Enhancing MPA Management Effectiveness for the Calamianes Islands MPA Network, Palawan Province, Philippines[1]

FINAL REPORT
(June 30 2009)

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EXECUTIVE SUMMARY

Introduction

Marine Protected Areas (MPAs) have received much attention in recent years as an alternative approach to traditional fisheries management (Roberts et al. 2001; Halpern 2003; Mora et al. 2006). The primary goals of MPAs are to protect critical habitat and biodiversity, and to sustain or enhance fisheries by preventing spawning stock collapse and providing recruitment to fished areas (Roberts et al. 2001; Halpern 2003). Establishment of MPAs has been practiced in the Philippines since the 1970s with more than 430 MPA sites legally established (Pajaro et al. 1999).

Despite the many potential benefits of MPAs to coastal management programs (Halpern 2003), the majority of MPAs do not meet their management objectives (Mora et al. 2006). In order to improve the management of these MPAs, the project titled "Enhancing MPA Management Effectiveness for the Calamianes Islands MPA Network, Palawan Province, Philippines" was launched to develop, refine and test indicators of MPA effectiveness. The objective of this project was to assess the management effectiveness of a network of MPAs in the Calamianes Islands, northern Palawan, Philippines using a suite of biophysical, socioeconomic and governance variables ('indicators') appropriate to regional conditions that influence the performance of MPAs. The majority of these indicators were developed by the World Conservation Union's (IUCN) World Commission on Protected Areas (WCPA) and the World Wide Fund for Nature (WWF) in a joint initiative aimed at improving the management of MPAs (Pomeroy et al 2004; Ehler et al. 2002). This paper aims to evaluate the management effectiveness of the MPA network in the Calamianes Islands, in additional to the traditional evaluation of individual MPAs.

Methodology

Complementary methods/techniques have been employed to implement the project. During the 'Project Start-up Meeting' held on 14-15 January 2008, the key research/project partners were brought together. This was followed by the "Training Workshop on Enhancing the Management Effectiveness of MPAs in the Calamianes." Attended by 31 participants on 24–28 March 2008, the key purposes of this workshop were to: (1) make the final selection of indicators to be tested, and (2) train local managers in the MPA Guidebook methodology. From the nine MPAs that comprise the Calamianes Islands MPA Network, these three MPA sites were selected for initial testing of the indicators: (1) Sagrada-Bogtong Marine Reserve, (2) Decalve Strict Protection Zone (Bintuan-Sangat Marine Park) and (3) Bugor-Sand Island Marine Protected Area. These MPAs have varied habitats: Sagrada-Bogtong (392 ha) that is predominantly

mangrove, while Decalve (63 ha) and Bugor-Sand Island (125 ha) largely consist of corals. All these sites have management plans and special enforcement teams.

Methodologically, the evaluation of MPA effectiveness has been a participatory process involving the MPAs' local resident communities, selected stakeholders at the municipal (planning and agriculture offices in the municipalities of Busuanga, Coron and Culion) and national (Department of Environment and Natural Resources and Bureau of Fisheries and Aquatic Resources) levels, one international research organization (WorldFish Center), one local academic institution (Palawan State University) and one foreign-funded project (USAID-funded Fisheries Improved for Sustainable Harvest [FISH] Project). The participatory selection of indicators during the workshop selected a suite of 23 indicators (6 biophysical, 8 socioeconomic and 9 governance).

Then, the testing (primary data gathering) of selected indicators followed. Testing of biophysical indicators formed part of the annual monitoring of the FISH project. Biophysical indicators were assessed using standard techniques, such as fish visual census for fisheries and line transects for marine habitats (coral reefs, mangroves and seagrass beds). Socioeconomic and governance indicators were assessed using household surveys (420 respondents) and key informant interviews or KII (28 respondents). A random sampling of household respondents was attempted at 90% confidence interval. Respondents for the KII included: village officials, municipality officials, tourism people, law enforcement personnel, pearl farm workers, national government agency representatives, MPA managers, members of fisheries and aquatic resources management councils, and officials of fishing associations. Data gathering was undertaken from May to June 2008.

Three validation workshops were undertaken to solicit the stakeholders' feedbacks. The first community validation was conducted right after data collection in each MPA site in May and June 2008. The second validation workshop on 9 September 2008 provided some highlights of results for the three MPA sites, which was participated by the MPA managers and representatives for the Calamianes Islands MPA network. The third community validation workshop was held in each MPA site. More quantitative highlights of the FISH Project's biophysical monitoring, household survey and KII results were presented to the community. Overall, the results of the study were accepted. Currently, further data processing and analysis are being undertaken.

Initial/Preliminary Results

Economically, most households are heavily dependent on the fisheries given fishing as the primary occupation. Although they utilize coral reefs the most, they also partly depend on mangroves and seagrass beds.

The three MPAs' fisheries exhibited multiplicity of gears and species. The results of the fisheries survey suggest a general decline in fish biomass. Major gears used by fishers

include hook and line, nets (drift and bottom set), fish traps and spear gun. key species caught by gear include: hook and line – threadfin breams and groupers; nets – siganids and mullets; fish traps - emperors; and spear gun - fusiliers. Relatively, during southwest monsoon (June to September), more fishers go out to fish and the catch rate is higher compared with northeast monsoons (November to February).

Perceptions of change in resource condition between before MPA establishment and the current MPA varied among sites. Respondents from Decalve Strict Protection Zone generally perceived the improving conditions of their coral reefs, mangroves and seagrass beds, while respondents from two other MPA sites perceived the reverse. Only Decalve is generating income from tourism-related activities, through a user fee system, particularly snorkeling and diving. Various human activities continue to threaten the MPA areas' coastal ecosystems. Compared to before the MPA establishment, however, the threats to the coral reefs have considerably diminished. More than four-fifths of respondents across sites have attributed the threats reduction due to MPA establishment.

Only about half of the respondents were aware of information generated about the MPA. This is surprising considering the extensive studies undertaken in the area since 2004. There is multiplicity of livelihood activities that include seaweed farming, gleaning, fish culture, pearl farm laborer, fish processing and fish trading. Majority of those engaged in capture fisheries earned net monthly income below the income range of PhP2000-2999 (about US$43-64). The stakeholders tended to value the coastal resources beyond their direct use values. They generally agreed to the importance of non-use and non-market values of coastal resources. Fish catches are mainly sold in the local market through either the retailer or wholesaler.

Enabling national and local legislations related to MPAs exist. The respondents perceived that local legislation and national legislation are adequate to support the MPA objectives. In terms of site governance, the MPA management boards are responsible. The stakeholders perceived that these governance bodies are performing well in terms of planning and monitoring; however, they need improvement in areas of information dissemination, enforcement and user fee system. Six types of resource use conflicts were identified, which largely deal with the fisheries sector.

In terms of degree of interaction between managers and stakeholders, most respondents indicated that they were aware of MPA-related meetings. Details of formal MPA rules and regulations are found in the respective management plans; however, respondents are generally aware of those that pertain to the fisheries. They are aware the fishing is prohibited within the core zones. Informal rules also exist.

Available and actually allocated MPA administrative resources are rather limited. Equipment/supplies are taken from various sources, particularly local governments, private sector (pearl farm) and FISH Project. Available personnel and funds are even more limited.

Management Implications

Most biophysical findings are consistent with the results of household surveys and KIIs. The relative decline in fish biomass is corroborated by the general perception of fishers regarding their declining fish catch. There are mixed results in terms of marine habitats status: the recorded improvement in coral cover in Decalve is validated by the stakeholder responses concerning their improving coral reef conditions; in Bugor-Sand, however, the respondents perceived that the coral conditions have worsened but the actual habitat condition has remained relative constant over the years. Such divergent results between perceptions and biophysical surveys could have been influenced by human factors, such as bias in terms of recollection and geographical orientation within and outside MPA.

