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PHILIPPINE ENVIRONMENTAL GOVERNANCE 2 PROJECT (EcoGov 2)

# **COST-BENEFIT STUDY OF MARINE PROTECTED AREAS:**

*Implications of Financing and Institutional Needs*

March 2009

This publication was produced for review by the United States Agency for International Development. It was prepared by Development Alternatives, Inc.



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The EcoGov 2 Project is an initiative of the Government of the Philippines, implemented in partnership with the Department of Environment and Natural Resources, Department of the Interior and Local Government, local government units and other stakeholders, funded by the United States Agency for International Development and managed by Development Alternatives, Inc. and its subcontractors:

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# **COST-BENEFIT STUDY OF MARINE PROTECTED AREAS:**

*Implications of Financing and Institutional Needs*

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March 2009

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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# **COST-BENEFIT STUDY OF MARINE PROTECTED AREAS: Implications on Financing and Institutional Needs**

## **ABSTRACT**

Six marine protected areas (MPAs) under various management arrangements were studied in the Philippines to estimate the costs and benefits of establishing a MPA and how are these shared on-site in order to gain insights on financing and institutional needs of MPAs. Data came from key informant interviews, focus group discussions, biophysical monitoring results, and secondary sources. External financial and technical assistance, community volunteer labor, networking and partnerships played important role in defraying the financial costs of the MPAs studied. Biophysical monitoring results provide inferential support to community anecdotes about improving fish catch and coral conditions as well as socio-economic and ecological benefits from MPA establishment. Establishing MPAs can have equity considerations in terms of sharing of costs and benefits as well as unintended effects on people's livelihood survival strategy which should be considered in the over-all MPA design. The study suggests the importance of networking and multisectoral collaboration, sustainable funding, incentives for community participation, and linking MPA management to over-all good coastal resource governance.

**KEY WORDS:** cost and benefits, sustainable financing, good coastal resource governance

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# ABBREVIATIONS AND ACRONYMS

CCEF	-	Cebu Coastal Environment Foundation
CPI	-	Consumer Price Index
CRM	-	Coastal Resource Management
CSCRMC	-	Camotes Sea Coastal Resource Management Council
DA-BFAR	-	Department of Agriculture-Bureau of Fisheries and Aquatic Resources
DENR	-	Department of Environment and Natural Resources
DF	-	Development Fund
EcoGov 2	-	Philippine Environmental Governance Phase 2 Project
Ha	-	hectare
Km	-	kilometer
IBRA 9	-	Illana Bay Regional Alliance 9
IEC	-	Information, Education, Communication
IRA	-	Internal Revenue Allotment
LGU	-	Local Government Unit
M&E	-	Monitoring and Evaluation
MPA	-	Marine Protected Area
MISSTA	-	Militar, Sto. Niño, Sugod and Tagulo
MT	-	Metric Ton
NGO	-	Non-Government Organization
NPV	-	Net Present Value
PELA	-	Pangalaran Environment and Livelihood Association
Php	-	Philippine pesos
PMMP	-	Pilar Municipal Marine Park
PNP-CG	-	Philippine National Police Coast Guard
PO	-	People's Organization
Sq m	-	square meter
TEV	-	Total Economic Value
USAID	-	United States Agency for International Development
USD	-	US Dollar
ZDS	-	Zamboanga Del Sur

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# INTRODUCTION

Marine protected areas (MPAs) are ‘places in the sea designed to protect the marine environment from the growing tide of human impact’ (Gravestock et al, 2008). In the Philippines, MPA is used as a general term applying to any ‘defined marine area established for conservation and protection and where activities are managed based on specific rules and guidelines’ (Micalat and Ingles, 2004). MPA management strategies can range from full protection or no-entry to allowing multiple use activities (IUCN-WCPA, 2008). The establishment of marine protected areas (MPAs) is among the most powerful tools for coastal resource conservation. Positive impacts of this approach on marine resources, fish population, and communities have been documented in numerous local and international studies (e.g., Russ and Alcala, 1996; White and Vogt, 2000; Christie and White, 2000; Roberts et al 2001; White et al, 2002, IUCN-WCPA, 2008). Promising results due to MPA establishment in terms of increasing trend in coral cover in selected MPA sites across the six marine biogeographic regions of the Philippines have been observed by Arceo et al (2008).

MPAs started to be established in the Philippines as a response to the destruction of coastal habitats and decline in fish catch (White et al, 2004). From very few MPAs in the early 1970s, the number grew to 1,169 in 2007 (Arceo, 2008) indicating increasing acceptance of this approach as a tool for conservation (White et al, 2004). But despite the growing popularity of MPAs, only around 10% of MPAs found in the Philippines are being managed effectively (Aliño et al, 2000) . The Philippines is not alone in this observation. It has been reported that quality of management of MPAs in the world highly varied (Gravestock 2002 cited in Gravestock et al 2008) and nearly a third of the global sample of MPAs studied underperformed and generally failed to meet their goals (Kelleher et al, 1995 cited in Gravestock et al, 2008). One of the major challenges that have been highlighted is the lack of adequate and sustainable financing mechanisms (Gravestock et al, 2008). Unfortunately, there is very little data and information on specific funding requirements of MPAs (ibid, p.273).

There have been numerous studies dealing with the valuation of various coastal and marine resources in the Philippines (e.g., White and Trinidad, 1998; Samonte-Tan and Armedilla, 2004; Samonte et al 2007). There have been sparser studies touching on both the benefits and costs and the financial requirements of managing MPAs in the country (an example will be that of White et al, 2000). Information on the distributional or equity issues involved (e.g., who gains and who loses at various spatial and temporal scales) in MPA establishment in the Philippines is also lacking. Moreover, while a study (Javier, 2003) suggests that the type of management institution has little bearing on MPA effectiveness, there

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has been no study linking management type, institutional arrangements, and governance practices to costs of effective MPA management. Such information can yield valuable insights on the need for subsidies and incentives, and on the possible basis for building a diverse and sustainable financing portfolio for a MPA as well as in designing MPAs and MPA management.

## **RESEARCH OBJECTIVES**

This study has three objectives: 1) analyze the costs of establishing MPAs and how these costs are shared among various stakeholders; 2) examine the benefits from MPA establishment; and, 3) identify the relationship of various governance practices and institutional arrangement to effective and efficient MPA management.

## **THE STUDY SITES**

The study covered six MPAs — two on Camotes Islands, Cebu Province, and four along Illana Bay in Zamboanga Del Sur (Figure 1 below and Table 1). The MPAs have been established to protect fishery resources and the rich marine biodiversity in their areas. They have been selected as case study sites because they represent varied types of MPA management, size, and age- factors which might have an influence on MPA costs and benefits.

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All the MPAs support rich fishing grounds. Natural habitats being protected in the various MPA study sites include coral reefs, mangrove forests, and seagrass beds. All of these resources provide diverse ecological, social, and economic



**Figure 1. Map showing the six case study**

1. Villahermosa Marine Sanctuary
2. Pilar Municipal Marine Park (PMMP)
3. MISSTA MPA
4. Tambunan MPA
5. Talisay MPA
6. Bibilik MPA (Illana Bay, Zamboanga del Sur)

functions important to host communities. The MPAs are large, with sizes ranging from 20 hectares to 179 hectares. The mean age was 3.5 years, the oldest being five years old. Two MPAs- Villahermosa Marine Sanctuary and Bibilik MPA have been established and managed by the host barangays since 2002 but became formally adopted at the municipal level only in 2004 and 2003, respectively. A local People's Organization (PO) has been protecting the Talisay Marine Sanctuary since the 1980's but the host municipality formally established this only in 2004.

All MPAs (except Talisay MPA which received only a financial grant) have been receiving technical assistance from the United States Agency for International Development (USAID) funded-Philippine Environmental Governance Project.

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# METHOD

The study used both primary and secondary data gathering. Primary data were gathered from semi-structured key informant interviews and focus group discussions involving total of 30 persons in the various study sites. Eight of the interviewees were directly involved in MPA management; the rest were ordinary fishers, community volunteers, representative of organizations assisting the MPA, and MPA guards. There were basically three groups of key informants. The first group (MPA managers, barangay and LGU officials concerned, assisting organization) were asked about the MPA management set-up, history, activities conducted and their costs during the establishment and operations phases, nature and source of assistance received, issues and problems encountered and how were they addressed. The second group (MPA guards, fish warden and *Bantay Dagat* members involved in guarding and protecting the MPA) were asked about issues and status of MPA enforcement. The third group (ordinary fishers, MPA guards, and community volunteers) served as key informants about observed biophysical changes in the MPA and the various socio-economic and political impacts of MPA establishment. Their responses were compiled as community anecdotes about the MPA sites and were not rated or quantified.

Interview results were validated with secondary data gathered from biophysical assessment reports, participatory resource assessments, fisheries profiles and MPA plans, and available MPA and LGU records. Data about MPA costs and receipts were obtained from actual values provided by the municipal, barangay, and donor agency key informants. The costs of volunteer labor, municipal staff labor, and barangay labor were derived from estimates provided by key informants about the quantity of such labor and their opportunity costs in the locality.

