335$, 60.8%).

For the case study, MPAs ($n = 56$) and proposed MPAs ($n = 3$) coral reef health (i.e., coral reef target fish densities, fish/1,000 m² and live hard coral cover,%LHC) in the central Visayas was used to assess the management/governance (i.e., MPA rating level) effectiveness. MPA groups were generated using an agglomerative hierarchical analysis and multidimensional scaling ordination (MDS), and clustering was based on Bray-Curtis Similarity. The MPA group attributes (factors) included in the tests were: fish densities,%LHC, MPA age, and MPA size. A SIMPER analysis determined the percentages of similarities and dissimilarities between groups. We used the software PRIMER[®] 2005 (Clarke and Warwick 2001). Percent LHC for each MPA were further classified according to Gomez et al. (1994): Poor = 0–24.9%, Fair = 25–49.9%, Good = 50–74% and Excellent = 75–100% while fish densities were classified using Hilomen, Nañola, Jr., and Dantis (2000): Very poor = 0–201 fish/1,000 m², Poor = 202–676, Moderate = 677–2,267, High = 2,268–7,592 and Very High $\geq 7,592$. Here, we use the fish density categories of Hilomen, Nañola, Jr., and Dantis (2000) for target fish and not to classify total reef fish counts. We also extrapolated our fish densities from a 500 m² sampling area to 1,000 m² in order to use the aforementioned categories.

Table 2 summarizes the number of MPAs by size and legal status that have management ratings utilized for the analysis. Figure 1 shows all the MPAs in the data base that are georeferenced.³ More than half (59.4%, $n = 392$ MPAs) of the number of MPAs that were included in our analyses belong to Region 7, the Central Visayas. This is followed by Region 4 (Southern Luzon) with 9.4%. The rest of the regions have fewer MPAs (0.5–8%). Those regions not represented in our database include Region 2 (Cagayan Valley), the national capital region, Autonomous Region in Muslim Mindanao (ARMM) and the landlocked Cordillera Administrative Region (CAR).

Results

MPA Management Rating Levels and Patterns of Management Concerns

We rated 551 MPAs by 2008 and the overall modal MPA rating levels increased across time along with the number of MPAs with rating. In 2001 to 2002, modal MPA rating were at 1 and increased to levels 2 and 3 by the succeeding years until it reached 4 by 2008. Figure 2 shows the changes in rating levels across years and their location. On a nationwide scale,