A key challenge is to transform the results of biophysical, socioeconomic and governance indicators into 'common metrics' for a simplified measurement of an MPA's management effectiveness. Development of evaluation ratings and/or indices (such as '+' for positive rating, '-' for negative rating, '0' for no change rating) for individual and cluster of indicators is on-going. Moreover, the results suggest that the 23 indicators tested may be prioritized in terms of their relative importance. Hence, a lesser number of indicators may be used for future MPA monitoring and evaluation.

1 Introduction

The fisheries sector is vital to the Philippine economy, providing substantial employment and income, contributing export earnings, and meeting local food security and nutrition requirements. In terms of contribution to the country's total fish production in 2005, aquaculture had the biggest share, with 46%. Commercial and municipal fisheries had lower contributions of only 27% each (BFAR, 2006). While capture fisheries provide a valuable source of fish and fishery products consumed by Filipinos and contribute significantly to the country's overall improvement of economic activity (i.e., as a source of employment and foreign exchange), they have experienced a steady decline in production in recent years, especially in coastal or municipal fishing areas, causing an alarming shortfall in supplies of aquatic products. Production from capture fisheries has fallen since the late 1970s due to stock depletion in coastal waters that affects municipal fisheries. Commercial fishing has suffered a similar decline, as overfishing has affecting offshore areas.

From a recent study, the biomass levels of coastal fish stocks in various fishing areas in the Philippines are today only 10-30% of the levels in the late 1940's (Barut et al. 2003; Armada 2004). In addition, about 25-30% of the total catch is lost due to improper handling, inadequate storage facilities and inefficient marketing.   Dickson et al. (2005) note that the depletion of fishery resources is caused by an open access policy on their use, a rapid increase in population in coastal areas, and the Government's inadequacy in providing sustainable programs for fishery development. From 1997 to 2003, the average production growth rate of commercial fisheries fell to 4% and of municipal fisheries to 2%. This deterioration caused the incidence of poverty among the coastal communities to increase by nearly 50% between 1987 and 1997 (Gorrez et al. 1999).

Marine Protected Areas (MPAs) have received much attention in recent years as an alternative approach to traditional fisheries management (Roberts et al. 2001, Halpern 2003; Mora et al. 2006). The primary goals of MPAs are to protect critical habitat and biodiversity, and to sustain or enhance fisheries by preventing spawning stock collapse and providing recruitment to fished areas (Roberts et al. 2001; Halpern 2003). Recently, MPAs have become a major component of Pacific Island coral reef conservation strategies. Establishment of marine protected areas (MPAs) has been practiced since the 1970s with more than 430 MPA sites legally established (Pajaro et al. 1999). The Sumilon and the Apo Island Marine Reserves were among the earliest fishery reserves and also well documented (see Alcala et al. 2002, 2005, Abesamis et al. 2006).

Despite the many potential benefits of MPAs to coastal management programs (see Halpern 2003), the majority of MPAs do not meet their management objectives (Mora et al. 2006). In order to improve the management of these MPAs, we propose to develop, refine and test indicators of MPA effectiveness in conjunction with a larger international

effort. The objective of this project is to assess the management effectiveness of a network of 9 MPAs in the Calamianes Islands, northern Palawan, Philippines (Figure 1), and to implement lessons learned and good practices from the GEF/UNEP project "Knowledgebase for Lessons Learned and Best Practices in the Management of Coral Reefs". These MPAs have been assisted by the Bureau of Fisheries and Aquatic Resources through the Fisheries Improved for Sustainable Harvest (FISH) Project. We propose to craft and measure a suite of biophysical, socioeconomic and governance variables ('indicators') appropriate to regional conditions that influence the performance of MPAs. The majority of these indicators were developed by the World Conservation Union's (IUCN) World Commission on Protected Areas (WCPA) and the World Wide Fund for Nature (WWF) in a joint initiative aimed at improving the management of MPAs (Ehler et al. 2002).

Figure 1. Map of the Philippines depicting FISH Project sites, including the Calamianes Islands.

The goal of the initiative is to provide decision-makers with tools for assessing the effectiveness of both individual MPA sites and networks of MPAs. The specific objectives of the initiative are to:

1. Develop specific indicators and guidelines for MPA managers to use in evaluating the effectiveness of their sites;
2. Use pilot projects to field test and refine the MPA management effectiveness indicators and guidelines;
3. Implement lessons learned and best practices from the GEF/UNEP Lessons Learned project; and
4. Increase awareness and use of monitoring and evaluation in the management of MPAs.

This progress report covers the period from 01 October 2007 - 28 February 2009

2 Methodology

Varied methods/techniques have been employed to undertake the project activities. To date, five major component activities have been undertaken. The first activity was the 'Project Start-up Meeting'. This was held at the WorldFish Center – Philippine Office from 14-15 January 2008. This consultation workshop achieved the following outputs: (1) brought together key research/project partners (i.e., FISH Project, Palawan State University, Palawan Council for Sustainable Development Staff, and WorldFish Center); (2) elaborated project work program, milestones; and (3) identified key technical and management options for improved delivery of project objectives. Other matters covered included the 'Letter of Agreements' among institutional partners, research teams, indicators, sampling sites and policy briefs/recommendations. Details are provided in the meeting report.

The second activity was the "Training Workshop on Enhancing the Management Effectiveness of Marine Protected Areas (MPAs) in the Calamianes Islands MPA Network, Palawan Province, Philippines." Attended by a total of 31 participants, this was held at the Darayonan Lodge, Coron, Palawan, Philippines from 24–28 March 2008. The purposes of this workshop were to: (1) make the final selection of indicators to be tested, (2) train local managers in the MPA Guidebook methodology, (3) finalize the work plan for the Calamianes Islands MPA Network, (4) increase awareness and use of monitoring and evaluation in the management of MPAs in the Calamianes Islands. Details are given in the progress report submitted to NOAA covering the period from 01 October 2007 to 31 March 2008.

During this workshop, nine MPAs that comprise the Calamianes Islands MPA Network were assessed using several criteria such as habitat types present, date of establishment and accessibility. Ultimately, these three MPA sites were selected for initial testing of the indicators: (1) Sagrada-Bogtong Marine Reserve, (2) Decalve Strict Protection Zone (Bintuan-Sangat Marine Park) and (3) Bugor-Sand Island Marine Protected Area. Basic site profile/characteristics and geographic location of these MPAs are given in Table 1

and Figure 2, respectively. All these sites have management plans and Special Enforcement Teams or SET. These MPAs have varied habitats: Sagrada-Bogtong Marine Reserve is predominantly mangrove, while the two others largely consist of coral reefs. All have tourism-associated activities, but only Decalve has a functional user fee system. Majority of the population are engaged in the fisheries sector.

Table 1. Profile of three MPAs selected for evaluation in Calamianes Islands MPA network, Palawan Province, Philippines.