To enable a crude comparison of cost of MPA relative to its economic value, an attempt was made to estimate the Total Economic Value (TEV) of existing mangrove resources in Pilar, Talisay and Tambunan MPAs using the benefit transfer method. The Total Economic Value (TEV) of a resource is the summation of Use Values (e.g., direct use, such as fisheries, recreation, fuel wood; and, indirect such as shoreline protection and carbon sequestration; and option use) and Non-Use values (quasi-option value, existence benefits, and bequest value, regardless of actual use) (UNEP, 2006). The benefit transfer method employed used as original context the estimated annual total economic benefit from mangrove ecosystem of USD600ha<sup>-1</sup>year<sup>-1</sup> in 1998 estimated by White and Cruz-Trinidad (1998) for a different site in the Philippines. Following the method of (Saplaco, 2000) for accounting for price differences in time, price

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adjustment was made by multiplying the 1998 original value with the ratio between 2007 consumer price index (CPI) and 1998.

To measure management effectiveness, the MPA performance rating developed by Cebu Coastal Environment Foundation (CCEF) (CCEF, 2005), as modified by the USAID/EcoGov2 project<sup>1</sup> was utilized. EcoGov2 added some indicators that measure adoption of good governance principles of transparency, accountability, and participation in MPA management. EcoGov2 also set minimum indicators that need to be met before an MPA can be considered as having achieved a certain level of maturity (for example, for an MPA to be considered established, it should have an approved plan, budget, management body, supporting municipal ordinances, etc.). The MPA level is determined through focus group discussions with multisectoral participants.

Fieldwork, data validation and analysis, and report writing were done from April to October 2007.

## RESULTS AND DISCUSSION

The six MPAs are under various management regimes. Three MPAs (MISSTA, PMMP, Bibilik) are being co-managed by the host municipality and the barangays<sup>2</sup>. Co-management is formalized through the adoption of a municipal ordinance establishing the MPA and specifying the organizational structure and the manner of sharing of accountabilities of the parties co-managing it. The three other MPAs are being managed by, respectively, a people's organization or PO (Talisay), the host municipality (Tambunan), and host barangay (Villahermosa).

### MISSTA

MISSTA is being co-managed by the municipality of Tukuran and four barangays (Militar, Sto. Niño, Sugod and Tagulo) through the creation of a multisectoral MPA Management Team that reports to the municipality's

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<sup>1</sup> There are five MPA levels, as follows: Level 1 (the MPA is initiated; it has a passing rating); Level 2 (the MPA is established-fair); Level 3 (the MPA is enforced-good); Level 4 (operations of the MPA is sustained-very good), and Level 5 (the MPA is institutionalized; it has an excellent rating).

<sup>2</sup> Also known by its former Spanish adopted name, *barrio*, a barangay is the smallest local government unit in the Philippines and is the Filipino term for a village.

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Coastal Resource Management Council. The MPA management team is headed by a Team leader (barangay captain of one of the host barangays) who acts as the chief implementer and contact person for the MPA. There are eight committees in-charge of various key activities of the MPA (e.g. IEC, site development, etc), whose heads are members of the Municipal Fisheries and Resource Management Council (MFARMC).

While only four barangays host the MPA, the other barangays in the municipality participate in the management of MISSTA as members of the CRM Council. The municipality made the release of the Internal Revenue Allotment (IRA) share of all eight barangays conditional upon their participation in CRM and MPA management activities. As an incentive, all barangays concerned are given a share in collected fines and penalties and MPA revenues. They also recommend members of Bantay Dagat (sea patrol)<sup>3</sup> that conduct regular MPA guarding and patrolling.

## **PMMP**

This largest study MPA is being co-managed by the two host barangays of Villahermosa and Lower Poblacion and the municipality of Pilar through the multisectoral Pilar Municipal Marine Park Management Board (PMMPMB) which has 20 members. The PMMPMB is responsible for formulating plans, programs and policies; coordinating activities, funds leveraging, imposing disciplines, performance evaluation and staff appointments. Twelve members of the PMMPMB are permanent members that sit also as members of management board of other MPAs in the municipality. These 12 members include six key municipal officials, and one representative each from the Philippine National Police, education, youth, PO/fisherfolk, religious and NGO sectors. The host barangays are represented by four barangay councilors each in the PMMPMB. Their barangay captains serve as board co-chairs, the chair being the incumbent municipal councilor who heads the Sanguniang Bayan Committee on Agriculture. The Marine Park Manager (MPM) who directly reports to the PMMPMB is the over-all head of Marine park operations, including protection activities. The MPM oversees five Working Committees (WC) representing five management programs of the marine park - Administration/Monitoring & Evaluation, Enforcement, Sustainable Financing, Site Development/Habitat Enhancement, and Capability Building/IEC. The PMMPMB and the five WCs, MPM and staff, and MPA guards constitute the General Assembly that meets yearly to discuss MPA concerns.

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<sup>3</sup> A civilian fisheries patrol \ force made up of volunteers that try to protect Philippine municipal waters which as mandated by law reaches up to 15 kilometers from the coastline.

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## **VILLAHERMOSA MARINE SANCTUARY**

Villahermosa is a barangay-managed marine sanctuary situated in Barangay Villahermosa in Tudela, Cebu. The MPA Manager, presently the chair of the environment committee of the Barangay Council, coordinates and supervises seven working committees of the MPA (Monitoring and Evaluation, Legislative, Financial/Administrative, Law Enforcement, IEC, Livelihood and Capability Building). The MPA manager and these seven committees compose the Villahermosa Marine Sanctuary Management Board.

Although the municipality has negligible role in the operation of the MPA, the Municipal Agricultural Office (MAO) staff assists the barangay conduct bi-yearly biophysical monitoring of the MPA. The municipality also funds certain MPA activities requested by the barangay. A local fisherfolks association (Hinugpong Kusog Villahermosa Fishermen Association or HKVFA) closely assists the barangay in biophysical monitoring, MPA site development, and law enforcement.

## **BIBILIK MARINE PROTECTED AREA**

Bibilik MPA is being co-managed by the barangay of Bibilik and the municipality of Dumalinao. A People's organization (Bibilik Fisherfolks Association) provides volunteer work assistance. The MPA Manager (Barangay Captain of Bibilik) directly supervises MPA operation. There were three MPA Committees: Biophysical Development, Environmental Protection and Enhancement, and Biophysical Monitoring proposed but not yet formed at the time of the study.

Bibilik MPA is under the umbrella management supervision of the municipal-level Dumalinao MPA Management Council formed to oversee the management of all MPAs situated in the municipality. The Dumalinao MPA Management Council has six committees, which at the time of the study have not been fully formed or functional.

## **TALISAY MARINE PROTECTED AREA**

Talisay Marine Protected Area is being managed by the Environment Committee of the people's organization Pangalaran Environment and Livelihood Association (PELA) by virtue of an ordinance passed by the host municipality of Tabina. The environment committee has six members, whose chair is a member of the municipality's CRM Technical Advisory Group.

The municipal CRM Officer serving as the Municipal Marine Sanctuary Coordinator has oversight functions over this MPA, including all the established marine sanctuaries in the municipality.

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## TAMBUNAN MARINE PROTECTED AREA

The municipality of Tabina through the Coastal Resource Management Office (CRMO) manages this MPA. The Municipal CRM Officer serving as the Municipal Marine Sanctuary Coordinator, is assisted by full-time MPA staff consisting of one CRM Aide, two fish wardens and two pumpboat operators.

Seven inter-barangay MPA Committees have been recently informally created to enhance MPA management; although it was only the IEC committee that was active at the time of the study. Some residents and one fisherfolks organization (Kahugpugan sa Santa Lucia or KASALU) provide volunteer intelligence support to law enforcement.

# MPA BUDGETS

## MUNICIPAL BUDGET

From 2005 to 2007, the host municipalities allocated a wide range of amounts (from Php25,000 to Php600,000) to support their MPAs (Table 2). The amounts seemed influenced by the type of management arrangement in place and the size of the MPA. The municipality of Tabina allocated no funds for the PO-managed Talisay MPA and allocated little for the barangay-managed Villahermosa Marine Sanctuary found within its territories. In contrast, much bigger amounts were allocated for the municipality-managed Tambunan MPA and the municipality-barangay co-managed MPAs (Pilar, Bibilik, and MISSTA), where the municipalities have bigger role and accountabilities. The three largest MPAs generally received the highest MPA budgets.

The kinds of activities in a particular year also affected the cost requirements and, therefore, the amount of LGU allocation. The size of the LGU's Internal Revenue Allotment<sup>4</sup> or IRA appeared to affect the MPA

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<sup>4</sup> Internal Revenue Allotment is an LGU's share of revenues from the national government, the amount based mainly on land area, population and policy of equal sharing (Section 28, Local Government Code of the Philippines). IRA constitutes about 70% of local government resources (DENR, et al. 2004)

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budget allocation as well. For instance, Tukuran and Tabina, which both had the largest IRAs, allocated the highest amounts for MPA management — 9% of their 20-Percent Development Fund (20DF).<sup>5</sup> Dumalinao, which had the second highest IRA, allocated only 1% of its 20DF for its MPA, but it did provide the biggest allocation on a per hectare basis. As regards the more IRA-deficient LGUs, namely Pilar and Tudela, their MPA budgets represented less than 4% and 1% of their 20DF, respectively.