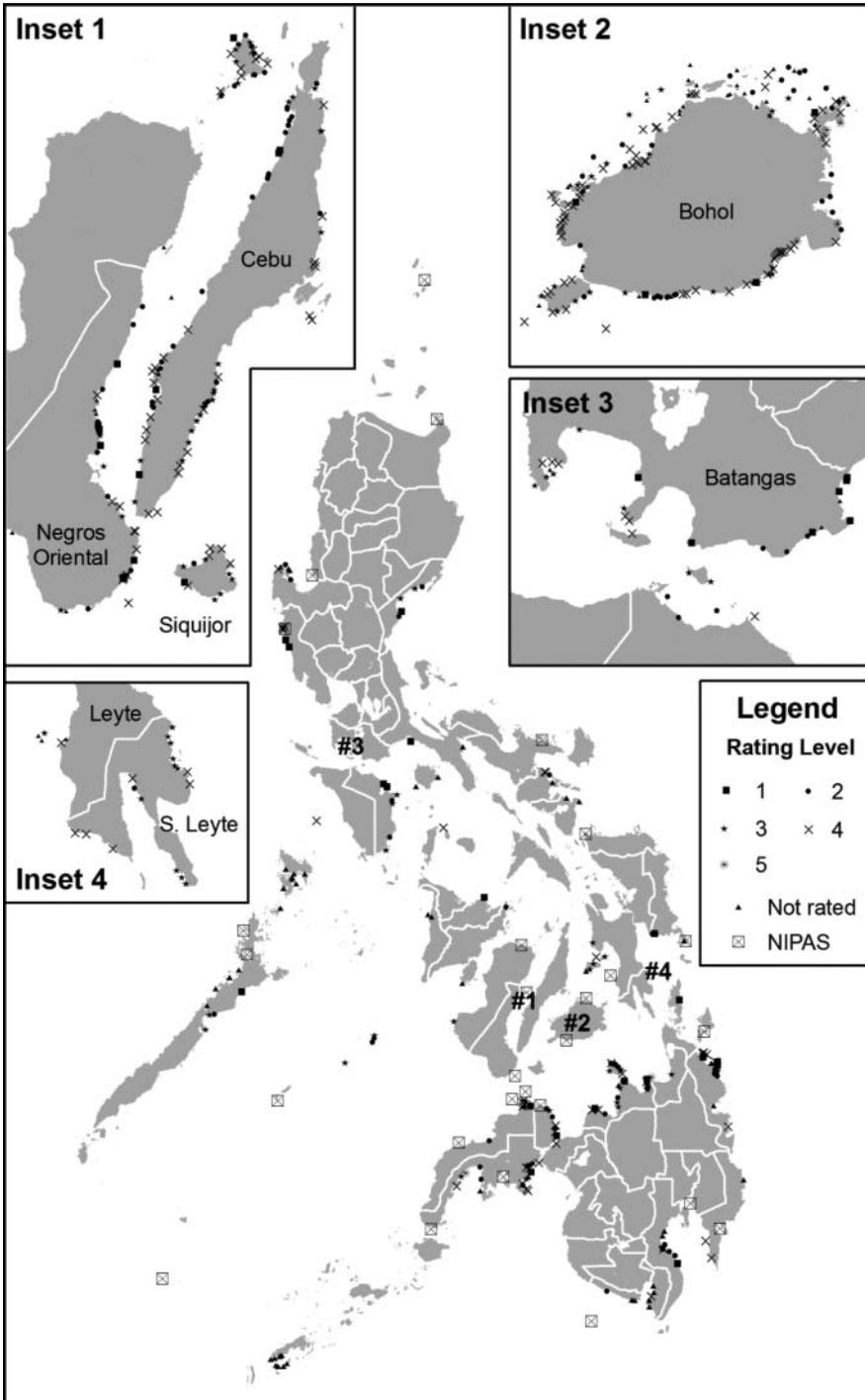


Figure 1. Distribution of locally managed no-take marine protected areas (MPAs) showing a dense area of level 4 ratings in the central Philippines (see insets 1 and 2).

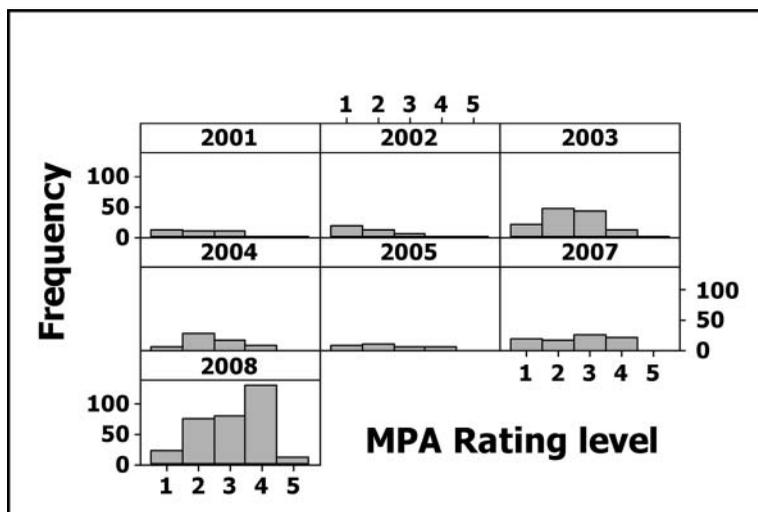


Figure 2. A time series frequency distribution of MPAs based on MPA rating levels showing an increasing trend: 1 = initiated, 2 = established, 3 = enforced, 4 = sustained, 5 = institutionalized. *n* per year: 2001 = 28, 2002 = 33, 2003 = 119, 2004 = 60, 2005 = 45, 2007 = 87, 2008 = 320.

the modal MPA rating is at level 4 (sustained) with a frequency of 149. This is followed by level 3 (enforced) with a frequency of 106. Level 5 MPAs (institutionalized) were found mostly in Region 7 (frequency = 8). Level 1 (initiated) MPAs are recently established MPAs either in year 2007 or 2008, with a frequency of 38 (Figure 2).

Figure 3 shows the patterns of management concerns across MPAs with different rating levels. Generally, the lack of a sustainable financial mechanism and lack of alternative livelihood are concerns at all MPA rating levels. Although the lack of a sustainable financial mechanism is a concern that appears to be highest at level 3 (74%) and lowest at level 5 (44%), statistical comparisons between management concerns within a level was not

Table 2
MPAs in database by size and legal status

Category/size	Total number	Local government declared (LGU)	National integrated protected area (NIPAS)	Total area covered (Ha)
Less than 5 ha	57	57	—	185.5
5 to 10 ha	107	107	—	910.8
10 to 25 ha	146	146	—	2367.5
25 to 100 ha	91	91	—	9597.9
Greater than 100 ha	52	24	28	89,211 (LGU) 1,514,077 (NIPAS)
No data	(11)	0	—	—
TOTAL	453	425	28	