Municipality	Barangay (Village)	Name of MPA	Year Established	Ecosystems/ Habitats	Total Area (ha)	Number of Households (2007)
Busuanga	Sagrada & Bogtong	Sagrada-Bogtong Marine Reserve	2006	Mangrove with patches of coral reefs and seagrass beds	392	441
Coron	Bintuan	Decalve Strict Protection Zone (Bintuan-Sangat Marine Park)	2004	Coral reefs with patches of mangroves and seagrass beds	62.61 (3,164)	296
Culion	Libis Culango Jardin Tiza Balala Baldat Osmena	Bugor-Sand Island Marine Protected Area	2005	Coral reefs with patches of mangroves and seagrass beds	125	197
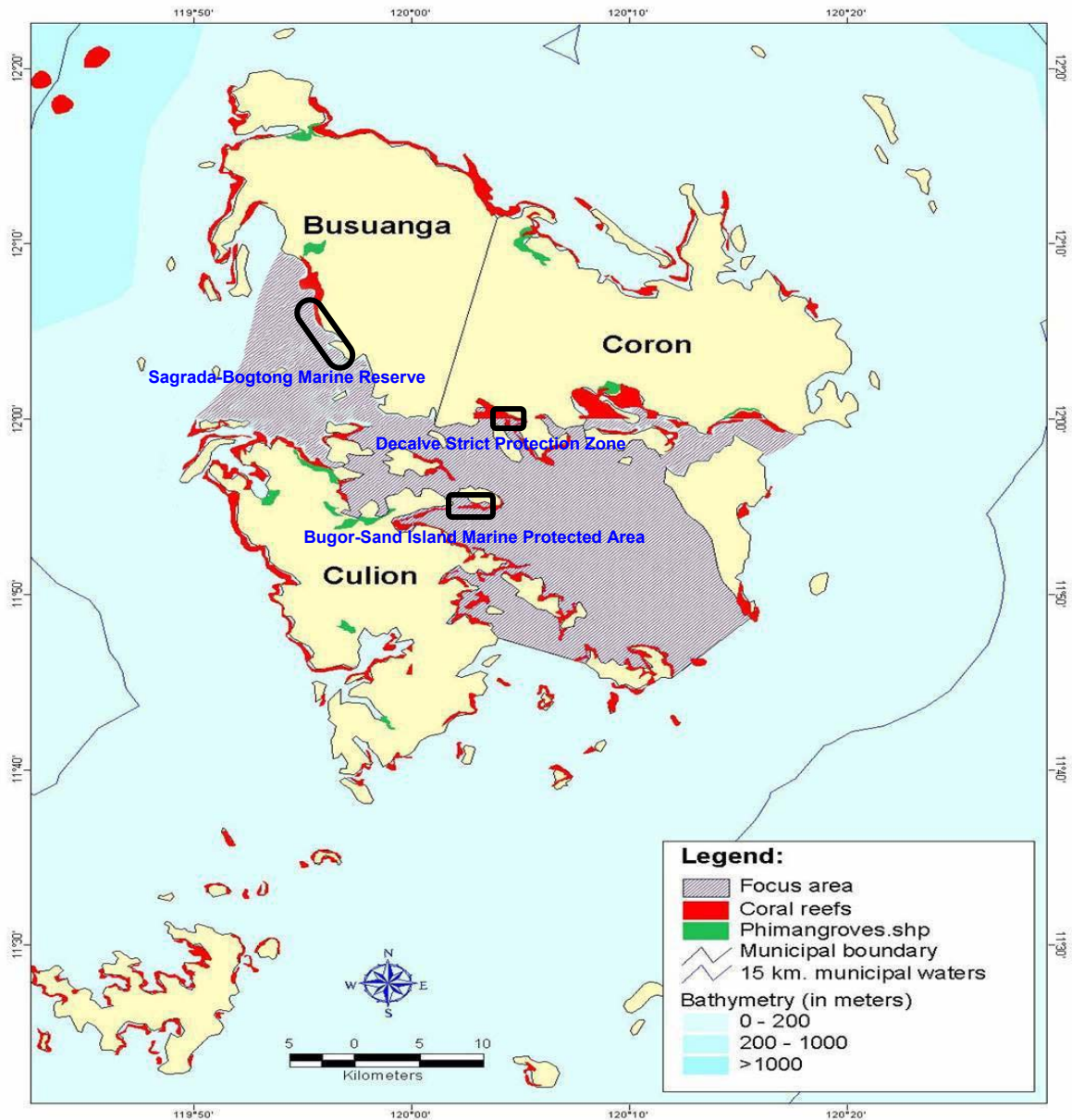
Figure 2. Location Map of three MPAs selected for evaluation in Calamianes Islands MPA network, Palawan Province, Philippines

The workshop was a success in initiating institutional partnership. Methodologically, the evaluation of MPA effectiveness has been a participatory process involving the MPAs' local resident communities, selected stakeholders at the municipal (planning and agriculture offices in the municipalities of Busuanga, Coron and Culion) and national (Department of Environment and Natural Resources and Bureau of Fisheries and Aquatic

Resources) levels, one international research organization (WorldFish Center), one local academic institution (Palawan State University) and one foreign-funded project (USAID-funded Fisheries Improved for Sustainable Harvest [FISH] Project). The selection of indicators underwent a participatory process as reflected in Table 2. A suite of 23 biophysical (6), socioeconomic (8) and governance (9) indicators were finally selected during the workshop (Table 3).

Table 2. Participatory process in the selection of indicators used in the evaluation of management effectiveness in Calamianes Islands MPA network, Palawan Province, Philippines.

Indicator Category	Identified in Project Proposal	Coron MPA Training Workshop Output		Recommended by Research Team	Final Indicators
		Initial	Prioritized		
1. Biophysical	5	10	10	6	6
2. Socioeconomic	7	10	7	8	8
3. Governance	8	11	10	9	9
Total	20	31	27	23	23

Note: One indicator (Number of tourists) was added during the development of the data gathering instruments. This indicator was not part of the MPA guidebook (Pomeroy et al 2004), but was used in MPA management effectiveness evaluation in other MPAs in Palawan.

Table 3. List of selected biophysical, socioeconomic and governance indicators used in the evaluation of management effectiveness in Calamianes Islands MPA network, Palawan Province, Philippines.

Cluster of Indicator	Name of Indicator
Biophysical	1. Focal species abundance
	2. Focal species population structure
	3. Habitat distribution and complexity
	4. Recruitment success within the community
	5. Food web integrity
	6. Type, level, and return on fishing effort
Socioeconomic	1. Local marine resource use patterns
	2. Level of understanding of human impacts
	3. Perceptions of local resource harvest
	4. Perceptions of non-market and non-use value
	5. Household income distribution by source
	6. Number and nature of markets
	7. Distribution of formal knowledge to community
	8. Changes in conditions of ancestral and historical sites, features, and/or monuments
Governance	1. Level of resource conflict
	2. Existence of a decision-making & management body
	3. Existence and adoption of a management plan
	4. Local understanding of MPA rules and regulations
	5. Existence and adequacy of enabling legislation
	6. Availability and allocation of MPA admin resources
	7. Degree of interaction between managers and stakeholders
	8. Clearly defined enforcement procedures
	9. Degree of information dissemination to encourage stakeholders compliance

The third activity was the testing (primary data gathering) of selected biophysical indicators. Testing of biophysical indicators forms part of the annual monitoring of the FISH project. This was undertaken between April - June 2008. Earlier monitoring activities were undertaken in years 2004 and 2006. Biophysical indicators were assessed using standard techniques, such as fish visual census for fisheries and line transects for marine habitats (coral reefs, mangroves and seagrass beds).

Socioeconomic and governance indicators were assessed using household surveys (420 respondents) and key informant interviews or KII (28 respondents). A random sampling of household respondents, using the list of community households, was attempted at 90% confidence interval (Table 4). Respondents for the KII are categorized into nine groups (Table 5).

Table 4. Sampling frame for household survey of stakeholders in Calamianes Islands MPA network, Palawan Province, Philippines.

Municipality / MPA Name	Household Population	Actual Sample	Confidence Interval
1. Coron (Decalve Strict Protection Zone / Bintuan-Sangat Marine Park	441	160	93.98%
2. Culion (Bugor- Sand Island Marine Protected Area)	296	157	94.76%
3. Busuanga (Sagrada-Bogtong Marine Reserve)	197	107	93.86%

Table 5. Respondents for key informant interviews in Calamianes Islands MPA network, Palawan Province, Philippines.