In order to have a glimpse of the percentage share of MPAs in the municipal budget specifically from the 20DF, data from the municipalities of Tabina and Pilar were studied. The data show that LGUs are faced with a need to allocate limited funds for many sectors and services. CRM and MPA do not always get the highest priority. For instance, Pilar allocated about two-thirds (66%) of its 20DF to infrastructure and only around 9% to environmental activities, of which less than 1% went to coastal resource management or CRM and none specifically for the MPA. However, the municipality did allocate Php150,000 for its MPA and an additional Php15,000 for CRM from its general funds. In the case of Tabina, around 30% of the budget went to environment and natural resources sector. Of this amount, about a third went to marine conservation and coastal resources management (7% to CRM and 2% to MPA management). Infrastructure comprised around one-fourth (23%) of the total DF funds in this LGU.

## **BARANGAY BUDGET**

The host barangays allocated from Php4,000 to Php23,000 for their MPAs, equivalent to Php22 to Php900 pesos per hectare of MPA per year (Table 3). These amounts represented from 1% to 18% of the 20DF of these barangays, the mean value being 7%. The exception was Barangay Malim, which allocated no funds for the municipality-managed Tambunan MPA. This barangay, however, was funding the salaries of two fish wardens assigned to the PO-managed Talisay MPA, also within its territory. This reinforces the earlier observation that LGUs tend to allocate funds to MPAs where they have direct accountability. This also shows that LGUs are strategic in allocating limited funds; they provide assistance where it is most needed and where they also get direct benefits.

The two barangays of LGU Pilar and the four barangays of LGU Tukuran that partnered with each other and with the municipality contributed equal amounts for MPA management, regardless of their IRA and territorial size. The sharing neither takes into account the financial capability of the

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<sup>5</sup> Presidential Decree No. 44 issued in 1973 requires all LGUs to allocate at least 20% of their annual budgets for development projects.

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barangays involved in the collaboration nor the variation in the benefits and costs that each can experience from the partnership.

The data in Table 3 shows that several contiguous barangays can pool their funds to co-manage large MPAs, resulting in bigger total budgets and lower financial exposure for each barangay. In other words, LGUs with limited resources can potentially benefit more from collaboration than with single management. Collaboration offers opportunities for sharing financial resources and labor. For example, in Pilar, the two barangays co-managing the MPA with the municipality both deployed *barangay tanods* (village auxiliary police), resulting in more patrol guards to protect the large MPA. In MisTTA, the four barangays that joined forces in MPA management were contributing only Php5,000 each, although they were protecting a very large MPA.

## MPA COSTS

The MPAs have both direct and indirect costs.

### DIRECT COSTS

Table 4 shows the direct costs incurred by the six MPAs. Direct costs refer to supplies, materials, labor salaries, communication, fuel, travel, equipment, and other costs experienced on-site. Direct costs were divided into two phases: establishment and operational (or implementation). The total cost was derived by summing up these two costs since the date of MPA establishment. This study considered as establishment phase costs selected capital costs (e.g., boat, guardhouse, outpost), and costs associated with site delineation, installation of marker buoys, organization and management planning activities as well as formal MPA adoption through a municipal ordinance. Regarded as the operational phase costs were annual administrative costs (personnel, office supplies, materials, staff travel, etc.), cost of maintenance (e.g. repair of patrol boats, marker buoys, guardhouse) and activities related to plan implementation (law enforcement, information-education-communication, training, site rehabilitation, etc.).

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Based on EcoGov experience, the establishment phase may normally span the first or two years of MPA life, depending on the pace of activities mentioned above. In the case of some of the study MPAs, some establishment activities like marker buoy demarcation were conducted intermittently over several years owing to the large size of the MPA and insufficiency of funds. In addition, there were operations (or MPA implementation) activities like law enforcement and capability-building training that overlapped with the establishment phase in all study sites. For the purposes of this study, the nature of activities determined whether they are establishment or operational phase costs, regardless of when they were actually completed. There were also several planned activities — such as construction of ecotourism facilities, replacement of typhoon-destroyed buoys, construction of a permanent guardhouse, livelihood activities, and the like — not undertaken by certain MPAs because of funding constraints.

Costs can be expected to vary between MPAs depending on several contextual variables such as: biophysical attributes (i.e., size, nature and condition of marine resources being protected), financial capability (including availability of external assistance), and management attributes (related to efficiency and effectiveness and maturity of the management organization), among others. Among the MPAs studied, costs varied with the nature of either materials or labor used (paid or unpaid, lower or higher opportunity cost) and the type of construction (e.g., permanent or temporary guardhouse, motor patrol boat or paddle boat). Costs also varied with the development stage of the MPA. During the establishment stage, the activities that generally entailed higher expenditures include the construction of guardhouse, multipurpose building, and boardwalks and the installation of marker buoys. During the implementation or operations stage, replanting of mangroves, coral transplantation, seagrass rehabilitation, and law enforcement were the more costly items. Table 5 shows the estimated costs of major activities in the study MPAs, based on key informant interviews and review of MPA records.

The absence of a clear relationship between total MPA costs and age and size variables might be attributed to the interactions of the contextual variables mentioned above. To illustrate, while the lowest total cost was understandably posted by the youngest MPA in Pilar municipality, the costs varied widely between MPAs of more or less similar age (Villahermosa and Bibilik; Tambunan and Talisay). In addition, while larger MPAs (Tambunan and MISSTA) tended to incur higher total costs as compared to smaller MPAs (Talisay and Villahermosa), the relationship between size and total cost is not very clear-cut in terms of the smallest MPA (Bibilik with size of 20 ha) which incurred the third highest total cost and fourth highest average annual cost. Overtime, it is surmised that the basic costs of the MPAs would decline as costs would consist mostly

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of maintaining facilities and sustaining enforcement activities and linkages and as MPA management becomes more mature, experienced and efficient.

The average total cost per year of the MPAs are compared in Table 5. Based on the figures presented, the barangay-managed Villahermosa MPA and the PO-managed Talisay MPA incurred the least average yearly total cost. The MPAs that are either managed by a municipality or co-managed between the municipalities and the host barangays generally posted higher average yearly costs. This does not necessarily mean that the municipality-managed or co-managed MPAs did their jobs more expensively. Rather, the costs seemed more a reflection of the degree of municipal and other external funding support enjoyed by these MPAs. In other words, municipality supported MPAs and those that were able to secure high external funding had more funds at their disposal which they put to use by deploying more and higher paid guards, purchasing more equipment, constructing more permanent structures and implementing site rehabilitation activities.

Economies of scale appeared to be working as shown in the column depicting average total cost per hectare per year in Table 5. To illustrate, the four largest MPAs incurred an average total cost per hectare of Php4,500 while the average for the two smallest MPAs was around Php16,000. The smallest MPAs (Bibilik and Talisay) also incurred the highest cost per hectare both for the establishment and operations phases (Table 5), indicating that large MPAs are less costly to run on a per unit area basis.

## **SHARING OF LABOR COSTS**

The summary presented in Table 6 shows that the type of management arrangement influenced the sharing of labor costs. In co-managed or municipality-managed MPAs, the LGU contributed the largest percentage of labor cost by mobilizing more municipal staff members to look after the MPA. In contrast, very limited municipal staff time was provided by the host municipalities in the case of barangay- (Villahermosa) and PO-managed (Talisay) MPAs.

In the barangay-managed MPA, barangay officials (43%) and community volunteers (54%) from the fisherfolk association (Hinugpong Kusog Villahermosa Fishermen's Association) contributed around 97% of the labor. Members of this association together with some barangay and MPA officials devoted every Sunday as a regular work schedule for MPA site

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development. PELA,<sup>6</sup> the people's organization that managed Talisay MPA contributed 80% of the labor requirements of this MPA.

Over-all, the study finds that community volunteer labor contributed significantly to MPA management. It is worth noting that these volunteers were mainly marginalized fishers who spent precious time for the MPA instead of for livelihood activities that would have immediately fed their families. They were motivated by high expectations that the MPA would improve their well-being. They also acknowledged that the MPA would benefit everyone in the community, even if only a few of them actively volunteered time and contributed to its management.

In Villahermosa, around 15 to 20 persons consistently contributed labor to the MPA in the last five years. According to barangay officials working in this MPA, they were being overburdened because they also have other functions and responsibilities in the barangay. To sustain volunteerism and for equity considerations, incentive scheme needs to be worked out for these community members, including giving them priority in employment opportunities, training, and livelihood assistance. In sum, MPA practitioners should pay more attention to economic factors (McClanahan, 1999), social sustainability (Mascia, 2003), and equity issues.

Table 6 also indicates that MPA management is labor intensive. Labor accounted for as much as 50% of total MPA cost.

## **EXISTING FINANCING SOURCES**

In general, five entities share in the costs of the six MPAs studied (Table 7): 1) LGUs (municipality, barangay, province); 2) local revenue streams (net revenues from livelihood, user fees, fund-raising, etc.); 3) national government agencies (DENR, DA-BFAR, Philippine National Police-Coast Guard or PNP-CG); 4) traditional and non-traditional donors and assisting organizations (aid organizations, private sector, NGOs, etc.); and 5) the host local community, which is the main source of volunteer labor.

Table 7 corroborates the previous observation that municipalities tended to commit more funds to MPAs they either directly manage (59%) or co-manage (mean of 55%). In contrast, the host municipality contributed only 8% to the MPA managed by the barangay and 4% to the PO-managed MPA.

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<sup>6</sup> Pangalaran Environment and Livelihood Association. "Pangalaran" is the name of the *sitio* or territorial enclave within the barangay where the MPA is located.