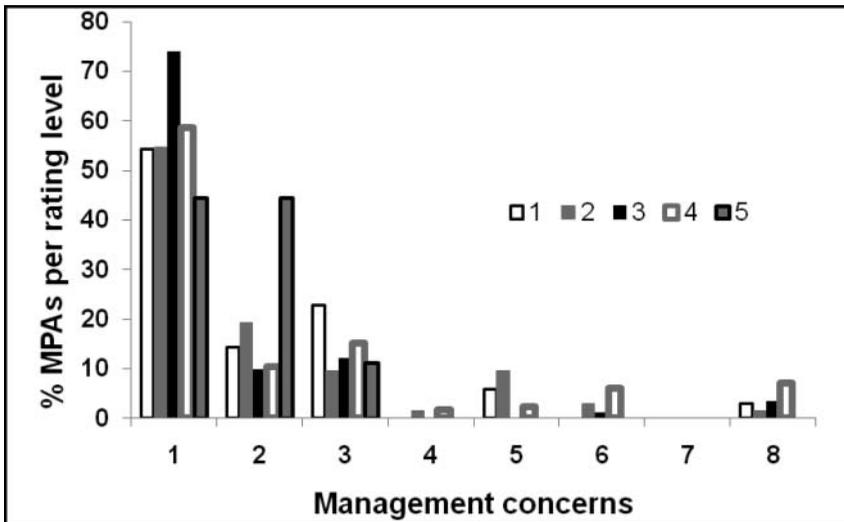


Figure 3. Percent frequency of MPAs with different rating levels within each of the top 8 identified management priority concerns in Philippine MPAs (1. Finance, 2. Alternative livelihood, 3. Community awareness, 4. Enforcement, 5. Management capacity, 6. Training, 7. Politics, 8. Gender balance). MPA Rating levels: 1 = Initiated, 2 = Established, 3 = Enforced, 4 = Sustained, 5 = Institutionalized (see Table 1).

possible due to sample limitations. Management concerns 6–8 appear to be prioritized by fewer MPAs.

Local Governance Capacity and MPA Coral Reef Health—Case Study

Coral reef health as monitored in the MPAs of concern focuses on living substrate cover and reef fish diversity (richness, density, and biomass). In 2008, 47.5% (28) of the MPAs in the central Visayas had fair (25–49%) live hard coral (LHC); 15.2% of the MPAs had poor (0–24%) LHC; 30.5% had good (50–74%) LHC; and only 6% of the MPAs had excellent (75–100%) LHC. Overall LHC in these MPAs is relatively good compared to national averages.

In contrast, 57% (54) of the MPAs had very low target fish densities. Twelve (20.4%) MPAs had moderate target fish densities and 12 MPAs good fish densities while only one MPA, Colase Marine Sanctuary in Southeast Cebu, had a high target fish density (fusiliers, surgeon fishes, and jacks that aggregate in schools). The fish data indicates heavy fishing pressure in the vicinity of the MPAs and that a few of the MPAs are most likely not strictly enforcing their no-fishing policy inside of the MPA.

Out of 56 MPAs assessed for coral reef health in 2008 within the Central Visayas area, 30 showed no significant changes in LHC or 53.6% MPAs in status quo. Further, 28.6% showed significant increases by 2008 and 17.1% decreased. Similarly, more than half of the 56 MPAs showed no significant change for target fish densities (57.2%), 26.8% showed an increasing trend and 16% decreased by 2008. This indicates that it may take approximately 5 years or more for most MPAs to have positive changes in LHC and fish densities of fishery target species (Russ et al. 2004).

Twelve MPA cluster groups were identified with multivariate analyses and clustering delineating two major groups (1 and 2) with a similarity of 58 supported by MDS analysis

