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### **Publication Date**

2005-04-01

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by

Gregory M. Wells

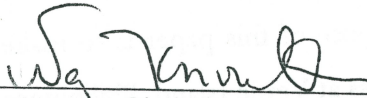
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of the requirements for the degree of

Master of Advanced Studies in Marine  
Biodiversity and Conservation

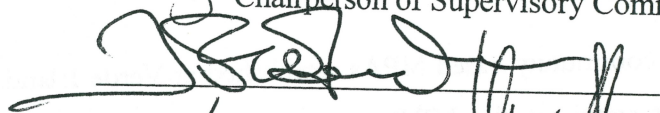
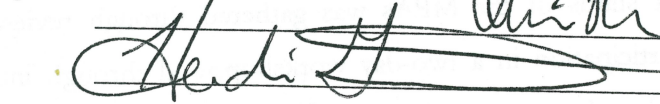
University of California, San Diego

2005

Approved by



Chairperson of Supervisory Committee

Program Authorized  
to Offer Degree

Date 2 June 2005

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UNIVERSITY OF CALIFORNIA, SAN DIEGO

EXECUTIVE SUMMARY

RECOMMENDATIONS FOR MONITORING MARINE PROTECTED  
AREA EFFECTIVENESS AT VERDE ISLAND, PHILIPPINES

by Gregory M. Wells

Chairperson of the Supervisory Committee: Professor Nancy Knowlton  
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Marine protected areas (MPAs) have been a popular strategy for protecting and managing coral reefs in the Philippines for the last two decades. However, a great majority of these protected areas are reported to be ineffective and are failing to achieve the goals and objectives for which they were established. As the numbers of MPAs increase, the need for systematic, long-term monitoring of these areas becomes apparent. The purpose of this paper is to make recommendations for monitoring MPA effectiveness at Verde Island, Philippines.

There are two community-based MPAs established at Verde Island. Information on the current status of the MPAs was gathered through review of selected documents, participation in a two-day workshop, and through interviews with community leaders, fishermen, government agencies, and NGOs with insight and knowledge of the MPAs at Verde Island.

Based on my findings, it is evident that management currently lacks the staff, funding, and enforcement capabilities to effectively manage established MPAs at Verde Island. Clearly, there is a need for better and more effective management of these MPAs, and a program to monitor and evaluate management effectiveness can help achieve this goal.

Given the stated and implicit objectives of the MPAs at Verde Island, a number of recommendations are provided for monitoring MPA effectiveness. These recommendations include: 1) Define and prioritize an explicit set of goals and measurable objectives; 2) Measure the impact of protection on fishery yields; 3) Monitor biological indicators of the coral reef ecosystem; 4) Ensure a sufficient replication of permanent transects within and outside MPAs; 5) Monitor the effectiveness of surveillance and compliance with MPA regulations; 6) Measure local awareness and understanding of MPA regulations; 7) Measure benefits from tourism; 8) Monitor level of stakeholder participation and satisfaction in management activities; 9) Measure effectiveness of education, information, and awareness programs.

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## ACKNOWLEDGMENTS

First of all, I would like to thank my committee members and advisors Nancy Knowlton, Heidi Gjertsen, Enric Sala, Jeremy Jackson, and Sarah Mesnick for their guidance and support during the development of this project and paper. In addition, I wish to thank the University of California, San Diego Extension Office for providing funding support for the field work described in this paper.

Furthermore, I gratefully acknowledge the contributions of Conservation International-Philippines, International Marinelifelife Alliance-Philippines, and the Batangas City Government for their assistance during my field work in the Philippines. In addition, I am much indebted to the local communities of Verde Island who with their cooperation have made this project a success.

Finally, I would like to thank my wonderful family for the support they provided me throughout my life. And to my friends, Andy Balendy, Amy Broulik, Lorraine Anglin, Fernanda Mazzillo, and Morgan Richie, thanks for making life fun while working.

# RECOMMENDATIONS FOR MONITORING MARINE PROTECTED AREA EFFECTIVENESS AT VERDE ISLAND, PHILIPPINES

## **Introduction**

Marine protected areas (MPAs) have been a popular strategy for protecting and managing coral reefs in the Philippines for the last two decades (Crawford et al. 2000). The widespread implementation of MPAs in the country largely stems from the well-documented success of long-standing MPAs, such as the model reserve at Apo Island, Negros Oriental. In addition, the decentralization of authority to local governments and communities in 1991, along with a government mandate to protect at least 15% of municipal waters has provided the legal framework for community-based MPAs to be replicated throughout the country (White et al. 2002). However, a great majority of these protected areas are reported to be ineffective, and consequently are failing to achieve the goals and objectives for which they were established (White et al. 2002). Now, over 700 community-based or local government supported MPAs have been established in the Philippines, yet only 10% are considered to be effectively managed (Alino et al. 2000).

As the numbers of MPAs increase in the Philippines and across the globe, the need for systematic, long-term monitoring of these areas becomes apparent. Monitoring and evaluation play a crucial role in managing MPAs by



documenting how management actions are or are not meeting intended goals and objectives. In addition, monitoring provides valuable ecological and socioeconomic data that helps guide the adaptive management process (Day et al. 2002; Pomeroy 2004). In recent years, various guidelines for evaluating MPA effectiveness have been developed, which highlight the importance of integrated assessments, including monitoring ecological, social, and economic parameters (Hockings et al. 2000; Pomeroy et al. 2004). These management effectiveness systems are guiding MPA practitioners and managers to effectively monitor, evaluate, and adaptively manage protected areas around the world (Pomeroy et al. 2004).

The purpose of this paper is to make recommendations for monitoring MPA effectiveness at Verde Island, Philippines. With this objective in mind, the paper is divided into five sections. Following this introductory section, the paper gives a brief background on Verde Island. Section three provides some insights into stakeholders' perceptions of goals and objectives relevant to MPAs at Verde Island. An overview of the current management status of the MPAs is discussed in section four. The last section of this paper, I offer some recommendations for monitoring MPA effectiveness on the island.

### **Verde Island**

Verde Island is situated in the Verde Island Passage (VIP) between the provinces of Batangas and Oriental Mindoro (Figure 1). The island occupies 1,638 hectares with the higher of two prominent peaks ascending 417 meters.