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External donor assistance played a significant role in defraying both establishment and implementation costs in all the MPAs. On average, donor assistance shouldered about 37% of the total cost of co-managed MPAs. Two successive grants from the USAID/EcoGov2 project paid around 80% of establishment costs and 50% of implementation costs of the PO-managed MPA. In the barangay-managed MPA (Villahermosa), donor assistance paid for 44% of the establishment and 20% of the implementation costs.

The management body of Villahermosa was very pro-active in soliciting donations from various sources, which included the Provincial Governor, Provincial Board Members, Congressman, and private companies. The MPA manager created a website for the marine sanctuary to solicit donations from Overseas Filipino Workers.<sup>7</sup>

The data in Table 7 also shows that national government agencies with mandates on fisheries and natural resources management like the Department of Agriculture's Bureau of Fisheries and Aquatic Resources (DA-BFAR) and the Department of Environment and Natural Resources (DENR), respectively, contributed very minimally, if at all, to MPA management.

Fines, penalties, and revenues also raised funds for the MPAs. One MPA (Pilar Municipal Marine Park) carried out creative fund-raising activities, including Christmas caroling, an MPA King and Queen Contest, and a Bingo Socials. Three MPAs explored alternative livelihood projects: crab fattening and goat-raising by Villahermosa; crab culture and agar-agar production by MISSTA; and, fish cage culture by Talisay. All six MPAs have ecotourism plans but only two, Talisay and Villahermosa, actually managed to start their ecotourism projects (by constructing a multipurpose guardhouse and a boardwalk). Talisay had also started renting out its multipurpose hall to interested organizations. Some guided snorkeling, diving, and swimming activities occurred in Tambunan but no fees were being charged yet.

MPA collections came mostly from fines and penalties, a source expected to diminish in importance with the decline in violations. It should be pointed out that collection of fines and penalties is not a sustainable funding mechanism as they are measures related to law enforcement and not to revenue generation. In PMMP, 25% percent of fines collected from MPA violations went to the apprehending guards as their incentives.

The high dependency of the MPAs on external donor assistance makes them vulnerable to withdrawal or stoppage of donors' support. In the absence of any external funding in particular, the LGUs should provide the

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<sup>7</sup> <http://www.villahermosa-marinesanctuary.iwarp.com>

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main support for MPA found within their municipal waters as this is their mandate under the Local Government Code of 1992 and the Fisheries Code of 1998. To address concerns on budget limitations and enhance their sustainability, the MPAs need to give more emphasis to sustainable revenue generation strategies.

## **NOTES ON TRANSACTION COSTS**

Applying the concept to fisheries management, Kuperan et al. (1998) defined transaction costs as the costs of gaining information about the resource and what users are doing with it, reaching agreements and coordinating with others in the group, and enforcing agreements that have been reached. The establishment of an MPA and formation of social networks for its management (collaborations within and between the barangays and municipalities, between LGUs, and with other outside partners) have corresponding transaction costs as various groups come together and negotiate, forge partnerships, coordinate, and work with each other.

Transaction costs have important implications to effective management and financing of MPAs. For instance, the study by Sumalde and Pedrosa (2001) revealed that while higher transaction costs led to better performance of stakeholders at the initial stage of project implementation, an increasing level of transaction costs eventually will result in slower performance of parties involved in the project. This is because the bulk of transaction costs are attributed to the value of time spent in looking for funds for the project.

While this study was able to collect cost estimates of meetings, public hearings, and other organizational activities that might qualify as transaction costs during the establishment and operations phases, this specific aspect of MPA costs was not studied in detail. However, the findings of Sumalde and Pedrosa (2001) that the factors that affect transaction costs in community-based coastal resource management include the number of people involved in the transactions, the number of activities, and the performance of the organization seemed to be true also in the sites studied. Top-down management approach such as in the case of municipality-managed Tambunan MPA presumably incurred lower transaction cost at the initial stage as opposed to co-managed MPAs (Pilar, MISTTA, Bibilik) because of the bigger number and diversity of actors and interests involved in the latter. Among the co-managed MPAs, transaction cost can be anticipated to be higher for MISTTA (with 4 host barangays, large MPA size) than with Pilar (with two host barangays, large MPA size) or Bibilik (one barangay, small territorial size). The smallness and local nature of all these networks (i.e. members are more familiar with each other and share common interest, thus it was not difficult to organize them for the purpose of MPA establishment) contributed to the observed over-all low costs of meetings and organizational activities. Transaction costs can be expected to taper down as the collaboration matures, organizational capacity develops, rules and operating procedures are worked out and stabilized, and the capacity of members to work together improves. In the case of co-managed and grassroots-managed (barangay and PO) MPAs, greater community involvement since the beginning stage can

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be expected to result in lower enforcement cost later due to higher sense of community ownership.

## **INDIRECT COSTS: NEGATIVE EXTERNALITIES**

There are also indirect costs or negative externalities associated with the establishment and operation of the MPAs. While not monetized in this study, these costs have important implications in both MPA design and operation.

Cordoning-off certain portions of fishing grounds to establish a protected area met initial resistance from affected members of the community. In the case of MPAs in Zamboanga del Sur, opposition candidates used this as an issue against the incumbent in the May 2007 local elections. One candidate even promised to shut down the MPA once he won. Table 8 shows that opposition to the MPAs came from those affected by the prohibition on fishing, mariculture, navigation, sand extraction, mangrove cutting, and other harmful activities inside the MPA. Vandalism of MPA facilities and marker bouys by affected individuals and death threats to MPA guards even occurred in Bibilik MPA. Community acceptance has since improved as a result of continuous information-education-communication activities and when the positive effect of the MPAs on fisheries became more apparent. Remaining pockets of resistance were said to be politically motivated.

Two important insights emerged from this study. First, the establishment of MPAs could bring about conflicts and negative consequences on certain sectors of the community. It is necessary to anticipate and mitigate these negative externalities to secure community cooperation and ownership. Second, the establishment of 'no-take zone' can result in strategic behaviors that can undermine the fishery enhancement goals of the MPA.

To illustrate, affected fishers shifted their operation to areas outside of the MPA so as not to lose their only income source (see Table 8). This has the effect of shifting the pressure to the remaining fishable areas outside of the protection zone, potentially resulting in further degradation of unprotected resources in the vicinity (Sanchirico, 2000). Only when fishing in farther locations becomes unprofitable can fishers be expected to shift to another livelihood activity. The 'no-catch zone' also encouraged illegal fishing and poaching inside the MPA (in Bibilik) to compensate for the reduction in fishable areas and added fuel expense of going farther to fish. The perceived improvement in fisheries due to MPA establishment (Table 9), moreover, had two unintended effects (Table 8): one, it attracted fishers from other localities to fish within the vicinity of the MPA; two, it lured some non-fishers to shift to fishing, perhaps further affecting fish population recovery.

These observations suggest a need to anticipate the behavior of affected fishers and to design the MPA so that other critical resources that might be affected by shifts in fishing location or fishing effort will also be protected. Nesting individual MPAs within broader management regimes that lead to over-all drop in fishing effort and networking of small MPAs are also suggested by Christie et

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al (2002). Scattered 'no take' areas cannot be expected to contribute to fish abundance and diversity when intensive fishing effort immediately adjacent to them takes out the fish that exit the area (ibid).

The above observations may also suggest a need to provide livelihood or other possible compensatory support to affected marginal fishers and sectors, at least at the initial stages of MPA implementation. For instance, World Bank (2006) observes that the establishment of an MPA can put financial and social burden on resource dependent communities.

The above underscores the importance of linking up MPA management with the over-all coastal resource management and socio- economic development strategy of the LGU for a more complementary, integrated and holistic management approach. For instance, Sanchirico (2000) believes that "while MPAs might provide a safe buffer under certain circumstance, they are still addressing a symptom and not the fundamental cause of overfishing and waste in fishery."

Another social cost is the creation of very high community expectations (such as higher fish yield), which if not met, can result in the erosion of confidence of communities and decision-makers on this management strategy (IUCN-WCPA, 2008). The issue of sharing of benefits (not only costs) from the MPA also came up. Since fish is a mobile resource, those who do not share in MPA cost could also benefit from it.

## **MPA BENEFITS**

### **ANECDOTAL BENEFITS**

All key informants revealed that the host barangays and communities felt satisfied with the socio-economic and ecological benefits resulting from the establishment of their MPAs (Table 8). Some of the major perceived benefits from MPA establishment are: enhanced fisheries, improved coral cover and marine biodiversity, improved ecological awareness, enhanced community solidarity, improved leveraging capacity, community empowerment and skills improvement. Synergy of ecological and social networks has been also emerging with the formation of MPA networks and inter-LGU alliances in both Illana Bay and Camotes Sea.

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## **DIRECT BENEFITS BASED ON ACTUAL BIOPHYSICAL MONITORING RESULTS**

Community claims about improved fish catch and signs of recovery of degraded coral reefs generally seemed inferentially supported by the results of yearly bio-physical monitoring conducted with the help from the USAID/EcoGov2 project regardless of type of MPA management (Table 9). Signs of fish stock recovery started to be noticed inside Pilar and Talisay MPAs. In Villahermosa, Bibilik, and Tambunan MPAs, increases in fish abundance and biomass were monitored inside the marine sanctuary. An increase in fish size was also noticed in all MPAs. The conditions of reef fishes and benthic forms in the immediate vicinity of the MPAs also generally showed improvement, although less evident as those inside the marine sanctuaries. Recruitment of hard corals was commonly observed in the various sites, which may indicate possible recovery. Except for the coral reefs inside Bibilik and Tambunan, the coral reefs in all MPAs generally remained in poor condition (i.e., still within the 1-24% range).