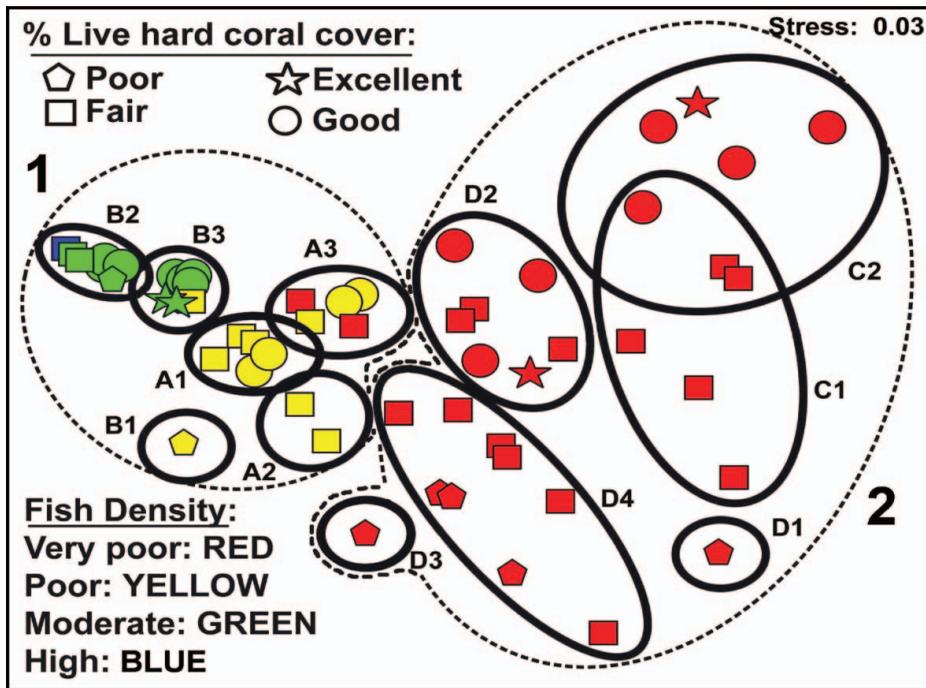


Figure 4. MDS plot of the 56 MPAs and 3 proposed case study sites in the Central Visayas with target fish densities, % live hard coral cover (LHC), and MPA size as the major contributing factors. Two major groups (1: A, B and 2: C, D) and 12 subgroups are generated. Target fish density classification followed that of Hilomen et al. (2000) and for LHC, Gomez et al. (2004) was used (color figure available online).

(Figure 4). A SIMPER analysis revealed that target fish densities, LHC and MPA size are the main contributing factors (90%) for the groupings that resulted. MPA age was excluded at 90%. Groupings of MPAs formed with generally low to high target fish densities and fair to excellent LHC and among MPAs with very low target fish densities but LHC ranges from poor to excellent.

This information on reef parameters allowed us to assess the impacts of local capacity building on MPA coral reef health using MPA ratings as a measure. When comparing the MPA ratings of the two major groups (Figure 4), the average MPA rating in group 1 (groups A and B: low to high target fish densities and fair to excellent LHC) was significantly higher (Mann–Whitney U Test, $W = 690$, $p = .0142$) compared to group 2 (groups C and D: very low target fish densities, LHC ranges from poor to excellent). Median MPA rating for Group A is at 4 (sustained), while 3 (enforced) for Group B. These results indicate that MPAs that have high MPA management ratings are likely to have better reef health conditions in terms of %LHC and fish density.

Discussion

One outcome of the Visayan case study comparing biophysical results and management effectiveness ratings is that LHC and target fish densities as measures of management and governance effectiveness may not be able to provide a complete picture without including

biomass and diversity parameters. While, monitoring changes in LHC and fish density do indicate the direction of changes over time and are credible measures, it is recommended that fish biomass and diversity are included. These additional fish parameters together with density can detect changes in shorter time scales (e.g., Russ and Alcala 1998; Raymundo, Mapa, and Cadiz 2005).

Management Associated Factors

The Philippines has over 1,000 established MPAs (PhilReefs 2008); however, a number of these are inactive. We documented five inactive MPAs, comprising 0.9% our total number of MPAs recorded in our GIS database, all located in Region 7. The major reasons for deactivation include lack of sustainable financial systems, mismanagement and lack of political and community support. This is consistent with our results where all MPAs, regardless of levels struggle with the aforementioned management issues. For active MPAs, our results suggest that more than half of the MPAs in our sample are from the Central Visayas and the modal rating level is at 4 (sustained) (Figure 2). Thus, it is suggested that MPAs must address and/or create sustainable financial mechanisms that can be included in coastal resource management (CRM) plans prior to establishment. Further, continued support from the local government or national government, whichever is appropriate, is a must for MPAs in the Philippines to remain active and to maintain an effective level of management.

The overall MPA rating pattern seen in 2008 matches with the results of our 392 subsamples tested. In both instances, MPAs located in the Central Visayas numerically dominate our data. In a most recent review of the status of MPAs in the Philippines, Arceo, Aliño, and Gonzales (2008) also recorded the most number of MPAs in Region 7, at 417 followed by Region 5 with 215. Weeks et al. (2009) reported a lower number of established MPAs in 2008 (985) but it also documented that in terms of bioregions, the Visayan Sea has the highest number of MPAs; it has 67% of all MPAs. This 67% may translate to 717 MPAs listed by Arceo, Aliño, and Gonzales (2008). This high number of MPAs in Region 7 and the Visayan Sea, however, does not translate to area protected. The Sulu Sea and South China Sea bioregions are better protected with the largest MPAs and coverage. This is because the Apo Reef Natural Park (27,469 ha) and the Tubbataha Reef Natural Park (96,828 ha) are both in these regions; both MPAs are priority sites under the protection of the Philippine national government and Tubbataha has the added support of being a World Heritage Site under UNESCO (Weeks et al. 2009). Both are no-take MPAs.