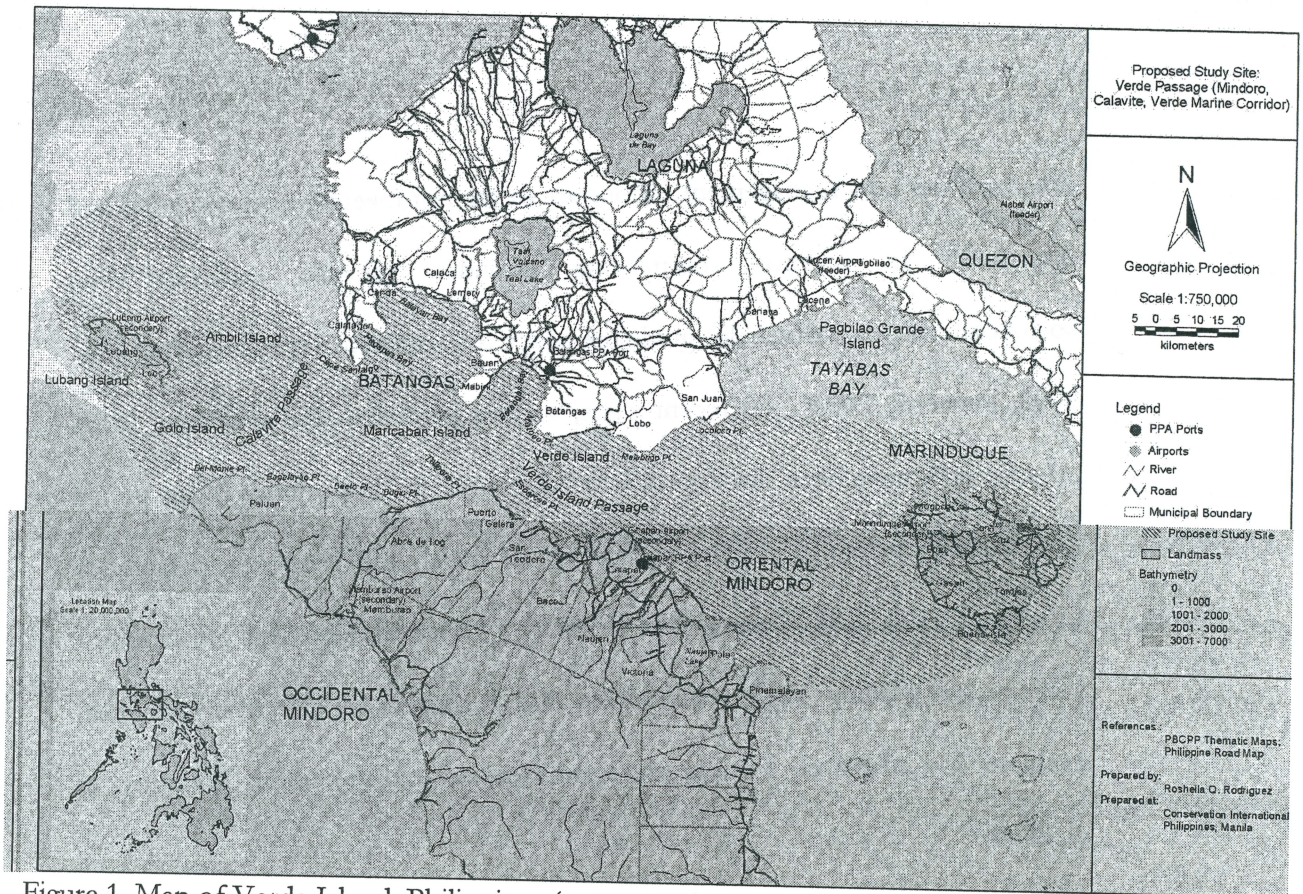


Figure 1. Map of Verde Island, Philippines (courtesy of Conservation International-Philippines)

The coastline is generally high, well-wooded, with occasional sandy beaches (BFAR 1996). Verde Island is surrounded by fringing reefs that extend seaward to about 200 meters (Nanola and Menez 2005). These reefs are located near the heart of the “Coral Triangle” (the region encompassing N. Australia, Indonesia, Philippines, and Papua New Guinea), which contains some of the most biologically diverse coral reefs in the world.

Few studies have reported on the status of the coral reefs fringing Verde Island. Initial assessments at a limited number of sites revealed the coral reefs to be in relatively good condition (BFAR 1996; Parfan et al. 2001). The most recent and most comprehensive survey of the island’s coral and reef fish communities



revealed that the reefs are in fair condition with a range in hard coral cover of 12% to 46%. In addition, reef fish biomass was estimated to be good condition, with a total of 162 species identified representing 30 families (Nanola and Menez 2005).

Verde Island is composed of six *barangays* or villages (Liponpon, San Andres, San Agapito, San Agustin Kanluran, San Agustin Silangan, and San Antonio) and is under the administrative jurisdiction of Batangas City in the province of Batangas, Philippines. According to the figures of the last census, the island has a population of 6,854 persons, comprising 1,514 households. The main sources of income are fishing, agriculture, animal husbandry, and business-related occupations. (CPDO 2000).

The island has faced many of the same problems and challenges confronting other coastal communities in the Philippines, including destructive fishing practices, declining harvests, and the loss of coral reef habitat. For years, the rampant use of cyanide and blast fishing had devastating effects on the island's reefs, leading to significant declines in fish catch. An important turning point, however, came in the 1990s, when key figures in the island community recognized the need to reverse the continuing trend of degradation and improve stewardship over their marine resources.

In 1992, a national NGO, Haribon Foundation, was called on to train aquarium fishermen from *barangay* San Andres on cyanide-free fishing techniques, a practice that is reportedly sustained to this day. Another community initiative



came several years later, when the *barangay* council of San Agapito persuaded many of their fishermen to end the destructive practice of blast fishing and support them in the establishment of a marine (hook and line fishing) reserve. These efforts and other initiatives supported by the local government and NGOs, helped pave the way to more sustainable management practices on Verde Island.