While the above observations seem to indicate improving resource conditions, there is a need for a more robust and longer-term monitoring in order to establish the validity of this observation.

## **VALUATION OF DIRECT AND INDIRECT ECONOMIC BENEFITS**

The computed indicative annual total economic value of the mangrove resource in the three study sites based on the benefit transfer method used are as follows: US\$113,712 (Php 5.2 M) for Pilar Municipal Marine Park, US\$10,712 (Php494,359) for Talisay MPA, and US\$7,004 (Php323,235) for Tambunan MPA. It should be pointed out than these values are only indicative values, as there are other factors such as differences in socio-cultural parameters, climate, resources conditions and others not taken into account in the benefit transfer valuation method used. Moreover, the values presented above do not include the values of other resources found in the three marine sanctuaries, such as coral reefs and seagrasses and the other mangrove forests dotting the whole coastline of the host municipalities. Adding up the values of these other resources will increase the TEV of the MPAs.

Based on the estimated values, the annual total management cost of Pilar MPA of around P528,000 represents only 10% of the annualized TEV of the mangrove resource. Furthermore, the average annual municipal budget of Php125,000 represents only 2% of the total annual benefits from the 138 ha mangrove resource found in this sanctuary. Similarly, the estimated yearly benefits from the mangrove resource of Talisay MPA exceed the total annual cost of managing this MPA (annual management cost being 67% only of the annual benefits). Note that the host municipality of Tabina allocated no funds for this MPA during the study period.

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Because the size of the mangrove forest is small, the total annual management cost of Tambunan MPA is greater than the estimated total economic benefits from this resource. The proportion of the management cost to the benefits in this sanctuary is expected to decline when the value of benefits from coral reefs is added. Various estimates of annual total economic benefits from Philippine coral reefs include USD 29,000 km<sup>-2</sup> (Samonte-Tan and Cerdillo (2004), USD39,407 km<sup>-2</sup> (White and Cruz-Trinidad,1998), and USD222,800 km<sup>-2</sup> (Samonte-Tan and White, 2007).

## HIGHER MPA INVESTMENT PAYS

Because the potential benefits from managing MPAs can be disproportionately large relative to the costs based on the estimated TEV of mangroves, LGUs should consider raising their investments (i.e., budget) on MPA management to possibly optimize the benefits from this conservation strategy. To illustrate, if Pilar will raise its MPA budget five times (from Php125,000 to Php625,000 or 18% of current 20DF), this translates to only 12% of the annual total economic benefits from the mangrove resources alone. But, the LGU has to be effective and efficient in the allocation of funds to maximize gains from the MPA.

Other studies show that it pays to invest on MPA management. In the case of Tubbataha Reefs, the benefit/cost ratio of about 8:1 (Samonte-Tan et al, 2004) indicates that every Php1 investment on MPA management costs can yield Php8 worth of benefits. The study made by White et al (2000) further shows that investing USD100,000 a year on Olango Island reefs and wetlands would pay off in terms of increasing net revenues to 60% or USD1.4 million from fisheries and tourism. In Gilutongan Island, which is in the municipality of Cordova, Cebu Province, good coastal resource management costing US\$21,000 per year could elevate net revenues to USD200,000 per year, including income from off-site tourism (ibid).

Improved fish production due to MPA spillover effects and good coastal resource management can help raise LGU revenues, such as from various registration fees (vessel, gears, and fisherfolk), and fees and taxes from various fish-related businesses, such as, fish vending and fish transport. Castillo (2007)<sup>8</sup> estimates that Davao City can generate annual revenues of Php656,237 from various registration fees and fish production activities based on current proposed fees, which represent only 1% of the total potential sales of fishers and operators.

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<sup>8</sup> Castillo, Gem. 2007. "Analysis of the Fisheries Ordinance for Davao City: Local Government and Fishers and Fish Transporters Perspective." Microsoft® PowerPoint presentation.

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In contrast, without sound coastal resource management, the Philippines will see further declines of its fisheries. Coral reef destruction deprives the Philippines of at least US\$160 million in lost fishery production per year and 127,000 small-scale fisher jobs lost (McAllister, 1988). Based on management cost data obtained from the six MPAs, the cost of protecting and conserving an MPA is far cheaper than the economic loss of doing nothing to reduce the destruction of coastal and marine resources. According to an estimate by Spurgeon (1998), rehabilitation costs for coral reefs could range from US\$10,000 to US\$6.5 million per hectare.

## **HISTORY OF MPA VIOLATIONS**

Effective law enforcement has resulted in the reduction in incidence of violations of MPA rules and illegal and destructive fishing within the immediate vicinity of all MPAs (Table 12). The incidence of violations was abruptly reduced if not halted in three MPAs- Villahermosa, Tambunan, and Talisay, but breaking of the local MPA ordinance and national laws still continued though reduced in Bibilik and Pilar. There was even an observed increased in incidence of violations in the latter, a year after the establishment of the MPA.

# **GOVERNANCE FEATURES**

With assistance from EcoGov, the establishment and operation of the MPAs considered the principles of transparency, accountability and public participation, regardless of the management arrangement. Site identification, resource assessment and plan preparation, legitimization and approval were conducted with participation from local stakeholders and in a transparent manner. Each MPA management plan specifies the roles and responsibilities of MPA managers and ensures the implementation of an accountable financial management system. Biophysical monitoring of MPA is done in a participatory manner with local stakeholders who have been trained on the method. Local communities also participate in the conduct of site rehabilitation and law enforcement. The degree of community involvement varied with the type of MPA management as mentioned above.

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Stakeholders' participation is important in MPA management. According to Kuperan, et al. (1998), costs are affected by differences in the level of users' participation in the design and implementation of management activities. Furthermore, the low program design costs of a centralized approach do not compensate for the high costs of implementation and enforcement resulting from the lack of legitimacy with user groups (ibid). On the other hand, while the program design costs are higher with the co-management approach because of the costs of effective participation, the costs of implementation, monitoring and enforcement under this approach are lower (ibid).

## **INTERNAL AND EXTERNAL COLLABORATIVE ARRANGEMENTS**

In addition to collaborative arrangements within the municipality (e.g. formal co-management between municipality and barangay and ad hoc partnerships between POs, municipality, barangays and external institutions), the LGUs hosting the six MPAs belong to inter-LGU networks. The LGUs that host the Illana Bay MPAs are active members of the Illana Bay Regional Alliance or IBRA9 that implements a unified ordinance on fisheries law enforcement and collaborate on coastal resource management issues that transcend individual municipality boundaries. They are also in the process of forming inter-LGU network of MPAs. The LGUs hosting the Camotes Islands MPAs form part of the Camotes Sea Coastal Resource Management Council (CSCRMC). The CSCRMC has a Protected Area Committee that oversees the management of all MPAs within the member LGUs. The Council members contribute Php25,000 as their annual contribution, while the LGUs belonging to IBRA 9 contribute Php50,000 each to support the operations of the alliance.

The formation of MPA networks (IUCN-WCPA, 2008, Christie et al, 2002) and inter-LGU alliances is proving to be a promising approach. The initial study of EcoGov 2 on the CSCRMC has shown (Arceo et al, 2008, unpublished), for instance, that the cost of law enforcement per square kilometer of municipal waters with an LGU enforcing the law individually is much higher (average of US\$72) and the effective enforcement coverage (5 square kilometers) is much lesser as compared to when the LGUs collaborate together (effective enforcement of 10 square kilometers and average cost to each LGU of US\$39).

## **MANAGEMENT EFFECTIVENESS AND EFFICIENCY**

Table 11 presents the specific management set-up, management effectiveness rating, and the average costs incurred per hectare per year by the six MPAs. The intention of this table is to show the relationship (if any) between MPA effectiveness and efficiency and the kind of

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management arrangement in the MPA. Effectiveness can be defined as the ability of the MPA to meet its goals and objectives. Efficiency is the ability of the MPA to meet its goals and objectives with minimum expenditure of resources.

Three of the study MPAs (MiSSTA, Tambunan, Villahermosa) were rated Level 3 (enforced), the rest (Talisay, Pilar, Bibilik ) were Level 2 (MPA is established). All Level 3 MPAs and Pilar qualified for Level 4 (sustained) rating based on the CCEF criteria but deficiencies in governance practices gave them a lower rating. All of these four more effectively managed MPAs also proved more efficient by incurring low annual cost per hectare. Interestingly, the two MPAs (Bibilik and Talisay) that had the highest annual cost per hectare also obtained the lowest management effectiveness, although both were also the smallest and presumably the easiest to manage on account of their size alone. Perhaps the reason for this observation is that both MPAs implemented major activities that did not benefit from the economies of scale due to their small sizes. The co-managed Bibilik qualified for Level 3 (enforced) under the CCEF system but was only given Level 2 rating as some violations and political interference in law enforcement still occurred. In the case of PO-managed Talisay, the absence of a management plan and high dependency on outside funding for financing requirements prevented it from getting a higher management effectiveness rating. Based on anecdotal and limited inferential data on biophysical improvements mentioned earlier, all six MPAs have started to achieve positive socioeconomic and biophysical results, regardless of the slight differences in their management effectiveness ratings.