The improved condition of MPAs in the Philippines is not without challenges. Maintaining good management and enforcement poses many difficulties especially during the early years of establishment. For most young MPAs, the priority management concern is the lack of budget and/or lack of a sustainable financial mechanism. MPAs that listed this as a primary concern comprised 52.8% of our sample; for lack of supplemental and alternative livelihood, 12.24% and 11.47% for lack of community awareness and or support (Figure 5). The rest of the concerns pertained to a lack of communication and enforcement equipment which depend on budget and political support, and are affected by conflicts among users and in some cases a lack of gender equity or women's empowerment. Most MPAs that reached level 4 are those that developed a revenue generating system that mainly supports the enforcement arm and a few other MPA implementation activities. MPAs with functional entrance or user-fee systems correlated well with higher levels of effectiveness. In locally managed MPAs, this revenue is usually shared among the MPA management body and/or people's organization, village (Barangay), and the municipality (town or city). Such

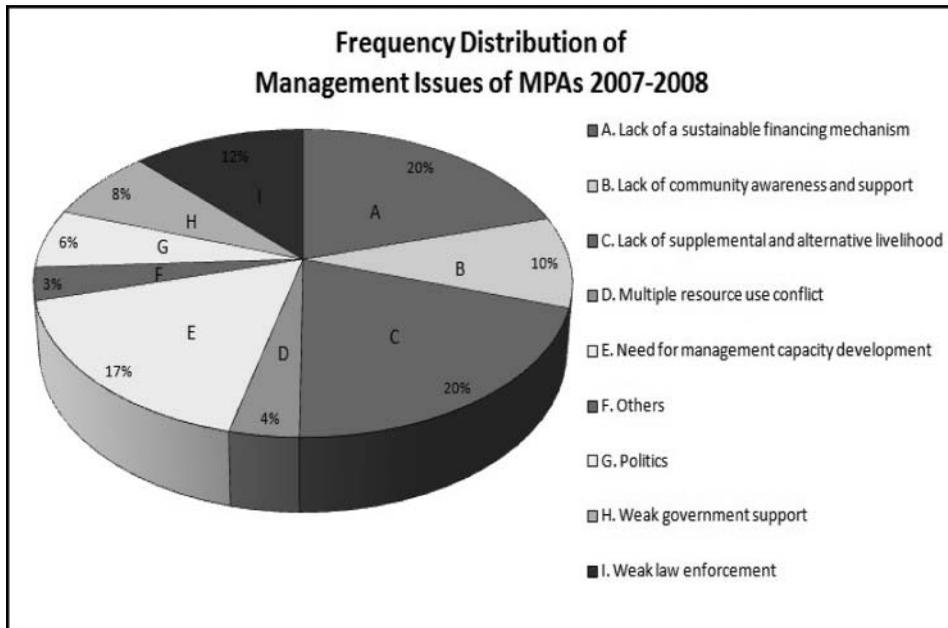


Figure 5. Frequency of management issues highlighted in the survey of MPAs. (Percentages indicate the relative number of times that survey responders indicated a particular issue. Responders could indicate more than one issue in a response.)

mechanisms have been evolving in the Philippines and are an important factor in the relative improvement of MPAs (White, Aliño, and Menesses 2006). An example is in Dauin Municipality, Negros Oriental, where a functioning MPA user system for 10 MPAs together with local government support has been recognized as a model site for best practices in coastal resource management nationwide (Maypa et al. 2006). Another functioning example is the user-fee system adopted by the two municipalities of Tingloy and Mabini in Batangas Province whereby one fee is collected from all divers entering this popular recreation area and is then divided between the two towns to support their marine conservation and MPAs projects.

A key observation is that for newly established MPAs to be financially sustainable, local government, and community support is critical (Raymundo, Maypa, and Cadiz 2005; Maypa et al. 2009; IUCN 2008). Further, MPAs assisted by multiple agencies (NGOs, academe or national government agencies) are more likely to become sustainable. The local government and various nongovernment sectors working hand-in-hand in an MPA or network, with a range of interests (e.g., research, training, enforcement enhancement, capacity building) combined with the willingness of a community or people's organization to manage with the right set of leaders comprises the ingredients for MPAs to move up in their rating levels.