Respondents' Category	Coron (Decalve Strict Protection Zone/ Bintuan-Sangat Marine Park)	Culion (Bugor- Sand Island Marine Protected Area)	Busuanga (Sagrada-Bogtong Marine Reserve)	Total (28)
1. Village Official	2	1	2	5
2. Municipality Official	4	5	3	12
3. Tourism People	1	0	0	1
4. Law Enforcement	0	0	1	1
5. Pearl Farm	1	1	0	2
6. National Government Agency	1	0	0	1
7. MPA Manager	1	1	1	3
8. Fisheries and Aquatic Resources Management	1	1	0	2
9. Fishing Association	0	1	0	1

In terms of data gathering instruments, a questionnaire was administered for the household survey while a series of questions were asked for the KII (see Appendix I). Primary data gathering was undertaken by a combined team from the PSU, WorldFish Center and FISH project. As part of the post-training activity, the draft data gathering instruments were pre-tested in Balisungan Marine Protected Area and Decalve Strict Protection Zone in March 2008. After revision, the final pre-testing was done in Balisungan Marine Protected Area (part of the MPA network) in May 2008. Actual data gathering was undertaken from May to June 2008. In summary, four complementary

methodologies were employed for testing the indicators used for evaluation of three MPA sites in Calamianes Islands, Palawan, Philippines (Table 6).

Table 6. Methodology for testing the indicators used for evaluation of three MPA sites in Calamianes Islands, Palawan, Philippines.

Indicator Cluster	Household Survey	Key Informant Interview	FISH Project Monitoring	Recruitment Training and Field Work
1. Biophysical	1		5	1
2. Socioeconomic	8	1		
3. Governance	6	3		

Note: values indicate the number of indicators tested

Fourthly, a series of three validation workshops were undertaken to solicit the stakeholders' feedbacks. The first community validation was conducted right after data collection in each MPA site in late May and early June 2008. During community assemblies, the research team presented the highlights of their immediate findings in qualitative manner. The second validation workshop was undertaken in Coron on 9 September 2008 whereby some highlights of results for the three MPA sites were presented. This event was participated by the MPA managers and representatives for the Calamianes Islands MPA network, making it sort of an integration workshop. The third community validation workshop was held in each of the three MPA sites. More quantitative highlights of the FISH Project's biophysical monitoring, household survey and KII results were presented to the community. In these three validation meetings, the community members were given the chance to clarify or correct certain information. Overall, the results of the study were accepted.

The fifth activity, which is on-going, relate largely to data processing and analysis. It includes 'cleaning' of databases, data aggregation and/or splitting and re-running of univariate analysis. Some bivariate analysis (eg correlations) and multivariate analysis (eg factor analysis) may be undertaken later depending on the results of the univariate analysis.

3 Results (Updated)

The results chapter is conveniently divided into three sections: (1) biophysical indicators, (2) socioeconomic indicators, and (3) governance indicators. Each section, in turn, is divided into two parts. The first part is the indicator's 'definition', which is liberally copied and/or adopted from the MPA guidebook (Pomeroy et al 2004). The second part is the 'description/analysis'. Here, the selected results are presented – such as tables and

figures – as well as their accompanying textual description. Some forms of analysis and/or interpretations are also provided.

3.1 Biophysical Indicators

3.1.1 Focal species abundance (B1)

3.1.1.1 Definition

Species abundance is the number of individuals of a particular species found to occur within and outside the MPA. A focal species is an organism of ecological or human value that is of priority interest for management through the MPA. In this case it was actually measured as focal species density, which is the number of individuals per unit area as measured by visual census of a belt transect. Focal species included major target species in the fishery and also indicator species, which are primarily corallivores that are thought to be useful indicators of reef health as their density and/or biomass is linked to live coral cover.

3.1.1.2 Description/analysis

The temporal trend in reef fish density is shown for the study sites (both inside and outside each MPA) in Figure 3. Table 7 summarizes the trends

Decalve Outside (Density)

Bugor Inside (Density)