More recently, coastal management efforts have focused on the implementation and management of two MPAs. In 2000, a U.S. Peace Corps volunteer, with the aid of the local government, organized cross-visits to community-based MPAs at San Salvador Island, Zambales and Tubigon, Bohol, which promoted support for MPA establishment and strengthened collaborations between island *barangays* and local government officials. With the experience still fresh in their minds, an organized core group began a collective effort to educate the island community on CRM issues and communicate the importance of the MPA concept. More than two years later, two community-based MPAs were established on the island in order to reduce fishing pressure and ensure a sustainable supply of fish stock at Verde Island.

Finally, a recent study revealed the Verde Island Passage to be a region of exceptionally high biodiversity with possibly the richest concentration of marine life on the planet (Carpenter and Springer 2005). This research, which identified the passage as the “center of the center” of marine biodiversity, led Conservation International-Philippines (CIP) to undertake an ecosystem-based management program (EBM) in the region with the principal goal to maintain and protect the

productive potential of the ecosystem such that species and ecological processes are sustained, and human welfare supported and improved. The first year of this program is focusing on site level interventions at Verde Island, including strengthening coastal resource management (CRM) systems and improving management of existing MPAs (CIP 2004).

### **Data Collection**

Information on the current status of MPAs at Verde Island was obtained during a 10-day visit to Batangas City, Philippines. During this visit, detailed information was gathered through review of selected documents, participation in a two-day CRM Vision, Mission, Goals (VMG) workshop, and through interviews with community leaders, fishermen, government agencies, and NGOs with insight and knowledge of the MPAs at Verde Island.

Interviews with these key stakeholders were undertaken for two primary reasons:

1. To generate information on the current management status of MPAs at Verde Island
2. To provide insight into stakeholders' opinions about the goals/objectives most relevant to their MPAs

Two distinct questionnaires were developed to facilitate the collection of data (Appendix 1). The first questionnaire covered issues pertaining to the current management of the MPAs and was directed to the MPA site manager and

government fisheries personnel. The information generated from this questionnaire is summarized in the following section (see Status of MPAs).

The second questionnaire was addressed to multiple stakeholders and focused on questions pertaining to MPA management goals and objectives. Since it was important to obtain different perspectives on these goals and objectives, a variety of key informants were interviewed, including local government officials, the Philippine Coast Guard, island fishermen and *barangay* councils, and the Verde Island Beach Resort.

At this time, a set of well-specified goals and objectives has yet to be defined for the established MPAs. Thus, it is expected that the information generated from this questionnaire will help in the identification of priority goals and objectives for MPA management. This information, in turn, will provide the basis for making recommendations that can be used to monitor and evaluate the impacts of MPA management actions.

### **Survey Results**

A total of 31 key informants were interviewed using the second questionnaire. Each interview began with the general question, “What is the primary reason for the establishment of the MPAs on Verde Island?” Most respondents (48%) stated that the primary reason was to contribute to the protection of marine resources on the island (Figure 2). This was followed by a more specific aim to protect fish species and/or habitat, and contribute to the

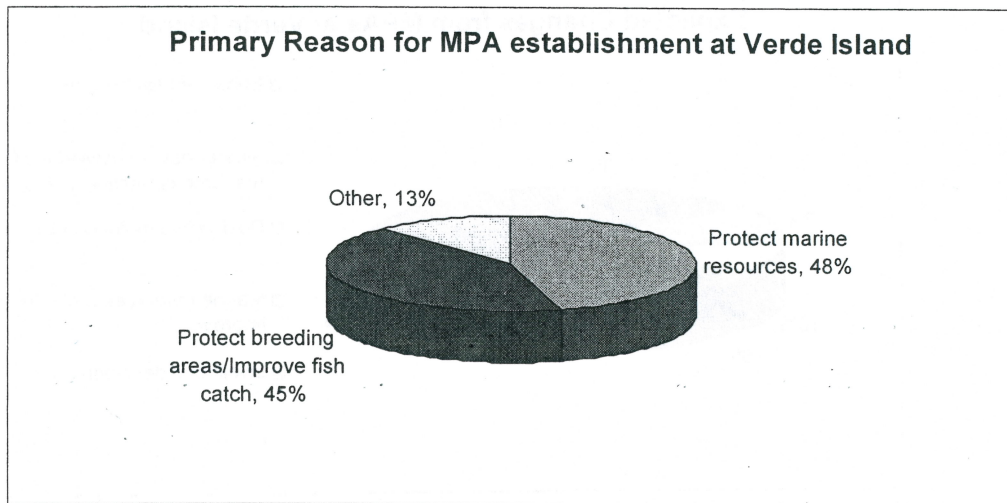


Figure 2. Primary reasons for the establishment of MPAs at Verde Island

augmentation of fisheries. The fact that these reasons were grouped separately does not necessarily imply that the statements are unrelated. In fact, it seems probable that further inquiry into the respondents' statements would have revealed that fisheries enhancement was the central reason for the establishment of the protected areas.

Building on the previous question, respondents were asked to describe the changes they hope to see with establishment of their MPA. A large majority (65%) of respondents expect to see an increase in fish abundance and/or fish catch, 13 % expect livelihood development, while 10% hoped for the elimination of destructive fishing (Figure 3).

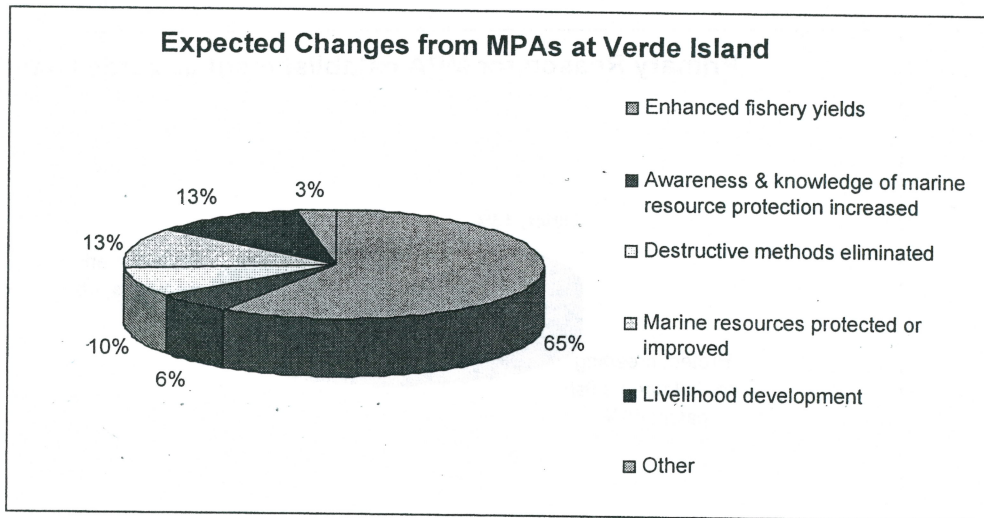


Figure 3. Changes key informants hope to see with MPA establishment

Additionally, respondents were asked to 1) review a list of objectives common to MPAs established in the Philippines, 2) indicate whether or not the objectives were relevant to designated protected areas on Verde Island, and then 3) choose three objectives most relevant for the establishment of the island's MPAs. Based on their responses, the top three management objectives for the MPAs are the following:

- Improve catch yields in areas outside the MPA (52%);
- Eliminate destructive activities inside and outside of the MPA (45%);
- Maintain ecological processes and genetic diversity of the marine environment (39%) (Figure 4).



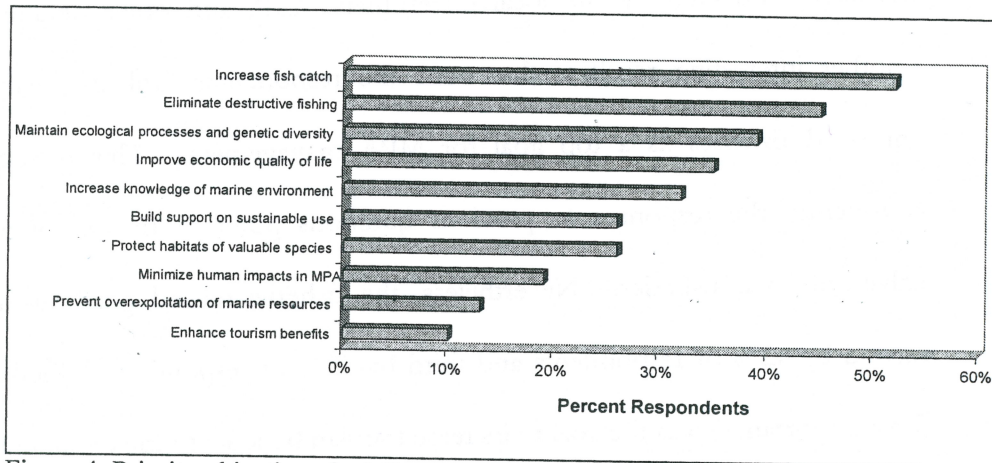


Figure 4. Priority objectives for MPA management at Verde Island

Conversely, the objectives judged to be of least importance were:

- minimize human impacts within MPA boundaries (19%),
- prevent overexploitation of marine resources (13%),
- enhance tourism benefits to the local community (10%).

Finally, respondents were asked to rank the importance of four common management goals of MPAs in the Philippines. The goals included in this ranking were as follows: biodiversity protection, improve or sustain fisheries, increase local awareness and knowledge of marine resource protection, and increase tourism benefits to the community. Based on the responses to this question, protection of marine biodiversity (52%) and increasing local awareness and knowledge of marine resource protection (48%) emerged as the top two priority goals (Figure 5). This result is not entirely unexpected considering that most of

the respondents have been actively involved in various CRM trainings and seminars conducted by the local government, CIP, and other organizations. Another interesting result is that none the respondents ranked sustained or improved fisheries as a top goal for MPA management. This is surprising considering the responses to previous questions point to the importance of enhanced local fisheries. Nevertheless, the fisheries-related goal was ranked second by 42% of respondents and third by 55% of respondents. Ranked last (least importance) was the goal to increase tourism benefits to the community.

In retrospect, it was recognized that the second questionnaire included several overlapping objectives (e.g. eliminate destructive fishing and minimize human impact), which may have introduced bias into some of the responses.

It should be noted that several respondents (16%) indicated that tourism was not a desired goal for the MPAs. A general concern was that an influx of tourism could result in negative environmental and social outcomes, as experienced in nearby Puerto Galera, Oriental Mindoro. In addition, 6% indicated that increasing local awareness and knowledge of marine resource protection was unrelated to MPA management. As a final point, several respondents mentioned additional goals they felt were pertinent to MPA management, but for summary purposes these were not included in the ranking. Goals mentioned more than once included promotion of island unity and equal enforcement of laws.