Pooling resources of selected MPAs by scaling-up the spatial metrics through forming networks and using ecosystem-based management (EBM) approaches appears to improve MPA management and mitigate MPA deactivation issues (Bellwood et al. 2004; Maypa, 2007; Lowry, White, and Christie 2009). Eisma-Osorio et al. (2009) showed that EBM can address political, socioeconomic, cultural, and environmental concerns common to a fisheries ecosystem with multiple municipal jurisdictions. In Region 7, a Southeast Cebu

Coastal Management Resource Council (SCCMRC) was formed to serve as a policy and supervising body with officers composed of vice-mayors of each municipality. A management committee and secretariat with technical staff from each municipality were organized to support the council. Further, an Integrated MPA Cluster Team (IMPACT) was created by the SCCMRC in 2008 to guide the establishment and management of the MPA network. Similarly, a Southwest Cebu Council, composed of mayors from nine municipalities on the Tañon Strait, formed in 2006 with the same principles of the southeast council. The Province of Siquijor developed a unified environmental code to address common issues of its municipalities. A technical support team was also created. These clusters, although still evolving, have become venues of consensus building and conflict resolution in working toward uniformity of MPA, environmental and fisheries management policies, coastal law enforcement plans and actions at various governance levels.

The results in MPA development and the relative improvements in management in the Philippines can be attributed to several supporting factors over the last 20 years that include:

1. In 1991, the Philippine government devolved authority for management of coastal and marine resources to 15 km offshore to local governments (Local Government Code of 1991) effectively allowing them to establish and manage MPAs within their jurisdiction; this legal support was enhanced by The Philippines Fisheries Code of 1998 (RA 8550), which vested local governments municipal waters and encouraged 15% of municipal waters be designated for marine fishery reserves and sanctuaries;
2. The rapid expansion of MPAs in the country since mid-1990s, many of which were not well-planned or managed, has encouraged efforts to build capacity and to monitor results (Arceo, Aliño, and Gonzales 2008);
3. From 1996 to 2004, a national program to improve the quality of coastal resources management in coastal municipalities including their planning and management of MPAs raised awareness and encouraged use of best practices;
4. In 2002, the MPA Management Effectiveness and Rating Guide was devised in association with a national database for pertinent information on MPAs, which was subsequently endorsed by the MPA Support Network for the Philippines;
5. Currently, the MPA ME System is applied to MPAs throughout the country as a planning and learning tool that has effectively improved the quality of management in numerous MPAs as reflected in the current study; and
6. The process of coastal resource management has spread to most coastal municipalities and includes integrated planning and management, focuses on MPAs and in some areas an EBM approach to managing fisheries and other resources of primary concern.

Conclusions

This study compiled comprehensive information on the status and occurrence of MPAs in the Philippines in coordination with various organizational partners. The study illuminates information available and the value of measuring the level of effectiveness of MPAs in the Philippines, and to what extent they are achieving their goals of marine conservation. Results show an increase in the management effectiveness rating of MPAs. MPAs with rating in 2008 were 320 compared to 45 in 2005. In addition, the level of ratings has increased from a modal level of 1 in 2002, to 4 in 2008, especially in Region 7. This

trend can be attributed to various factors illuminated above that are promoting both the establishment and improved management of MPAs.

This study has also shown the relative value of the monitoring and evaluation process to promote learning and improved management. In relation to this, several lessons are:

1. The MPA Rating System is a useful tool to assess and monitor how well an MPA is doing and determine gaps while it educates the management body through the process.
2. Nationwide use of this tool (or variations thereof) should be continued with certain refinements so that all aspects (e.g., governance, biophysical, and social) of MPAs are evaluated.
3. The MPA Rating System should include biological parameters that can be linked with effects of good management and governance (e.g., Maypa et al. 2009).
4. Results show that 98% of the MPAs in the Philippines are small to medium in size (1.8– 880 ha), which agrees with the results of Arceo, Aliño, and Gonzales (2008) and Weeks et al. (2009) and suggests that MPAs be redesigned to larger spatial scales, that network designs are considered, and that newly planned MPAs aspire for larger areas.
5. The development of a national awards system for well-managed MPAs has been helpful in promoting the MPA Rating System as a monitoring and evaluation tool for newly established and older MPAs alike and suggests this popularization continue.
6. The MPA database and rating system functions because collaborators and partners have collected and shared data on MPAs and suggests that this essential function be maintained to update and keep viable the database system.
7. The greatest MPA successes are in areas where an ecosystem-based and multi-sector management approach is being utilized to pool resources for sustainability.

Notes

1. In 2010, the “MPA Rating System” was slightly modified and called the “MPA Evaluation and Assessment Tool” (MEAT), which is used nationwide for all MPAs declared under local government. A variation on the MPA Evaluation and Assessment Tool is also used to evaluate the 28 nationally declared MPAs in the country. The MPA Evaluation and Assessment Tool has four levels instead of the five used in the MPA Rating System but is compatible because levels 1 and 2 were merged.