Bugor Outside (Density)
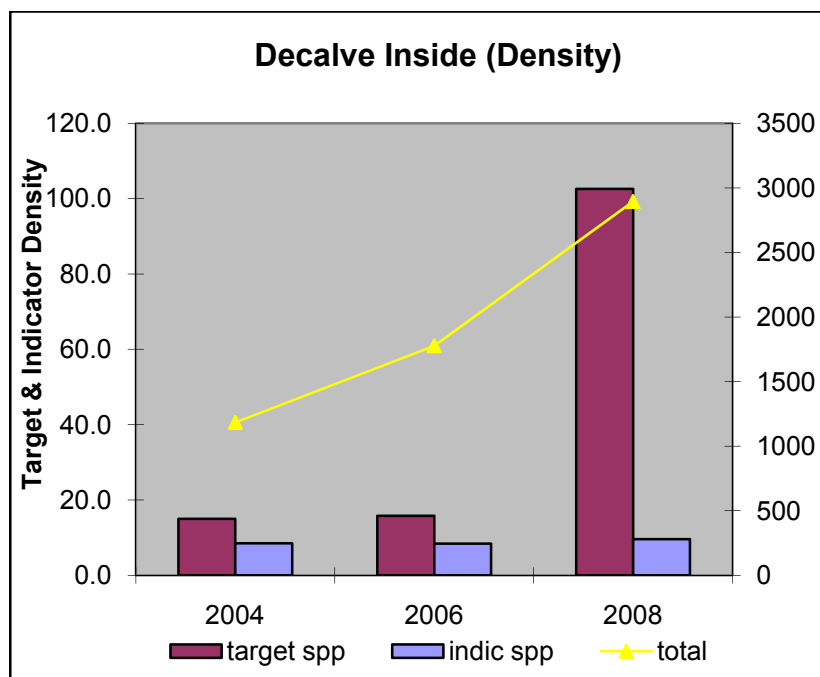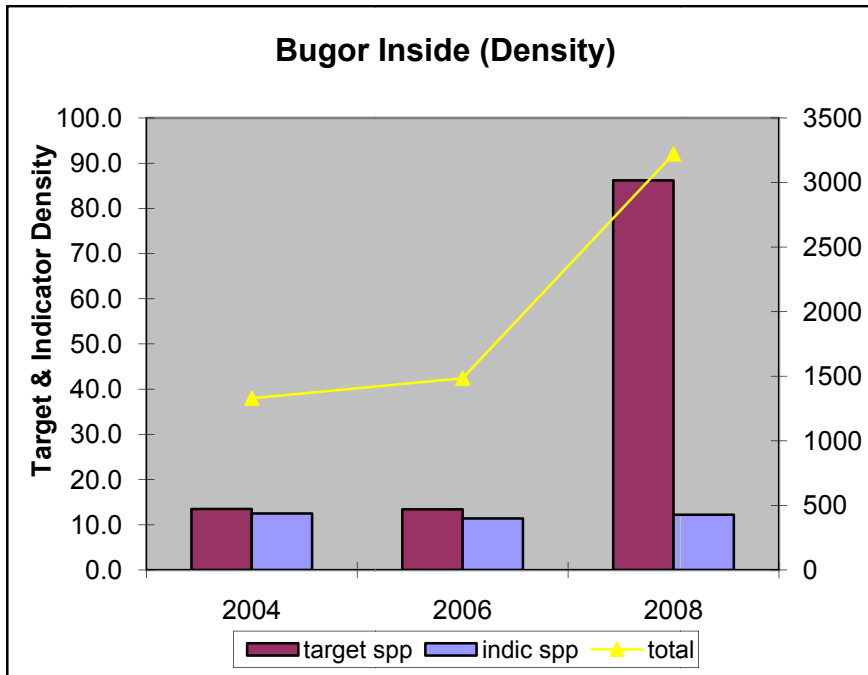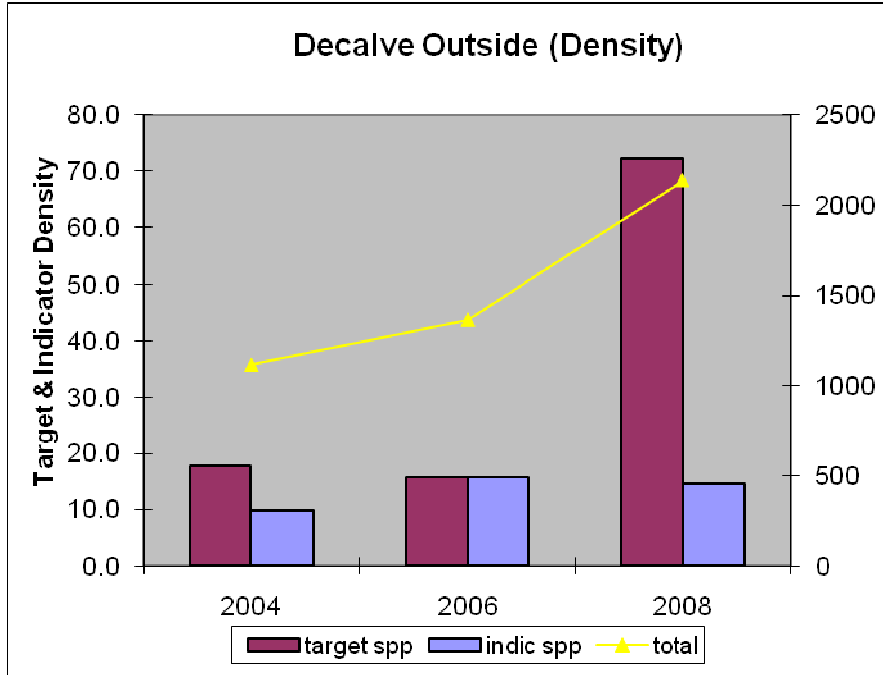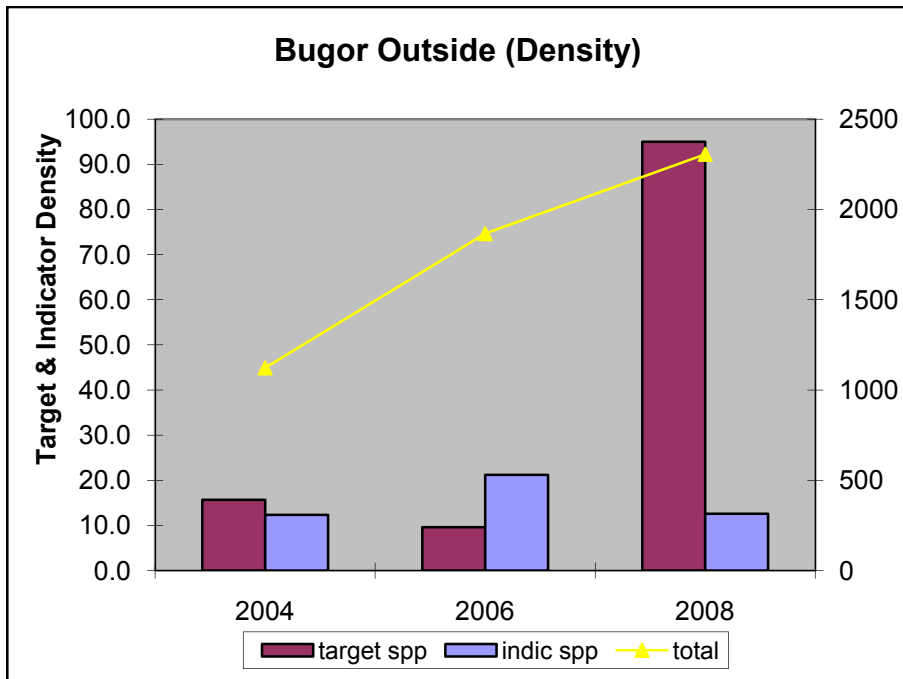
Figure 3. Density of reef fishes inside and outside MPAs at Decalve and Bugor. Target species are those important to the fishery. Indicator species are mainly corallivores considered indicative of coral health.

Bintuan Inside (biomass)
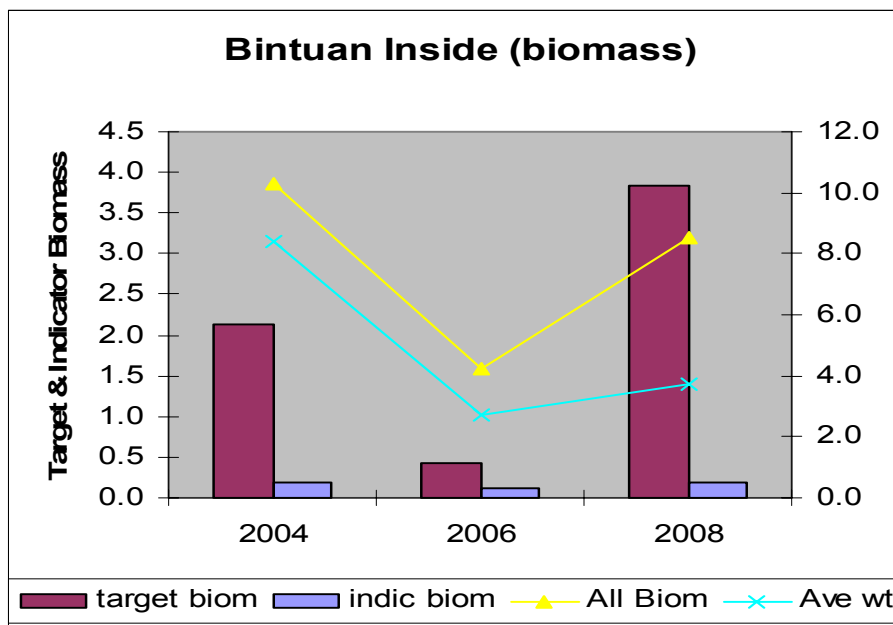
Bintuan outside (Biomass)
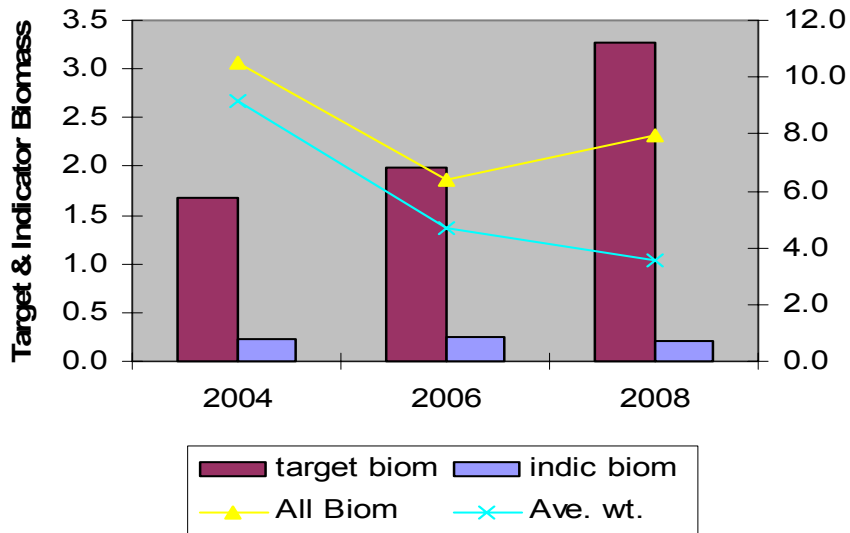
Bugor Inside (Biomass)