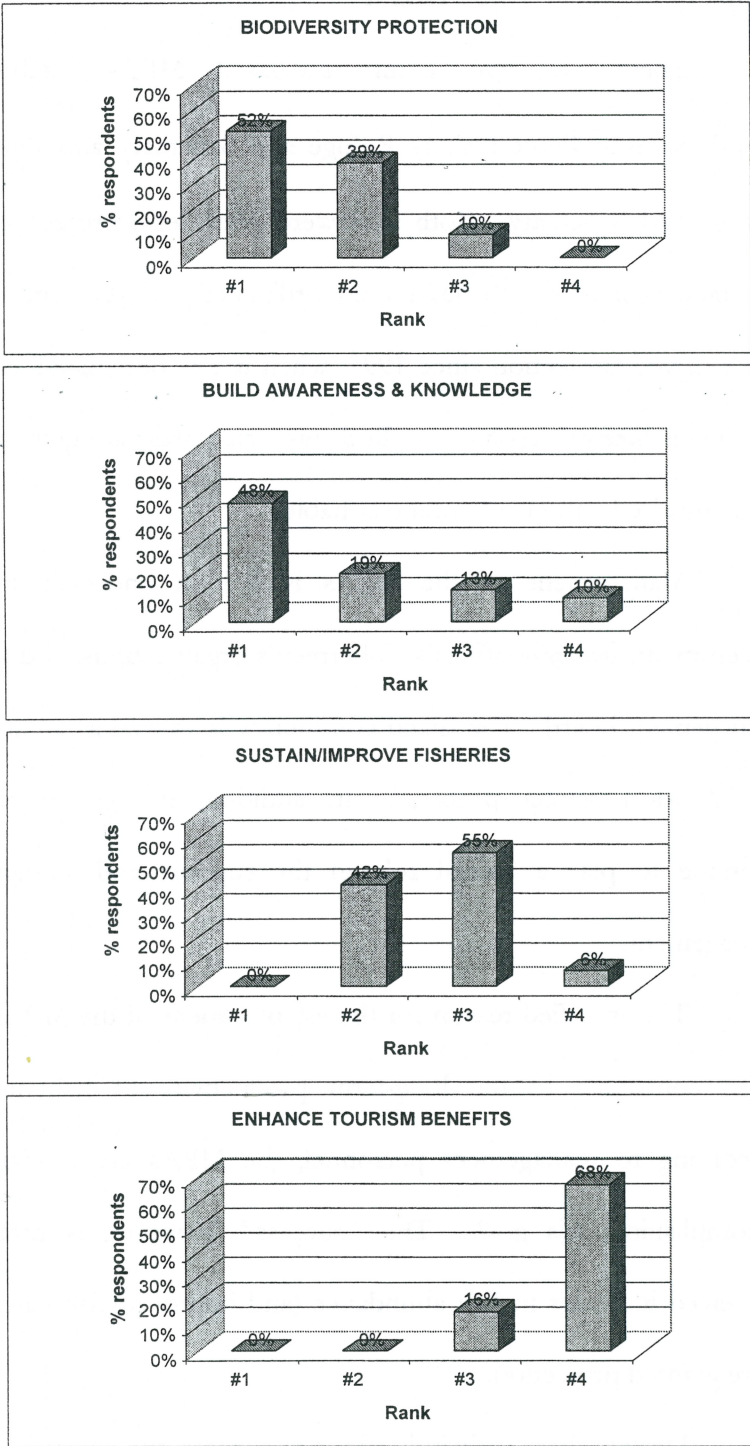


Figure 5. Ranked responses on MPA goals by key informants



### Status of MPAs at Verde Island

There are two community-based MPAs established at Verde Island—Nalayag Point Fishery Refuge and Sanctuary and Pulong Bato Fishery Refuge and Sanctuary. Both sites were given legal protection and declared as “no-take” sanctuaries through a city ordinance in 2002. Pulong Bato, however, has received protection since 1997, when it was designated as a marine reserve through a *barangay* resolution. Both protected areas are quite small (< 2 ha) and are comprised entirely of coral reef habitat.

Management of the MPAs is a joint endeavor involving the city government, *barangay* officials, fishermen’s organizations, and the protected area management board. The island community is viewed as an active participant in the decision-making process. In addition, non-government organizations continue to play a crucial role in the support and strengthening of MPA management.

The specified reason for the establishment of the MPAs on Verde Island is to contribute to the long-term productivity of fisheries on the island. According to management personnel, the MPAs are moderately effective in accomplishing this goal. This “success”, however, is mostly attributed to perceived increases in fish abundance (and improved fish catch) since the areas were granted protection.

Despite these early indications of success, the current budget is described to be insufficient to sustain effective management of the MPAs. This situation is

further exacerbated by the delayed release of funds and/or the lengthy processes imposed at the government level. As such, many of the management activities continue to be supported by outside sources.

Staffing levels are also reported to be inadequate to effectively manage the protected areas. Currently, six personnel are assigned to the management of these areas, including two salaried government fisheries staff and four island residents (site managers, fish wardens) that receive a small honorarium. As a consequence, many of the management activities must rely, to a large extent, on voluntary effort from the island community.

Overall, human activities are not viewed to be effectively managed within protected areas by management staff. Although nearby communities are believed to support the existence of the MPAs, fishing activities within the no-take areas is recurring. Adding to this problem are reports of occasional poaching by fishermen from neighboring municipalities. In addition to fishing, the MPAs also face significant pressure from scuba diving. Both sites have recognized tourism value and are frequented by dive operators from resorts at Puerto Galera, Mindoro, Anilao, Mabini and Verde Island. By one account, up to 50 divers may visit the Pulong Bato site in a single day (T. Almazan personal communication April 2005). However, despite the current regulation on scuba diving within the protected areas, virtually nothing has been done to manage these activities (e.g. prohibit diving, limit on divers or boats) or control the anchoring on reefs (e.g. mooring buoys).

Enforcement of rules and regulations is seen as a major challenge to management of the MPAs. Enforcement measures are deemed to be weakly enforced or lacking entirely at the designated protected sites. Consequently, encroachment (and poaching) continues to be one of the major problems currently facing management. A local strategy to advance enforcement efforts has been to secure patrol boats for *barangay* use. Three boats are currently stationed on the island; however, patrols are reported to be infrequent and operations are undocumented.

With regard to livelihood development, most efforts have been limited to *barangays* adjacent to protected areas, and only one activity (swine dispersal) has seen some success since the declaration of the MPAs. Even so, the livelihood programs carried out have been supplemental at best, and viable alternatives have yet to be introduced for displaced fishermen. Responding to the issue of a lack of alternative livelihood opportunities on the island, participants of the VMG workshop set a goal to explore other livelihood options for families dependent on fishing.

With respect to improving MPA management, two priorities were identified by managers. Most important was the need to build local expertise and capacity for effective management of the MPAs. Also emphasized was the need for alternative sources of income for fishermen displaced from the area closures.

Finally, a monitoring and evaluation program is recognized to be very important for MPA management. However, the current lack of monitoring

equipment (e.g. scuba gear, survey instruments, camera, etc.) and insufficient technical expertise in data collection and analysis is a management concern. At present, much of the needed equipment and technical expertise is provided through NGO assistance. To support monitoring efforts, a biological assessment was recently conducted to establish benchmark information on protected and non-protected sites and identify areas for long term monitoring. A total of eight permanent monitoring sites have been established, including two sites within the protected areas. In addition, six officials from the fishermen's organizations and two fisheries personnel were trained in scuba diving and basic coral reef and reef fish monitoring methods.

### **The Importance of Monitoring**

It is evident that management currently lacks the ability to effectively manage and enforce protection of MPAs at Verde Island. The reported lack of staff, inadequate funding, and poor enforcement are all significant operational problems that need immediate attention in order to sustain MPA efforts. To make matters worse, there appears to be varying support of the MPAs by the island community, evidenced by continued fishing in no-take zones. As a matter of fact, if not for the efforts of several key individuals, the MPAs would likely be protected in name only (so called "paper parks").