Looking at the interrelationships between the various anecdotal and biophysical improvements observed in the various MPA sites, their cost profiles, management effectiveness ratings, and history of violations, two inferences can be made. First, management performance may not be necessarily related to the type of management arrangement, whether top-down, co-managed or grassroots managed. Second, management effectiveness and the ability to produce results seemed not a function of budget alone. Instead, many internal and external factors seem to come into play. This study suggests that these include the political will to enforce rules, the ability to forge collaborations and leverage outside financial and technical support in situations of funds scarcity, and the practice of good governance. Moreover, the size of MPA also matters, it pays more to invest in bigger MPA sizes. This study further suggests that the effectiveness of MPA management should not be viewed only in terms of management inputs but also in relation to the ability of the MPA to produce tangible biophysical, economic, institutional, and social results that can encourage sustained stakeholders participation. For instance, Pollnac and Pomeroy (2005) found that perceptions of benefits influenced early involvement of communities and that achievement of these benefits stimulated sustained participation in integrated coastal management projects in both the Philippines and Indonesia.

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# CONCLUSIONS

The study showed that establishing and managing a MPA can have significant financial and human resource cost consideration, particularly during the initial stages. Costs varied with local contexts; the operation of the economies of scale is apparent. Cost-sharing and partnerships among local stakeholders helped in defraying MPA costs, with and local communities contributing significantly to MPA management through volunteer labor. National government agencies provided limited support, but there are many opportunities for them to get more engaged such as in providing needed technical assistance. MPAs managed by people's organizations and barangays would benefit from increased local government support, which the study showed to be minimal over-all and tend to focus only on MPAs that LGUs themselves directly manage or co-manage. Though external funding support is critical particularly during the initial stages, there is a need to pursue building self-generated funds to enhance MPA management and sustainability. Also important is the need to design a system for equitable sharing of costs and benefits and to provide early incentives to marginalized MPA managers and cooperators.

The cost of establishing and managing a MPA appears to represent only a minor fraction of the potential benefits that can be derived from it. However, MPA establishment is not a sufficient ingredient in managing coastal areas. The value of MPAs lies in their limiting fishing effort and in providing spillover for the fishing population to subsist on. MPAs must be designed so as to maximize this goal and the net benefits that can be derived. An integrated approach that links MPA management to over-all coastal resource management and the social and economic development strategy of an LGU is necessary. Furthermore, networking of small, isolated MPAs based on ecological connectivities and integration of MPA efforts through the creation of social networks can lead to greater effectiveness by increasing spatial scales pertinent to fisheries management and biodiversity conservation as well as to more cost-efficiency in the long run.

Effective and efficient MPA management does not necessarily depend on the kind of management arrangement involved. Political will, the ability to muster needed local and external support, and practice of good governance are important. Lastly, the MPA can be seen to really matter only when it is able to meet its fisheries and ecological goals as well as produce net tangible benefits to local communities.

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# ACKNOWLEDGMENTS

The authors thank the following persons from the various study sites for serving as key informants and providing data for this study: Ponciano Edaño, Engr. Charles Macabuac, Romeo Suzon, Edwin Suzon, Marianito Verallo, Josephine D. Cabalun, Rohelio Cabrales, Romeo Masqueda, Vicente Mosqueda, Vicente Curtino, Alfredo Arnoco, Susan Cataylo, Rodolfo Go, Allan Blanza, Mario Octavio Arsenal, Ramon Baltazar, Jr., Agapito Laraga, William Martonia, Jesreel Josol, Bebie Perong, Wilma Lluvido, Carlos Lluvido, Octavio Arsenal, Ramon Baltazar, Tining Enero, and Enoc Marasigan. Contributions of the following consultants and staff of EcoGov2 are also acknowledged: Hazel Arceo, Marie Fe Portigo, Vincent Lumbab, and Maritess Magtangub for providing data and facilitating the fieldwork; Dr. Gem Castillo for providing technical advice; and Mr. Jose Ibarra Angeles for editing.

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# Tables



**Table 1. Brief profile of the study MPAs**

MPA	Location	Total Size (ha)	Natural Assets	Management Set-up	Date Formally Established
Pilar Municipal Marine Park (PMMP)	Brgys. Lower Poblacion & Villahermosa, Pilar, Cebu	179.4	138 has mangrove Seagrass Coral reefs	Co-management between municipality and barangay	September 2005
Villahermosa Marine Sanctuary (MS)	Brgy. Villahermosa, Tudela (Camotes Island, Cebu)	69.3	Seagrass Coral reefs Mangroves	Barangay-managed with some funding assistance from municipality	September 2004
Bibilik MPA	Brgy. Bibilik, Dumalinao, Zamboanga Del Sur (ZDS)	20	Coral reefs Seagrass Mangrove forests	Co-management between municipality and barangay	Established by the Barangay in 2002 but adopted by municipality in February 2003
Tambunan MPA	Brgy. Malim, Tabina, ZDS	103	Coral reefs Mangrove	Municipality managed	July 2003
Talisay MPA	Sitio Pangalaran, Brgy. Malim, Tabina, ZDS	32.8	Corals 13 ha Mangrove	People's Organization-managed	Protected by the PO since 1980's, formally established in 2004
Militar, Sto. Niño, Sugod and Tagulo (MiSSTA) MPA	Brgys. Tagulo and Brgy. Sugod, Tukuran, ZDS	160	Coral reefs Seagrass Mangrove forests	Co-management between municipality and barangay	2003

**Table 2. Average amount budgeted for MPA activities by municipal LGUs in each study site (2005-2007), in Philippine Pesos**

Municipality	MPA being funded	Income Class	Average Yearly IRA in million pesos	Ave. Yearly MPA Budget (as % of 20% DF)	Ave. Yearly MPA Budget Per Hectare
Pilar, Cebu	PMMP	5 <sup>th</sup>	16.9	125,000 (4%)	697
Tudela, Cebu	Villahermosa MS	5 <sup>th</sup>	16.5	25,000 (<1%)	361
Dumalinao, ZDS	Bibilik MPA	4 <sup>th</sup>	28.0	61,900 (1%)	3,095
Tabina, ZDS	Tambunan MPA	5 <sup>th</sup>	24.5	435,717 (9%)	4,230
Tabina, ZDS	Talisay MPA	5 <sup>th</sup>	24.5	0	0
Tukuran, ZDS	MisTTA MPA PALS MPA	4 <sup>th</sup>	33.3	600,000 (9%)	3,750

**Table 3. Average yearly amounts budgeted for CRM/MPA activities by host barangays (average of 2005-2007), in Philippine pesos**

Barangay	MPA being supported	Average Barangay IRA (Pesos)	Average MPA Budget / Year	Average MPA Budget/ha/Year
Brgy. Lower Poblacion & Brgy. Villahermosa (Pilar, Cebu)	PMMP	Lower Poblacion- 543,147 Villa Hermosa- 612,171	P4,000/barangay (4% of 20DF in Lower Poblacion, 3% in Villa Hermosa)	P22 per barangay P44 (total for the two barangays)
Brgy. Villahermosa (Tudela, Cebu)	Villahermosa MS	639,084	P22,721 (18% of DF)	P328
Brgy. Bibilik (Dumalinao, ZDS)	Bibilik MPA	500,000	P18,200 (18% of DF)	P910
Brgy. Malim (Tabina, ZDS)	Talisay MPA	700,000	P11,600 (8% of DF)	P354
Brgy. Malim (Tabina, ZDS)	Tambunan MPA	700,000	0	0
Brgy. Militar, Brgy. Sto. Niño, Brgy. Sugod and Brgy. Tagulo (Tukuran, ZDS)	MisTTA MPA	S. Niño-1,767,964 Militar- 637,000 Sugod- 521,946 Tagulo- 483,000	P5,000 each barangay (1% of DF in Santo Niño, 4% in Militar, 5% in Sugod, and 5% in Tagulo)	P31.25 (each barangay) P125 (total for 4 barangays)

**Table 4. Total estimated cost incurred in the establishment and implementation of the six study MPAs (undiscounted, in Philippine pesos, from establishment to 2006 only)**

MPA	Establishment <sup>9</sup>	Implementation <sup>10</sup>	Total Cost	Average Cost/Year	Average Cost/Ha /Year
PMMP	445,082 (2,481/ha)	612,153 (3,390/ha)	1,057,235	528,617	2,947
Villahermosa MS	377,867 (5,453/ha)	808,898 (11,672/ha)	1,186,765	237,353	3,425
Bibilik MPA	799,159 (39,958/ha)	1,427,326 (71,366/ha)	2,226,485	445,297	22,265
Tambunan MPA	840,778 (8,163/ha)	1,999,942 (19,417/ha)	2,840,720	710,180	6,895
Talisay MPA	357,576 (10,902/ha)	970,452 (29,587/ha)	1,328,028	332,007	10,122
MisTTA	741,081 (4,632/ha)	1,574,016 (9,838/ha)	2,315,097	771,699	4,823

<sup>9</sup> Includes certain capital costs (e.g., boat, guardhouse/outpost), installation of marker buoys, ordinance formulation, organization and planning activities, data in parenthesis is cost per hectare