2. MSN is a multi-sector group composed of government and nongovernment organizations, people’s organizations, and academic institutions that support MPA actions through complementary collaborative efforts at the local, regional and national levels (PhilReefs 2008); and LMP is a national organization composed of all municipal governments in the country.

3. A full list of MPAs and their associated data is located at www.coast.ph

References

- Abesamis, R.A., A. C. Alcala, and G. R. Russ. 2006. How much does the fishery at Apo Island benefit from spillover of adult fish from the adjacent marine reserve? *Fishery Bulletin* 104 (3): 360–375.
- Alcala, A. C. 1998. Community-based coastal resource management in the Philippines: A case study. *Ocean and Coastal Management* 38:179–186.
- Alcala A. C., A. A. Bucol, and P. Nillos-Kleiven. 2008. Directory of marine reserves in the Visayas, Philippines. Foundation for the Philippine Environment and Silliman University-Angelo King Center for Research and Environmental Management. Dumaguete City, Philippines.

- Aliño, P. M. 2008. Chapter 4.3.1. Effective coastal zone management practices in the Philippines. In *Asia-Pacific Coasts and Their Management, States of Environment Series: Coastal Systems and Continental Margins* 11 (XVI), ed. N. Mimura, 217–222. Dordrecht: Springer.
- Aliño, P. M., N. E. Palomar, H. O. Arceo, and A. T. Uychiaoco. 2002. Challenges and opportunities for marine protected areas (MPA) management. *Proc. of the 9th International Coral Reef Symposium* 2:635–640.
- Arceo, H. O., P. M. Aliño, and R.O.M. Gonzales. 2008. Where are we now with marine protected areas? In Coral Reef Information Network of the Philippines (PhilReefs) (2008) *Reefs Through Time: Initiating the State of the Coasts Reports*. Coral Reef Information Network of the Philippines (PhilReefs), MPA Support Network, Marine Environment & Resources Foundation, Inc. and the Marine Science Institute, University of the Philippines, Diliman, Quezon City. 152 p.
- Balgos, M. C. 2005. Integrated coastal management and marine protected areas in the Philippines: Concurrent developments. *Ocean and Coastal Management* 48:972–995.
- Bellwood, D. R., T. P. Hughes, C. Folke, and M. Nystrom. 2004. Confronting the coral reef crisis. *Nature* 42:827–833.
- Bendijo, R. G., M. L. R. Alcalá, E. R. Dolumbal, and A. K. Amor. 2004. *Coastal environmental profile of Siquijor, Philippines*. Siquijor Coastal Resource Enhancement Project, Siquijor, Philippines.
- Carpenter, K. E., and V. G. Springer. 2005. The center of the center of marine shore fish biodiversity: The Philippine Islands. *Environmental Biology of Fishes* 72:467–480.
- Carter, E., A. Soemodinoto, and A. White. 2010. *Guide for improving marine protected area management effectiveness in Indonesia*. Bali, Indonesia: The Nature Conservancy Indonesia Marine Program, xi+49 p.
- Christie, P., and A. White 2007. Best practices for improved governance of coral reef marine protected areas. *Coral Reefs* 26:1047–1056.
- Christie, P., A. White, and E. Deguit. 2002. Starting point or solution? Community-based marine protected areas in the Philippines. *Journal of Environmental management* 66:441–454.
- Clarke, K. R., and R. M. Warwick. 2001. *Change in marine communities: An approach to statistical analysis and interpretation*. Plymouth: Plymouth Marine Laboratory, 160 p.
- Eisma-Osorio, R. L., R. Amolo, A. P. Maypa, A. T. White, and P. J. Christie. 2009. Scaling-up local government initiatives towards ecosystem-based fisheries management in SE Cebu Island, Philippines. *Coastal Management* 37:291–307.
- Gomez, E. D., P. M. Aliño, H. T. Yap, and W. Y. Licuañan. 1994. A review of the status of Philippine reefs. *Marine Pollution Bulletin* 29 (1–3): 62–68.
- Hilomen V. V., C. L. Nañola, Jr., and A. L. Dantis. 2000. *Status of Philippine reef fish communities*. Paper presented to the Workshop on Status of Philippine Reefs, January 24, 2000, Marine Science Institute, UP Diliman, Philippines.
- IUCN World Commission on Protected Areas (IUCN-WCPA). 2008. *Establishing marine protected area networks—Making it happen*. Washington, DC: IUCN-WCPA, National Oceanic and Atmospheric Administration and The Nature Conservancy. 118 p.
- Kelleher, G., C. Bleakley, and S. Wells (eds.). 1995. *A global representative system of marine protected areas, Vol. III*. Central Indian Ocean, Arabian Seas, East Africa and East Asian Seas. Great Barrier Reef Marine Park Authority/The World Bank/The World Conservation Union (IUCN), 147 p.
- Lowry, G. K., A. T. White, and P. Christie. 2009. Scaling up to networks of marine protected areas in the Philippines: Biophysical, legal, institutional, and social considerations. *Coastal Management* 37:274–290.
- Maliao, R. J., A. T. White, A. P. Maypa, and R. G. Turigan. 2009. Trajectories and magnitude of change in coral reef fish populations in Philippine marine reserves: A meta-analysis. *Coral Reefs* 28:809–822.
- Maypa, A. P. 2007. Effects of coral reef degradation on reef fish communities: Can marine protected areas contribute to resiliency? *Silliman Journal* 48 (2): 149–152.
- Maypa, A. P., C. E. Reboton, P. L. Cadiz, and A. T. White. 2006. *Integration: How many divers are too many? A tourism carrying capacity study in two small marine protected areas in the*