Clearly, there is a need to apply better and more effective management of MPAs at Verde Island, and a program to monitor and evaluate management



effectiveness can help achieve this goal. Monitoring and evaluation can play an integral role in the effective management of MPAs (Day et al. 2002; Pomeroy 2004). Monitoring and evaluation can help guide management actions and priorities by generating information on how management is doing and where it can be improved (Day et al. 2002).

### **Recommendations**

Given the stated and implicit objectives of the MPAs at Verde Island, a number of recommendations are provided for monitoring MPA effectiveness. These measures are by no means exhaustive, but focus on a range of biological, socioeconomic, and governance indicators that can be realistically be undertaken to monitor, evaluate and adaptively manage the MPAs at Verde Island.

#### **Define and prioritize an explicit set of goals and measurable objectives**

A necessary first step in developing a monitoring plan is to define the MPA goals and management objectives. If goals and objectives are poorly defined or fail to articulate desired outcomes, the ability to adequately monitor and evaluate MPA performance is hindered. It is, therefore, essential to establish clearly defined objectives that are specific, achievable, measurable, realistic and time-bound in order to provide a practical basis for monitoring and evaluation (Day et al. 2002).

## **Measure the impact of protection on fishery yields**

Coral reef fisheries provide a significant source of food and income to the communities at Verde Island. As such, an important and expected outcome of MPA management is the maintenance and/or enhancement of fish catch over time. It should be emphasized, however, that although no-take MPAs have been shown to lead to increases in fish density, biomass, diversity, and individual size (Halpern 2003), there are very few well-documented examples where fish catch has increased due to spillover effects to unprotected areas (Sale et al. 2005). Nevertheless, measuring the potential benefits to fisheries is an important aspect to monitor in order to measure trends in fish catch as well as demonstrate the MPA's effectiveness in sustaining or improving fish yields over time.

Fish catch monitoring is typically accomplished by collecting catch and effort (or CPUE) data during fishing operations or through creel surveys at landing sites. These methods, however, may require significant logistical investment and therefore are not currently recommended given the limitations of management (Pomeroy et al. 2004).

A simple, cost-effective alternative is to train a group of fishermen to record daily catch and effort data for a select number of target species. Ideally, data will be collected on a regular basis (e.g. daily, weekly) and throughout the course of the year in order to account for seasonal variations in fish abundance. In addition, there should be consistent participation of a number of fishermen, representing a range of gear types, to ensure reliable results (Meeuwig and

Samoilys 2003). This participatory approach will serve to strengthen the fishermen's ability to participate in management and, in time, may generate local support for a more in depth investigation of fish catch using well-designed surveys with academic or NGO support (K. Parks, personal communication, May 2005).

A sample catch survey that can be used for participatory catch monitoring is included in Appendix 2.

To supplement catch-effort data, fishermen can be interviewed to measure their perceptions on the changes in fish catch over time. (and if the MPA is perceived to have an effect on any observed changes) (Pomeroy et al. 2004). These interviews can provide useful information for understanding how the MPAs are performing from the fishermen's perspective. This information is best collected during household surveys or by conducting a random survey of the island's fishing population (Pomeroy et al 2004).

As a final point, to ensure that catch monitoring is sustained, it is essential that the results are presented on a regular basis, so that fishermen are informed of the trends in fish yield and the effects of the MPA on fish catch (Meeuwig and Samoilys 2003).

### **Monitor biological indicators of the coral reef ecosystem**

For both MPA sites, monitoring should focus on the biological indicators relevant to assessing the general condition and trends of the coral reef ecosystem.

These indicators should include benthic substrate cover, fish abundance and diversity, and numbers of key macro-invertebrates. A set of standardized methods designed for community-level monitoring programs in the Philippines is outlined in *Coral Reef Monitoring for Management* (Uychiaoco et al. 2001).

Briefly, the methods to be followed during biological monitoring include:

1. Assessment of corals and other benthos using the point intercept technique on at least two replicate 50 meter transects at the eight permanent monitoring sites. At each transect broad benthic categories (hard coral, soft coral, dead coral, dead coral with algae, sponges, macroalgae, coralline algae, turf algae, rock, rubble, sand) are noted at 25cm intervals along the full transect length, thus producing 200 data points for each transect. From these measurements the percentage cover of the various categories can be calculated for each site.
2. Using the same transects, record abundances of 19 families of fish within a 10 meter wide belt, and 5 meters above the transect.
3. Using the same transects, count ecologically important macro-invertebrate species within a 5 meter belt of each transect.

Sample data forms are included in Appendix 3.

Due to the natural variability of the coral reef ecosystem, the above monitoring procedures should be repeated every year during the same time period (e.g. non-monsoon season, April-June). Visual fish surveys should be completed at least quarterly during the first year of monitoring and annually



thereafter. In addition, as capacity for monitoring increases, it may be useful to collect length estimates to determine fish biomass (using a length-weight relationship equation), which gives a better indication of the health of the fish stock. In cases where schooling species (e.g. *Anthias squamipinnis*) are too numerous to be counted, numbers should be estimated using log4 abundance categories as described in English et al. (1997). Finally, monitoring these indicators should be designed and developed as a long term commitment since it may take several years (or more!) before results can be interpreted with confidence (Pomeroy et al. 2004)

### **Ensure a sufficient replication of permanent transects within and outside MPAs**

Eight permanent monitoring sites have been established around the island, including two sites within the MPAs. Since an objective of the monitoring program is to assess changes in the coral reef environment and evaluate the effectiveness of the MPAs, it is important to establish a monitoring protocol that generates results with statistical confidence (English et al 1997). To increase the likelihood of representative sampling, at least two replicates should be sampled at each site, both inside and outside the protected areas. Since replication will require additional sampling effort and cost, it may be necessary to allocate more effort to replication within sites and reduce the frequency of sampling (e.g. once a year). In any case, it should be stressed that an inappropriately designed sampling

approach can waste significant time and effort, as results may lead to false trends and misleading conclusions on MPA performance. For this reason, management may choose to draw on the assistance of an outside expert (e.g. university or NGO) to help guide the monitoring process.

### **Monitor the effectiveness of surveillance and compliance with MPA regulations**

Effective enforcement is critical if MPAs are to achieve expected benefits of biodiversity protection and enhanced fisheries (Rogers and Beets 2001).