<sup>10</sup> Includes administrative costs (personnel, office supplies and materials, travel, etc) and activity costs (law enforcement, IEC, training, , rehabilitation, ecotourism facilities, etc), data in parenthesis is cost per hectare

**Table 5. Comparison of major costs incurred by each study MPA**

Phase/Costs	Pilar	Villahermosa	Bibilik	Tambunan	Talisay	MISSTA
<b>Establishment</b>						
Guardhouse/ Outpost/Multipurpose Building	56,400	13,000	47,500	6,954	128,500	87,000
Patrol Boat(s)	68,000	none	24,000	250,000	64,000	92,026
Planning and Organizational Activities (including resource assessment, meetings and other transactions costs)	147,614	181,492	655,759	385,634	59,320	455,055
Delineation and installation of marker buoys	173,068	183,375	71,900	198,190	105,256	107,000
<b>Operational</b>						
M&E	34,802	31,350	66,080	57,550	0	118,750
Training/ Capability-building	57,451	120,152	171,152	158,340	186,200	325,080
Protection/ Enforcement	169,099	51,980	227,016	580,740	121,200	390,842
Sustainable revenue generation/ Livelihood, Ecotourism	50,126	117,463	119,732	2,500	290,907	100,000
Rehabilitation (e.g. mangrove replanting, corals, etc)	0	312,000	456,826	650,000	315,340	538,842

**Table 5. Percent sharing of labor costs in all study sites, 2005-2006**

MPA	Municipal Officers and Staff and paid guards (% of Grand Total)	Barangay Officials and paid guards (% of Grand Total)	Community Volunteer Labor (% of Grand Total)	% Share of Labor Cost To Total MPA Cost
PMMP	247,137 (91%)	12,841 (5%)	6,900 (4%)	26%
Villahermosa MS	6,958 (2%)	124,880 (43%)	156,000 (54%)	50%
Bibilik MPA	321,183 (81%)	43,418 (11%)	30,000 (8%)	18%
Tambunan MPA	98%	<1%	2%	42%
Talisay MPA	11%	9%	80%	39%
MisTTA MPA	88%	12%	No data	42%

**Table 6. Sources of funds for the study MPAs**

<b>MPA</b>	<b>Establishment Stage (%)</b>	<b>Implementation Stage (%)</b>	<b>Grand Total (%)</b>
<b>PMMP</b>	445,082	612,153	1,057,235
Municipality	202,904 (46%)	427,159 (70%)	630,063 (59%)
Barangay	4,990 (1%)	15,851 (2%)	20,841 (2%)
Community	0	11,000 (2%)	11,000 (1%)
Outside Grants/Donations	237,188 (53%)	152,243 (25%)	389,431 (37%)
MPA Collections/ Revenue	0%	6,900 (1%)	6,900 (1%)
<b>Villahermosa MS</b>	377,867	808,898	1,186,765
Municipality	70,874 (19%)	22,937 (3%)	93,811 (8%)
Barangay	88,000 (23%)	235,143 (29%)	323,143 (27%)
Province	0	25,000 (3%)	25,000 (2%)
Community	48,000 (13%)	312,000 (39%)	360,000 (30%)
NGA (Dep Ed, BFAR)		45,000 (5%)	45,000 (4%)
Outside Grants/Donations	166,993 (44%)	164,818 (20%)	331,811 (28%)
MPA Collections/ Revenue	4,000 (1%)	4,000 (0.5%)	8,000 (1%)
<b>Bibilik MPA</b>	799,159	1,427,326	2,226,485
Municipality	497,240 (62%)	537,901 (38%)	1,035,141 (46%)
Barangay	25,691 (3%)	76,399 (5%)	102,090 (5%)
Community	15,000 (2%)	50,000 (4%)	65,000 (3%)
Province	0	3,860 (0.3%)	3,860 (0.2%)
NGAs (DENR, DA-BFAR, PNP, Maritime)	3,000 (<1%)	29,816 (2.0%)	32,816 (2%)
Outside Grants/Donations	258,228 (32%)	729,350 (51%)	987,578 (44%)
<b>Tambunan MPA</b>	840,778	1,999,942	2,840,720
Municipality	548,685 (65%)	1,124,779 (56%)	1,673,464 (59%)
Barangay	1,503 (0.2%)	29,863 (15%)	31,366 (1%)
Community	1,500 (0.2%)	9000 (0.5%)	10,500 (0.4%)
Province	0	2,250 (0.1%)	2,250 (0.1%)
Outside Grants/Donations	278,290 (33%)	784,050 (39%)	1,062,340 (37%)
NGA (DENR, Maritime, Coast Guard)	10,800 (1%)	50,000 (2%)	60,800 (2%)
<b>Talisay MPA</b>	357,576	970,452	1,328,028
Municipality	7,000 (2%)	40,933 (4%)	47,933 (4%)
Barangay	0 (0%)	24,372 (3%)	24,372 (2%)
Community	54,820 (15%)	418,040 (43%)	472,860 (36%)
Outside Grants/Donations	295,756 (83%)	487,107 (50%)	782,863 (59%)
<b>MISTTA MPA</b>	741,081	1,574,016	2,315,097
Municipality	469,607 (63%)	904,794 (57%)	1,374,401 (59%)
Barangay	43,546 (6%)	139,805 (9%)	183,351 (8%)
Outside Grants/Donations	227,928 (31%)	460,817 (29%)	686,745 (30%)
NGA	0	68,600 (4%)	68,600 (3%)

**Table 7. Negative externalities caused by MPA establishment in the various study sites**

MPA	Who were affected	How affected	Remarks
PMMP	Navigational boats owners	Dry-docking inside the site was prohibited	Permanent, boat operators now drydock in Leyte
	Illegal fishers and fishers who operated inside the MPA	- 2-3 chlorine/ <i>tuble</i> fishers lost their earnings of P190 each - Spear/cyanide fishing (2-3 boats with net income of P5,000/boat, net share per crew of P400-P500 per outing)	Off-set by good harvest using legal gears in areas outside of the MPA Illegal fishers shifted activities to other areas
	Sand quarrying operators	Loss of net income of P650/day each for two families	Temporary, operation was relocated to another barangay
	Mangrove cutters	30 to 40 persons in Lower Poblacion and 10-15 in Villahermosa who engaged in mangrove cutting for livelihood	Mangrove wood and fuel now bought in the municipality of Tudela Mangrove harvesting is illegal by law
Villahermosa MS	Shellfish collectors	Prohibition on collection of shells inside core zone affected subsistence and commercial collectors	Minimal as collection of shellfish for food still allowed inside the bufferzone
	Fishers who formerly operated in present no-take/core zone	Greater distance and hence, time and cost to go to the areas where fishing is allowed	Net fishers affected and shifted activities to outside the boundaries of MPA, fishing pressure must have shifted there
Bibilik MPA	Fish pen/cage operators Fishers	Area of fishpen operation had to be relocated in another area 'No take zone' affected fishers	Affected individuals still against the MPA; poaching of fish inside MPA Death threats to Bantay Dagat
	Subsistence fishers who formerly operated inside the MPA	-5 families (1 km of walk, or additional 20 minutes travel by non-motorized banca or 2-3 minutes if motorized, -Around 50 families affected by prohibition on shellfish collection	Affected fishers had to walk extra kilometer to move to other location, fishers shifted operation immediately outside the MPA, offset by improved catch now in these areas
Tambunan MPA	Boat owners	Prohibition on passing and anchoring except along designated passage way meant additional travel time and fuel (20 motor and 10 paddle boats)	Temporary, prohibition not strictly enforced
	Fishers and shellfish collectors	Enforcement of no-take zone meant these activities had to be done outside the MPA	Offset by improved catch now
Talisay MPA	Boat owners	20 boat owners resisted the MPA because of the effect on navigation	Remaining opposition to the MPA due to partisan politics, not linked to MPA operation
	Fishers	More than 30 fishers from Sitio Pangalaran, 20 fishers from Brgy. Lumban engaged in hook and line fishing, 10 families from Brgy. Concepcion involved in octopus fishing	There is no dislocation of livelihood and the impact is in terms of extra paddling time and fuel for motorized due to the need to relocate fishing activities
MiSTTA MPA	Boat owners and majority of fishers	Additional expense for motorized boats and 5-20 minutes difference in paddle boat time	Offset by improved catch now, resistance addressed through frequent meetings/consultations