- central Philippines*. A technical report submitted to NOAA. Coastal Conservation and Education Foundation, Cebu City. 6 p.
- Maypa A. P., A. T. White, R. L. Eisma-Osorio, D. Apistar, S. Tesch, R. Bendijo, and E. Cañares. 2009. *Effectiveness and status of marine protected areas in the Central Philippines: 2002–2008*. A technical report, the Local Governance for Coastal Management project of the Coastal Conservation Education Foundation. Cebu City. 11 p.
- PhilReefs (Coral Reef Information Network of the Philippines). 2008. *Reefs through time 2008: Initiating the state of the coasts reports*. Coral reef information network of the Philippines (PhilReefs), MPA Support Network, Marine Environment & Resources Foundation, Inc. and the Marine Science Institute, University of the Philippines, Diliman, Quezon City. 152 p.
- Pollnac R. B., B. R. Crawford, and M. L. G. Gorospe. 2001. Discovering factors influencing the success of community-based marine protected areas in the Visayas Philippines. *Ocean & Coastal Management* 44:683–710.
- Pomeroy, R. S., J. E. Parks, and L. M. Watson. 2004. *How is your MPA doing? A guidebook of natural and social indicators for evaluating marine protected area management effectiveness*. Gland, Switzerland: IUCN.
- Raymundo, L. J., A. P. Maypa, and P. L. Cadiz. 2005. Calagcalag Marine Preserve. In *Reefs Through Time: 2004 Biennial Report on the status of Philippines coral reefs*. Coral Reef Information Network of the Philippines (PhilReefs) and the Marine Science Institute, University of the Philippines, Diliman, Quezon City, Philippines. 115 p.
- Roberts, C. M., C. J. McClean, J. E. N. Veron, J. P. Hawkins, G. R. Allen, D. E. McAllister, C. G. Mittermeier, et al 2002. Marine biodiversity hotspots and conservation priorities for tropical reefs. *Science* 295:1280–1284.
- Russ, G. R., and A. C. Alcala. 1998. Natural fishing experiments in marine reserves 1983–1993: roles of life history and fishing intensity in family responses. *Coral Reefs* 17:399–416.
- Russ, G. R. 2002. Yet another review of marine reserves as reef fishery management tools. In *Coral reef fishes: Dynamics and diversity in a complex ecosystem*, ed. P. F. Sale, 421–441. New York: Academic Press.
- Russ, G. R., A. C. Alcala, and A. P. Maypa. 2003. Spillover from marine reserves: The case of *Naso vlamingii* at Apo Island, Philippines. *Marine Ecology Progress Series* 254:15–20.
- Russ, G. R., A. C. Alcala, A. P. Maypa, H. P. Calumpong, and A. T. White. 2004. Marine reserve benefits local fisheries. *Ecological Applications* 14 (2): 597–606.
- Staub, F., and M. E. Hatzizios 2004. *Score card to assess progress in achieving management effectiveness goals for marine protected areas*. Washington DC: World Bank, 30 p.
- TNC (The Nature Conservancy), WWF (World Wildlife Fund), CI (Conservation International) and WCS (Wildlife Conservation Society). 2008. *Marine protected area networks in the Coral Triangle: Development and lessons*. TNC, WWF, CI, WCS and the United States Agency for International Development, Cebu City, Philippines. 106 p.
- Weeks, R., G. R. Russ, A. C. Alcala, and A. T. White. 2009. Effectiveness of marine protected areas in the Philippines for biodiversity conservation. *Conservation Biology* 24 (2): 531–540.
- White, A. T., P. A. Aliño, and A. Menesses. 2006. *Creating and managing marine protected areas in the Philippines*. Fisheries Improved for Sustainable Harvest Project, Coastal Conservation and Education Foundation, Inc. and the University of the Philippines Marine Science Institute, Cebu City, Philippines. 83 p.