Bugor Outside (Biomass)
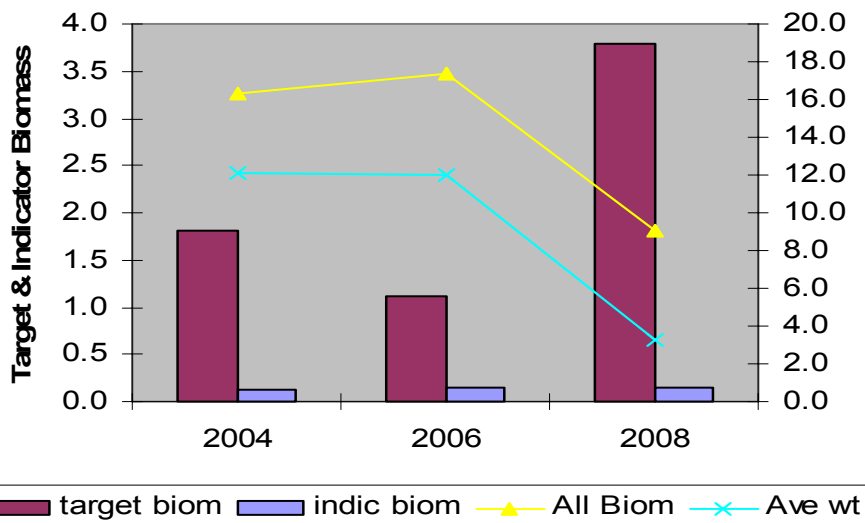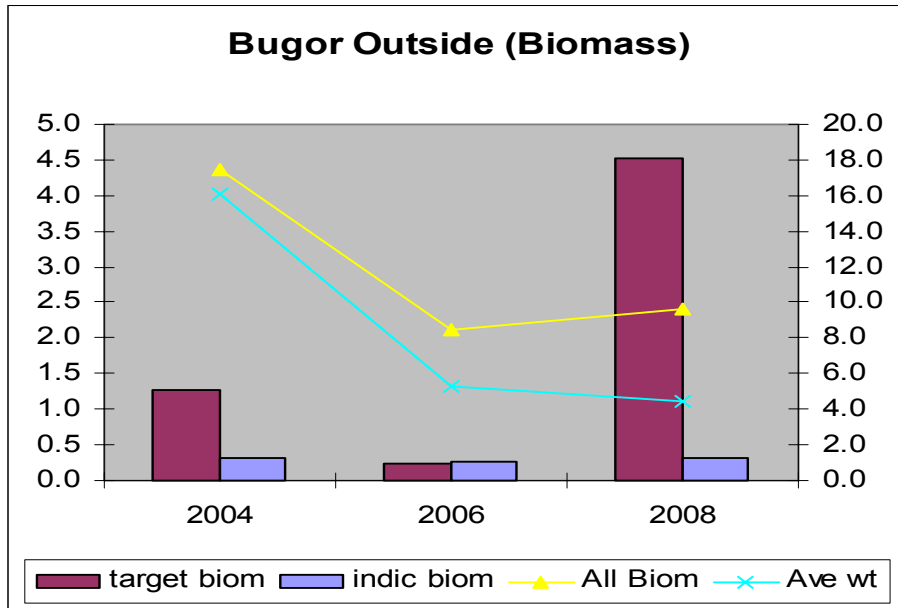
Figure 4. Biomass of reef fishes inside and outside MPAs at Bintuan (Decalve) and Bugor. Target species are those important to the fishery. Indicator species are mainly corallivores considered indicative of coral health.

Table 7. Summary of trends in abundance and biomass of reef fish in the Calamianes Islands MPAs.

Fisheries Condition	Decalve	Bugor-Sand	Sagrada-Bogtong
Abundance (inside and outside)	1. General increase in abundance of all fish inside and outside. 2. Target fish increase from 2004/06-2008 3. Reef health indicator fish ~same.	1. General increase in abundance of all fish inside and outside. 2. Target fish increase from 2004/06-2008 3. Reef health indicator fish ~same.	n/a

Biomass (inside and outside)	1. Target fish increase in biomass 2004/06-2008. 2. Little change in reef health indicator fish. 3. Overall decrease in biomass of all fish due to decrease in average size of fish.	1. Target fish increase in biomass 2004/06-2008. 2. Little change in reef health indicator fish. 3. Overall decrease in biomass of all fish due to decrease in average size of fish.	n/a

3.1.2 Focal species population structure (B2)

3.1.2.1 Definition

Population structure is the probability with which different sizes and ages of individuals are likely to occur within a population of a focal species.   This enables managers to have a snapshot of what proportion of the focal species population is made up of reproducers and help forecast population growth rates or predict declines that may happen.

3.1.2.2 Description/analysis

See Annex 1: FISH Project technical report, pages 17-23.

3.1.3 Habitat distribution and complexity (B3)

3.1.3.1 Definition

Habitat is defined as the living space of an organism, population, or community, as characterized by both its biotic and physical properties. The habitat distribution within a specified area or ecosystem is the structural and spatial characterization of all habitat types represented, based on their: Physical location (including depth); Configuration (i.e. placement next to one another); and Extent in terms of total area (in km^2).

Habitat distribution varies widely with each MPA may only encompass one or two different habitat types. At the other end, large-scale ecosystem MPAs may host dozens of

different habitats. Habitat complexity is defined as the extent (area in km2) and diversity (number) of habitat types and distinct zones found within a specified area.

3.1.3.2 Description/analysis

The reefs surrounding Bugor and Sand Islands are considered as traditional fishing grounds and gleaning area by fisherfolks coming from Chindonan and other parts of Culion. Tagbanuas also gather lato and giant clams or taklobo and some other edible fauna in the area. Bintuan's irregular coastline is bordered with dense mangrove forests and grand limestone cliffs. Barangay Bintuan is well characterized by wide areas of interconnected mangroves, seagrass and coral reefs where various forms of marine organisms thrive. Mangrove forests densely line the shore, coves and islands, followed by seagrass meadows that occur in contiguity with fringing coral reefs.

Coastal habitats were assessed by the FISH project. In terms of coral and mangrove habitats, they are either improving in conditions or have remained constant since the establishment of the MPAs (Figure 4; Table 8). A detailed description of the habitat structure of the MPA sites can be found in Annex 1 (FISH Project technical report): pages 5-17.