**Table 9. Summary of community anecdotes on benefits of MPA**

MPA	Perceived Benefits
PMMP	<ul style="list-style-type: none"> <li>• Politicians involved in MPA management became more popular</li> <li>• Improved catch (around 10 additional fishers from Monserrat, San Isidro, Kawit and San Juan and 1 family from Upper Poblacion were attracted to fish in the area as a result).</li> <li>• Community ecological awareness improved</li> <li>• Due to observed benefits, four barangays- Esperanza, Kawit, Oablog, and San Juan have decided to rehabilitate and renew the management of their abandoned marine sanctuaries</li> <li>• Strengthening of the Bibilik Women's association and the Bibilik Fisherfolk's association resulted in their greater ability to leverage funds.</li> </ul>
Villahermosa MS	<ul style="list-style-type: none"> <li>• Coral reefs improved, shellfish abundance and fish catch improved both inside and near MPA</li> <li>• Improved ecological awareness and community cohesion</li> <li>• Trained POs and barangay officials, improved credibility of barangay officials</li> </ul>
Bibilik MPA	<ul style="list-style-type: none"> <li>• As a result of improved catch, around 25 fishers from other localities and barangays come to Brgy. Bibilik to fish outside the fish sanctuary. In 2001, before the MPA establishment, barangay residents fished in neighboring municipalities of San Pablo, Dimataling and Tabina</li> <li>• Improved knowledge through training; better environmental awareness</li> </ul>
Tambunan MPA	<ul style="list-style-type: none"> <li>• More fish, larger sizes of fish caught, more shells, squids and octopus being caught now</li> </ul>
Talisay MPA	<ul style="list-style-type: none"> <li>• Improved law enforcement; better protected mangroves, signs of recovery of fish and corals</li> <li>• PO received award, was nominated for another award</li> <li>• PO became more empowered and now assists/train other MPAs manage their sanctuaries</li> <li>• The PO supplies the need for mangrove planting materials of and conducts IEC in other barangays in the municipality like Bagongon, San Andres, and Malim</li> </ul>
MisTTA MPA	<ul style="list-style-type: none"> <li>• More fish now being caught outside sanctuary, from 3 kg before to 5-6 kg using single hook and line and from 2 kg before to 4-5 kg now using multiple hook and line</li> <li>• More abundant and diverse fish inside sanctuary</li> <li>• Trained LGU personnel, community officials and fisherfolk organizations</li> <li>• People attracted to visit the sanctuary for ecotourism</li> </ul>

**Table 9. Historical change in corals and reef fish conditions inside and outside the MPAs**

Parameter	Pilar		Villahermosa		Bibilik		Tambunan			Talisay		
	'05	'06	'05	'06	'05	'06	'03	'04	'06	'03	'04	'06
Inside the MPA												
Hard coral (% cover)	8.63	10.64	3.50	10.17	ND <sup>11</sup>	37.50	19.35	22.13	33.39	14.3	8.31	22.19
Soft Coral (% cover)	1.19	4.48	0.25	0.37	ND	1.38	1.5	1.67	2.34	5.9	5.21	8.48
Sponges (% cover)	1.75	0.37	0.25	0.37	ND	10.88	3.45	3.53	8.69	6.55	5.21	5.88
Mean fish density (individuals per 500 m <sup>2</sup> )	392.0	573.0	52.5	273.7	369	1040	853	688	1,389	578	532	626
Mean fish biomass MT km <sup>-2</sup>	1.43	5.46	1.11	3.61	4.74	36.04	10.4	17.4	22.8	10.74	14.11	51.66
Outside the MPA												
Hard coral (% cover)	5.21	11.89	4.85	7.78	ND	64.58	17.1	21.2	34.98	16.5	21.46	31.10
Soft Coral (% cover)	0.78	1.63	0.95	0.85	ND	0.13	1.5	2	0.66	31.2	12.66	0.27
Sponges (% cover)	0.63	0.81	0.95	0.85	ND	6.43	4.5	10.9	0.79	6.665	5.3	2.7
Mean fish density (individuals per (500m <sup>2</sup> )	266	360	133	141	320	1073	555	680	875	669	702	588
Mean fish biomass (MT km <sup>-2</sup> )	4.63	2.14	0.58	0.87	9.43	28.8	14.2	23.2	50.3	17.04	24.6	38.6

Data Sources:

EcoGov. 2007. Pilar Municipal Marine Park M&amp;E Report.

EcoGov 2007. Villahermosa Marine Sanctuary M&amp;E Report.

MSA Naawan Foundation for Science and Technology Development Incorporated. 2006. Final Report Marine Sanctuary Monitoring and Evaluation and Training in Selected MPAS of IBRA 9.

<sup>11</sup> No data

**Table 10. Estimated value of mangrove resources found in three study MPAs**

MPA	Size of Mangrove Stand (ha)	Estimated TEV/ ha/year (2007 prices and exchange rate)	Total Estimated Annual TEV	Average Annual Total MPA Cost as % of Annual TEV	Average Annual Municipal MPA Budget as % of Annual TEV
PMMP	138 ha	US\$824/ha (PhP38,028) <sup>12</sup>	US\$113,712 (PhP 5,247,809)	PhP 528,617 (10%)	P125,000 (2%)
Talisay MPA	13 ha	US\$824/ha (PhP38,028)	US\$10,712 (PhP494,359)	PhP 332,007 (67%)	0 <sup>13</sup> (0%)
Tambunan MPA	8.5 ha	US\$824/ha (PhP38,028)	US\$7,004 (323,235)	P710,180 (220%)	435,717 (135%)

<sup>12</sup> Arrived at by doing price adjustments on original 1998 TEV of US 600/ha/year (exchange rate of 1US\$= 42.85). The 1998 prices was converted to 2007 prices by multiplying it with the ratio of consumer price index of 140.6 for 2007 and 90.7 for 1998 . Source of CPI statistics: [www.census.gov.ph/data/sectordata/tscpiyr.htm](http://www.census.gov.ph/data/sectordata/tscpiyr.htm); The adjusted price was then converted to 2007 dollar value of PhP46.15 Source: <http://www.bsp.gov.ph/Statistics/spei/tab12.htm>.

<sup>13</sup> The municipality did not allocate funds for this MPA

**Table 11. Management effectiveness status of the study MPAs relative to their costs**

MPA (date of formal establishment)	Management Set-Up	Management Effectiveness Rating (2007)	Status	Inferential Biophysical Monitoring Results	Average Cost Year <sup>-1</sup>	Cost Ha <sup>-1</sup> Yr <sup>-1</sup>
Pilar Municipal Marine Park (179.4 ha), Sept. 2005	Barangay-municipality co-managed	Level 2 (MPA is established)	With Mgt. Plan, annual action planning, 24-hours guarding, floating guardhouse, marker buoys, patrol boat, yearly M&E, IEC, fund-raising activities, capability building activities, billboards; annual MPA General Assembly meeting, functional Management Board that meets monthly; MPA and fishing-related violations reduced but continues.	Improved hard coral cover, fish density and biomass inside the MPA; hard coral cover and fish density improved immediately outside MPA	528,617	P2,947
Villahermosa Marine Sanctuary (69.3), formally adopted by the municipality in Sept. 2004; although already existing in 2002	Barangay- managed, closely assisted by a fisherfolk organization	Level 3 (MPA is enforced)	With Mgt Plan, ordinance, annual action planning, 24-hour guarding, marker buoys, no patrol boat, concrete multipurpose guardhouse and boardwalk being constructed, yearly M&E, IEC; capability-building training; alternative livelihood project, website, effective law enforcement	Improved hard coral cover, fish density and biomass inside and immediately outside the MPA	237,353	P3,425
Bibilik Marine/ Fishery Sanctuary (20 ha), formally adopted by the municipality in 2003, although already existing in 2002	Municipality-barangay co-managed	Level 2 (MPA is established)	With Mgt. Plan, annual action planning, 24-hours guarding, yearly M&E, regular IEC, marker bouys, guardhouse, patrol boat, billboards, coral transplantation, mangrove reforestation, coastal clean-up; capability-building training; political interference on law enforcement; continuing death threats to Bantay Dagat; law enforcement not yet effective; proposed working committees not yet formed	Improved fish density and biomass inside and outside MPA, no baseline data on coral cover	445,297	P22,265
Tambunan Municipal Sanctuary (103 ha), 2003	Municipality-managed	Level 3 (MPA is enforced)	With Mgt. Plan, annual action planning, 24-hours guarding, guardhouse, M&E, IEC and sea camp, marker buoys, patrol boat, mangrove reforestation, coral planting, fish cage project, financial mgt. training, patrolling and monitoring equipment & logistics; of the 7 MPA committees created, only the IEC is functional yet; effective law enforcement	Improved hard coral cover, fish density and fish biomass inside and outside MPA	710,180	P6,895

<b>MPA (date of formal establishment)</b>	<b>Management Set-Up</b>	<b>Management Effectiveness Rating (2007)</b>	<b>Status</b>	<b>Inferential Biophysical Monitoring Results</b>	<b>Average Cost Year<sup>-1</sup></b>	<b>Cost Ha<sup>-1</sup>Yr<sup>-1</sup></b>
Talisay Municipal Sanctuary (32.8 ha); formally established in 2004, but area has been protected since the 1980's	PO-managed	Level 2 (MPA is established)	Without a management plan, with guard house, patrol boat, marker buoys, boardwalk, regular IEC, sea camp, mangrove nursery, financial mgt and paralegal training; effective law enforcement	Improved hard coral cover, fish density and biomass inside MPA	332,007	P10,122
MisTTA Municipal Sanctuary (160 ha); 2003	Barangay-municipality co-managed	Level 3 (MPA is enforced)	With Mgt. Plan, annual action planning, 24-hours patrolling, floating outpost, marker buoys, patrol boat, billboards, IEC, coral planting, mangrove replanting, crab fattening and agar-agar projects; financial, value formation, and enforcement training; purchase of equipment & logistics, 2006 elections affected management meetings and activities; effective law enforcement	No biophysical monitoring record available	771,699	P4,823

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**Table. 12. History of MPA and fisheries law violations**

Year	Incidence of Violation					
	Pilar	Villahermosa	Bibilik	Tambunan	Talisay	MisTTA
2003	-	-	10	-	20	-
2004	-	42	6	25	17	7
2005	1	21	4	14	5	5
2006	17	7	4	8	1	3
May (2007)	6	0	1	0	0	0