To gauge the effectiveness of surveillance measures and assess compliance with MPA rules and regulations, each patrol unit should maintain a record of patrol activities, including number of patrols, hours of operation, patrol area, number and type of infraction, and any unauthorized entry. This information can be compiled and reviewed at the end of each year to track trends in violations, determine the effectiveness (or regularity) of enforcement activities, and identify areas where enforcement operations can be improved (Pomeroy 2004). It should be noted that trends in violations should be interpreted with caution since it is virtually impossible to detect every violation. Thus, it may be useful to obtain secondary information by interviewing communities (e.g. fishermen) adjacent to the established MPAs (Bishop 2003).

### **Measure local awareness and understanding of MPA regulations**

Engaging stakeholders during decision-making arrangements has been shown to increase understanding, promote support, and increase legitimacy of MPA rules and regulations (Mascia 2003). However, when stakeholders are not engaged, and rules are not well articulated or understood, noncompliance typically will follow.

Local levels of awareness and understanding of MPA regulations can be determined by asking a series of questions to stakeholders (e.g. sample of fishermen) on their awareness of MPA rules and whether rules are regarded as being simple, clear, and socially acceptable (Pomeroy et al. 2004). Information generated from these interviews can help managers identify potential reasons for noncompliance and where corrective actions are needed to improve awareness and knowledge of MPA rules and regulations.

### **Measure benefits from tourism**

Aside from providing benefits to both fisheries and conservation, MPAs have also generated ancillary benefits through enhancing non consumptive activities such as tourism and recreation (Sanchirico 2002; Rosales 2003). In some instances, tourism revenues have helped sustain protection and management of the MPA (Green and Donelley 2003; Dixon 1993) or have provided additional sources of income to neighboring communities (Russ and Alcalá 1999).

Although tourism enhancement does not appear to be a priority goal for the MPAs at Verde Island, both sites are of significant tourism value due to their popularity among both international and Filipino scuba divers. Approximately 30 dive operators and an indefinite number of charter boats visit the protected reefs on a regular basis (G. Reyes personnel communication, April 2005). Recognizing the economic benefits of these areas, an economic valuation study was undertaken to determine potential user fees based on diver willingness to pay.

A complete computation of tourism-related benefits is often difficult to measure. Since scuba diving is the only recreational activity carried out in the MPAs, direct economic benefits can be approximated by collecting user fee receipts from divers. These receipts should be compiled and summed on an annual basis and converted to real (inflation adjusted) values so inter-annual comparisons can be made (MBRS 2003; Ross et al. 2003). Additionally, if MPA revenues accrue to the local community it may lead to greater MPA buy-in from stakeholders (Ross et al. 2003).

#### **Monitor level of stakeholder participation and satisfaction in management activities**

Stakeholder involvement is widely recognized as a necessary ingredient for the effective management of MPAs (Pomeroy et al. 1997; Courtney and White 2000; Pollnac et al. 2001; White et al. 2002). Securing stakeholder involvement not only builds community support for the MPA, but fosters a



greater sense of ownership and commitment to sustain management (Pollnac et al. 2001). In contrast, where stakeholders have not been actively engaged or satisfied with management, sustaining enthusiasm and support for the MPA has proved difficult (Russ and Alcala 1999).

A recurring theme during Verde Island's coastal management planning is the promotion of island unity through cooperation and equal participation in coastal management decisions. Therefore, the active support and participation of stakeholders from each *barangay* is essential in order to sustain MPA support. The extent to which this aim is being achieved can be determined by conducting surveys with primary stakeholder groups, such as individual members of the MPA management board and *barangay* fishermen's organizations. Using a five-point scale, respondents can be asked to score both their level of involvement and satisfaction in MPA management (Pomeroy et al. 2004). This information can be useful in clarifying perceptions of stakeholder participation in management and identify where co-management arrangements need to be improved.

### **Measure effectiveness of education, information, and awareness programs**

Education, information, and awareness programs play a vital role in building support for the effective management of MPAs (Alder 1996; Pomeroy et al. 2004). Among the benefits of a successful education and awareness program are a heightened local awareness and understanding of coastal management

issues, enhanced environmental stewardship, and increased community support for MPA management actions (Beger et al. 2005).

In practice, this indicator is measured by interviewing stakeholders to determine levels of awareness and satisfaction with environmental education programs and activities provided throughout the year. Additionally, respondents can be asked a series of questions to measure changes in their knowledge, attitudes, and behaviors regarding the environment. Ideally, these questionnaires will be conducted using a before/after scenario to adequately determine if the education or awareness program had an impact on the participants and the community (Pomeroy 2004; LMMA 2004). Information generated from these surveys can assist managers in identifying appropriate strategies for improving community education and awareness programs that support MPA efforts. (Pomeroy et al. 2004).

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APPENDIX 1

**Key Informant Questionnaire  
MPA Site Description**

What is the name of the MPA? \_\_\_\_\_

What is its geographic location? \_\_\_\_\_

What is the size (ha.) of the MPA? \_\_\_\_ Are the boundaries marked?  Yes  No

What are the primary habitats/ecosystems represented at the site?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Has there been a recent survey on the local flora and fauna? Can a copy be made available?  
\_\_\_\_\_  
\_\_\_\_\_

When was the MPA established and under what legislation?  
\_\_\_\_\_  
\_\_\_\_\_

Who initiated the establishment of the MPA?  
\_\_\_\_\_  
\_\_\_\_\_

Can a copy of the legislation be made available?

**MPA Management - Stakeholders**

What are the different stakeholder groups that are affected by the MPA? What is the total number of people in each group?

- |   |   |
|---|---|
| <input type="checkbox"/> Fishermen _____            | <input type="checkbox"/> Barangay _____ |
| <input type="checkbox"/> Resort/Dive Operator _____ | <input type="checkbox"/> Other _____    |
| <input type="checkbox"/> LGU _____                  | <input type="checkbox"/> _____          |

What organizations are involved in managing the MPA?

- |   |                                       |
|---|---------------------------------------|
| <input type="checkbox"/> Provincial Gov't _____ | <input type="checkbox"/> PO _____     |
| <input type="checkbox"/> Municipal Gov't _____  | <input type="checkbox"/> NGO _____    |
| <input type="checkbox"/> Barangay Gov't _____   | <input type="checkbox"/> Resort _____ |
|   | <input type="checkbox"/> Other _____  |

What is the role and level of community participation in MPA management?