Bintuan outside

Bugor inside
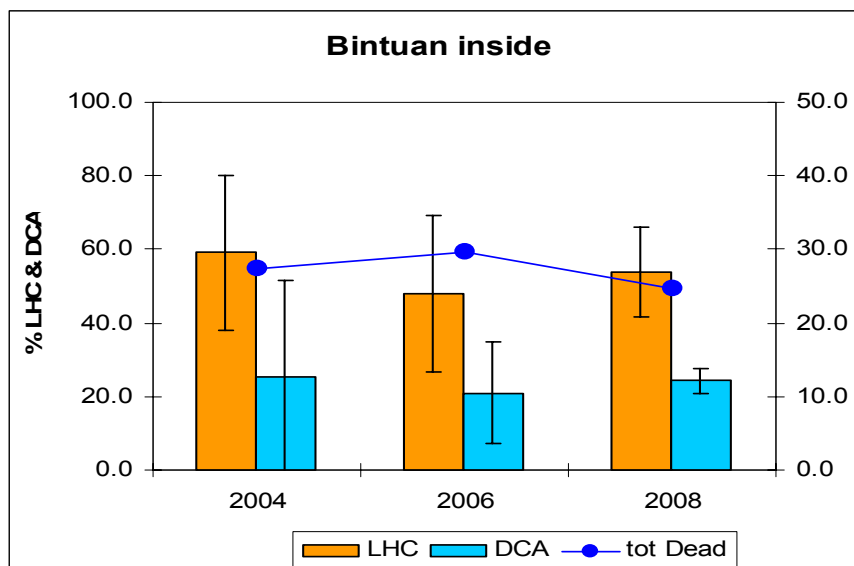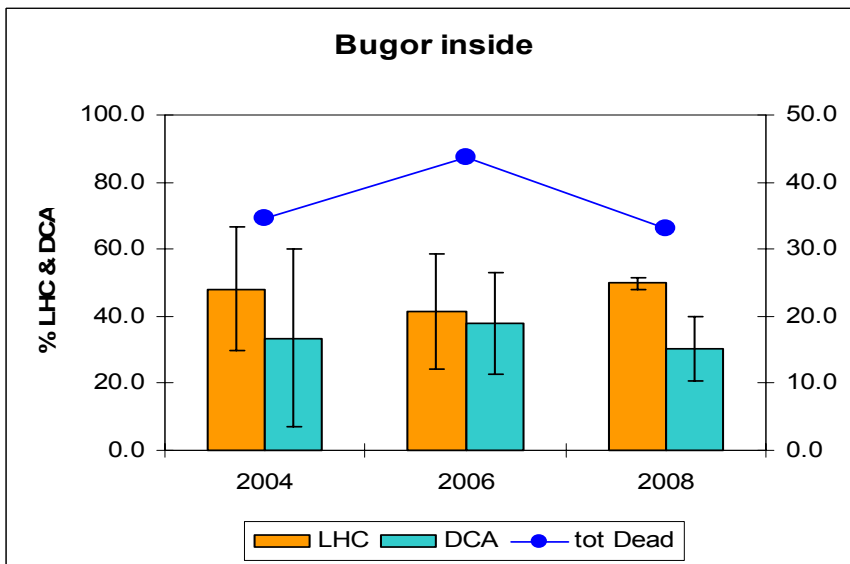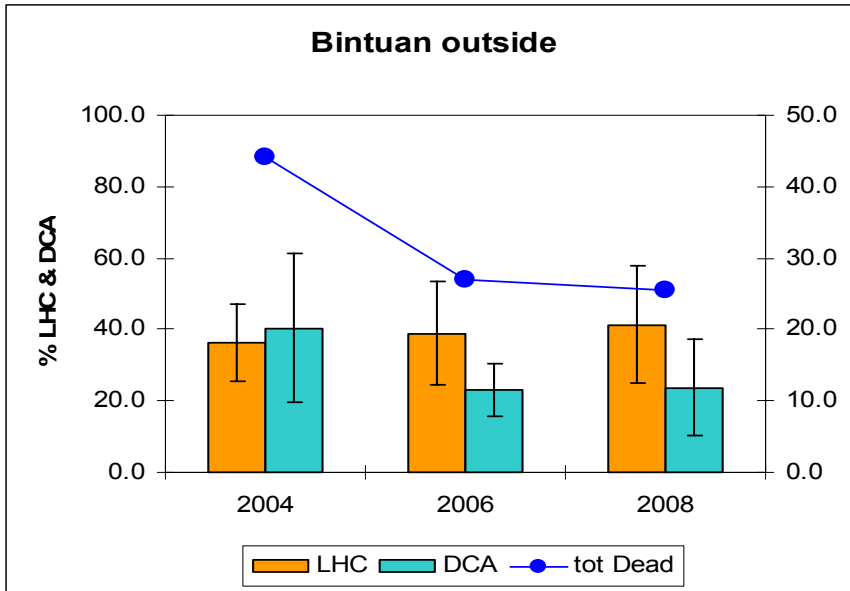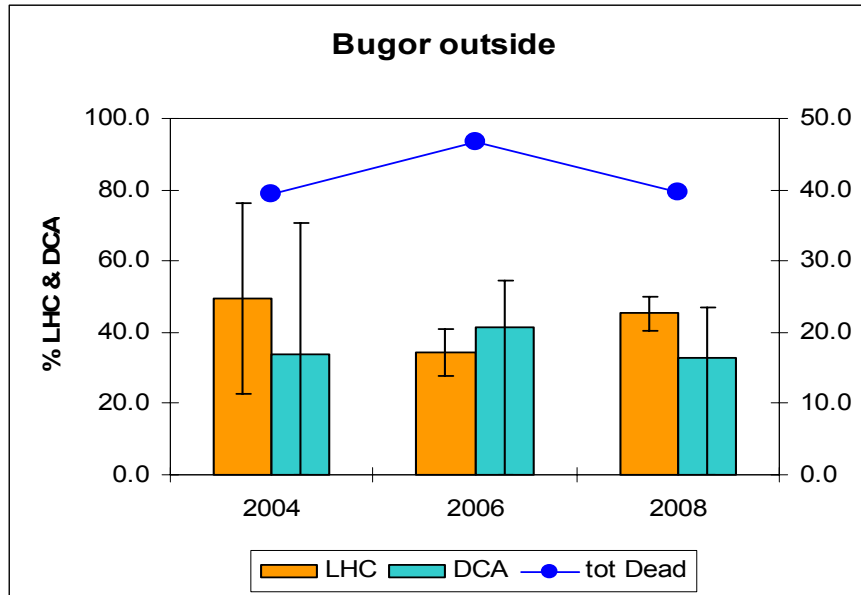
Figure 4. Reef habitat structure at Bintuan (Decalve) and Bugor sites. LHC = live hard coral. DCA = dead coral and algae. Tot Dead = total percentage of dead substrate.

Table 8. Status of the coastal habitats in the three MPA sites.

Fisheries Condition	Decalve	Bugor-Sand	Sagrada-Bogtong
Coral cover (inside and outside)	1. Generally little change in live/dead coral cover inside.	1. Same pattern of changes inside and outside.	n/a
	2. ~40% decrease in total dead coral cover.	2. General decrease in the variability within any year.	
	3. Very slight (~14) increase in live coral cover outside.	3. Little change from 2004-08.	
	4. Large variability within any given year.		

Source: FISH Project PPT of Willy Campos and Benjie Francisco
Note: n/a means no actual site monitoring was done in the MPA site

3.1.4 Recruitment success within the community (B5)

3.1.4.1 Definition

Recruitment success within the community is the degree of larval input, settlement and juvenile recruitment and survivorship experienced across populations of organisms that exist within a community. Measuring recruitment across a range of habitats is necessary to determine essential nursery habitat for key species.