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- non-existing       partial       active

Do nearby communities understand and support the existence of the MPA

- Yes  No

### **MPA Management - Goals & Objectives**

Is there a clearly stated, well-understood reason for the designation of the MPA?  
Explain.

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Do you think the MPA is effective in accomplishing its management goals and objectives?       Yes       No

Why or why not?

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### **MPA Management - Capacity & Resources**

What is the number of MPA management staff?

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In your opinion, are staff numbers adequate for the management needs of the MPA?  Yes  No



What is the annual budget for MPA management? Php. \_\_\_\_\_  
Can a list of this year's expenditures for MPA management be made available?

What is the source(s) of funding \_\_\_\_\_  
Is it secure?  Yes  No

Is the available budget sufficient to meet the needs of the MPA?  Yes  No

Are there adequate equipment and facilities to assist in MPA management?  
 Yes  No

What resources are available?  
\_\_\_\_\_  
\_\_\_\_\_

What is not available?  
\_\_\_\_\_  
\_\_\_\_\_

**MPA Management – Monitoring**

Is there regular monitoring of the site to track changes in the MPA and/or nearby communities over time?

Biophysical  Yes  No      Socioeconomic  Yes  No  
Behavioral  Yes  No      Governance  Yes  No  
Other \_\_\_\_\_

Who is involved in monitoring?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Is there a monitoring plan?  Yes  No  
\_\_\_\_\_

Have people been trained in monitoring?  Yes  No  
By whom?  
\_\_\_\_\_

Do you feel a monitoring & evaluation program is needed for MPA management?

- Very Important       Somewhat important       Neutral  
 Somewhat not important       Not at all important

What are the priority needs for implementing a monitoring program?

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How knowledgeable are the management staff concerning monitoring environmental and socioeconomic parameters of the MPA?

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- Very knowledgeable     Somewhat knowledgeable     Not knowledgeable

Are there suitable areas outside the MPA to establish control sites for ecological and socioeconomic monitoring?  Yes  No

Where? \_\_\_\_\_

### **MPA Management – Uses**

What human activities occur within or in the vicinity of the MPA?

- Fishing (specify types)       Boating  
 Scuba Diving       Other tourism  
 Sportfishing       Other activities (specify)

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What activities are controlled or managed in the MPA?

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Have human activities been effectively managed within the MPA?  Yes  No

Does fishing or other extractive activities occur within MPA boundaries?

Yes  No

Specify.

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Are these activities legal?  Yes  No

Is the MPA of significant social or economic value to the local community?

Specify.

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What are the benefits to those outside the community?

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Does the site have high tourism or recreation value?  Yes  No

What recreational activities occur within the MPA? How many local and foreign tourists visit each month?

Activities	# visitors/month
1.	
2.	
3.	

### MPA Management – Enforcement

Is there an active enforcement of the MPA rules and regulations?  Yes  No

Who is responsible for carrying out MPA enforcement activities?

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Is there a patrol boat?  Yes  No

Is it used?  Yes  No

How often are patrols made? \_\_\_\_\_ per week \_\_\_\_\_ per month

Are land-based patrols conducted?  Yes  No

Are local communities aware of the penalties for violating the rules?

Yes  No

Has anyone been caught breaking the rules?  Yes  No

What happened to them?

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### **MPA Management – Other programs**

Has an alternative livelihood opportunity been created with the MPA establishment?  Yes  No

Specify.

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Has an environmental awareness and education program been implemented?

Yes  No

Specify.

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### **MPA Management – Problems/Issues**

What are the major problems facing the MPA?

1. 

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2. 

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In your opinion, what are the top two priorities for improving MPA management?

1. 

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2. 

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What other issues about MPA management are important and have not been discussed?

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## Key Informant Interview Perceived MPA Goals/Objectives

Organization/Group Affiliation \_\_\_\_\_

1. In your opinion, what is the primary reason for the establishment of MPAs on Verde Island?

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2. What changes do you hope to see as a result from protecting these areas?

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3. In your opinion, are the following objectives relevant to the establishment of your MPA? (check yes or no)

- a) Improve catch yields in areas outside MPA.     Yes     No
- b) Eliminate destructive activities inside and outside of MPA.     Yes     No
- c) Minimize human impacts within MPA boundaries.     Yes     No
- d) Protect habitats needed for the survival of economically important species.  
     Yes     No
- e) Protect and manage the marine environment in order to maintain ecological processes and genetic diversity.     Yes     No
- f) Increase awareness, knowledge and appreciation of the marine environment.  
     Yes     No
- g) Enhance tourism benefits to local community.     Yes     No
- h) Build community support on sustainable use and management of marine resources.     Yes     No

i) Prevent the overexploitation of marine resources.     Yes     No

j) Improve the quality of life (economic wealth) of the local community.  
 Yes     No

4. From the list above, choose your top three objectives for the establishment of MPAs on Verde Island (place letter in space provided)

(1) \_\_\_\_\_ (2) \_\_\_\_\_ (3) \_\_\_\_\_

5. Rank in order of importance the following goals for your MPA (1 highest priority and 4 lowest priority). If a goal is not desired, place a zero in the space provided.

- \_\_\_\_\_ Protect/conservate marine biodiversity
- \_\_\_\_\_ Sustain/enhance local fisheries
- \_\_\_\_\_ Increase awareness/understanding of marine resource protection
- \_\_\_\_\_ Increase tourism benefits to community
- \_\_\_\_\_ Other (please specify below)

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APPENDIX 2

**CATCH SURVEY FORM**

Name: \_\_\_\_\_ Sheet No.: \_\_\_\_\_

Barangay: \_\_\_\_\_ Date: \_\_\_\_\_

Fishing Gear: \_\_\_\_\_ Time: \_\_\_\_\_

Fishing Grounds: \_\_\_\_\_

Distance from MPA (m) : \_\_\_\_\_

Fishing Duration: \_\_\_\_\_ hours Fishing Time: \_\_\_\_\_ to \_\_\_\_\_

Scientific Name (family level)	Local Name	# of fish	Weight (grams)

Remarks: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_