3.1.4.2 Description/analysis

There was no significant difference in total recruitment of reef fishes between any of the sites or between MPAs and open areas at a given site (Figure 5). There was also no significant difference in total recruitment to any of the eight habitat types surveyed, including: reef slope, reef flat, reef crest, mangrove, seagrass, macroalgae, mixed coral/seagrass, and mixed coral/algae (Figure 6).
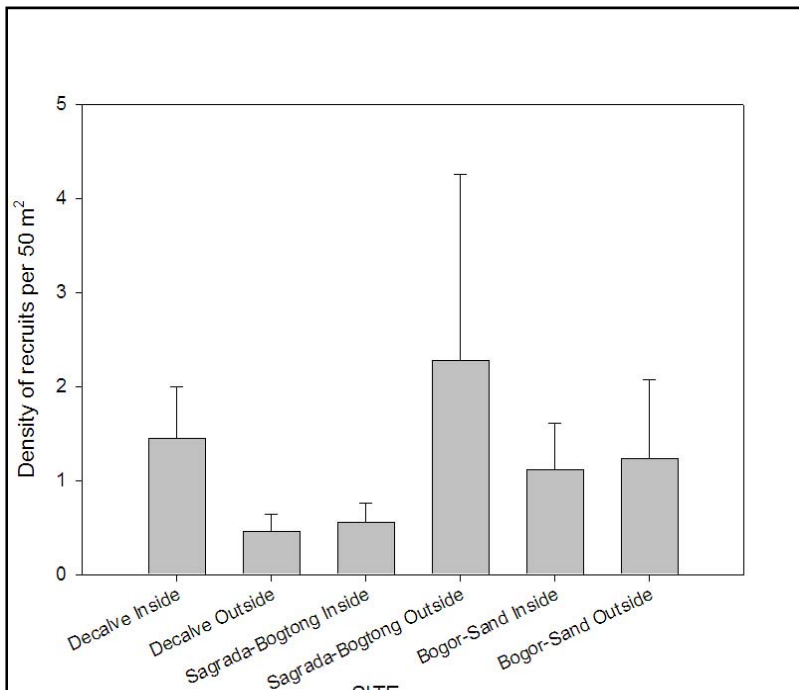
Figure 5. Recruitment of all reef fishes combined to transects inside and outside the 3 MPAs.
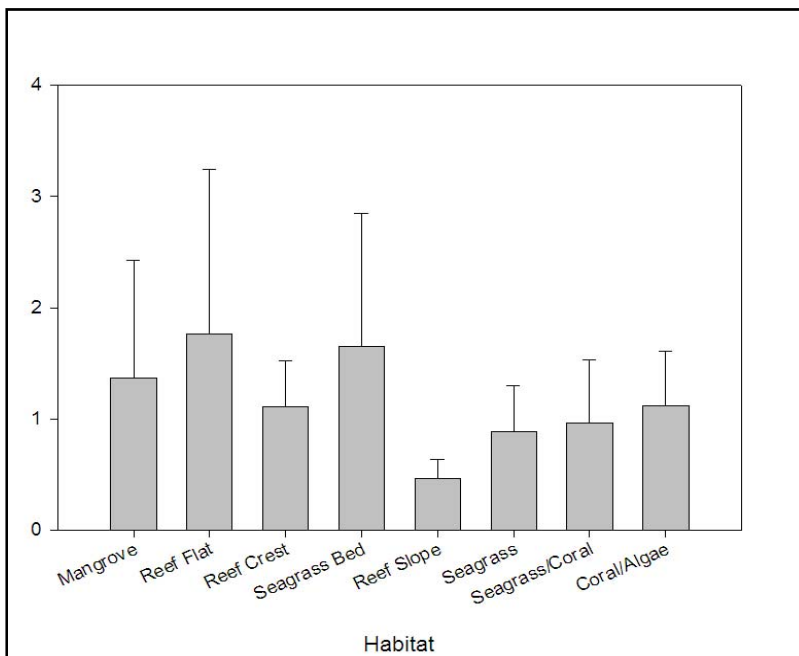
Figure 6. Recruitment of all species combined at all sites to various habitat types.

Food web integrity (B6)

3.1.4.3 Definition

A food web is a representation of the energy flow through populations in a community. Food web integrity is a measure of how supportive (for members of the community) and reliable trophic relationships are within the interconnected food chains of a community.

3.1.4.4 Description/analysis

An interesting phenomenon in the Calamianes Islands was the removal of both the upper and lower trophic levels (Figure 7). Abundance of primary herbivores (parrotfishes, rabbitfishes and surgeonfishes) was low, as was abundance of piscivores (groupers, snappers, jacks and barracudas). The most abundant species were mid-trophic level (wrasses, haemulids and pomacentrids). While most reef fisheries focus on larger carnivorous species, this pattern reflects the Pacific trend of preference for herbivorous species. Figure x shows the distribution of trophic levels at Bugor MPA (yellow line) in comparison to that of Apo Island MPA in Negros Oriental, which has been established for over 20 years.
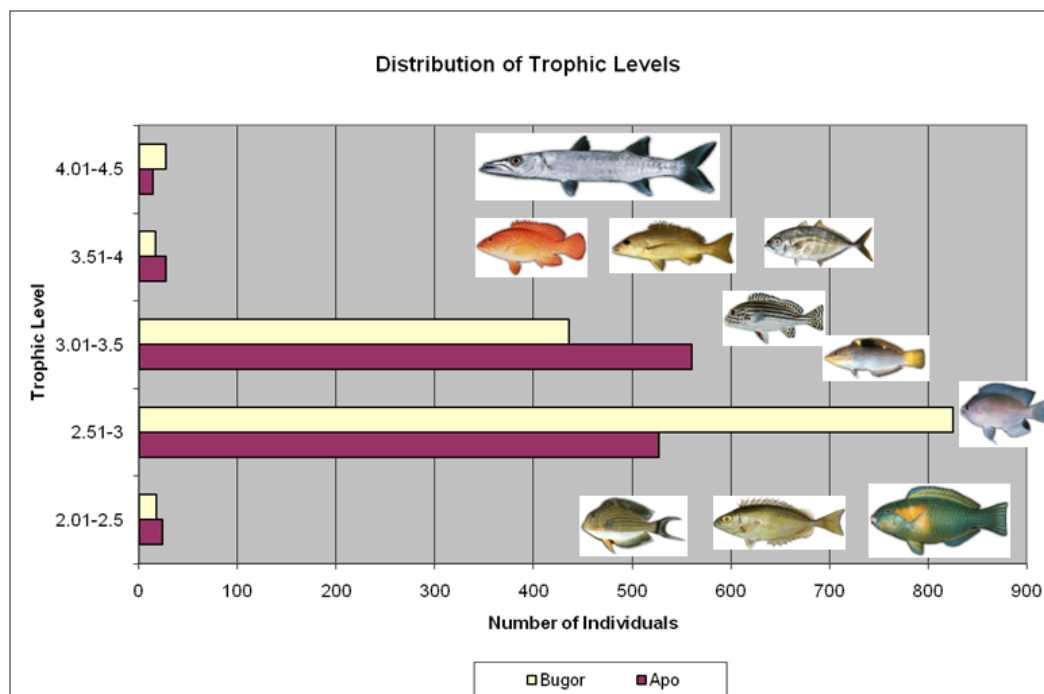
Figure 7. Abudnace of fish in each trophic level at Bugor MPA (yellow line) and Apo Island MPA in Negros Oriental (red line).

3.1.5 Type, level, and return on fishing effort (B7)

3.1.5.1 Definition

The type of fishing effort is a description of the kind and degree of extractive power used during fishing activities, both in terms of technology and skilled labor. The level of fishing effort is a measure of the amount of total labor (number of people) and time (number of hrs/days) used during a fishing activity. The return on fishing effort is measured as the number (of individuals) or weight (biomass) of a species caught per unity effort (day or hr per person or team of people) of harvest invested across each fishing method and technology used.

3.1.5.2 Description/analysis

The three sites exhibited multiplicity of gears and species (Table 9). Some 35 gears are used catching about 128 species of marine organisms. This condition is typical in many tropical marine fisheries.

Table 9. Summary of the number of fishing gears used and species caught at the three MPA sites in Calamianes Islands, Palawan, Philippines.

	Gears	Species
Complete list in Decalve Site	18	59
Complete list in Bugor-Sand Site	22	70
Complete list in Sagrada-Bogtong Site	15	56
Common to All 3 Sites	8	28
Common to Decalve and Bugor-Sand Sites	11	37
Common to Decalve and Sagrada-Bogtong Site	9	34
Common to Bugor-Sand and Sagrada-Bogtong Site	11	34
Exclusive to Decalve Site	6	16
Exclusive to Bugor-Sand Site	8	27
Exclusive to Sagrada-Bogtong Site	1	16

Coastal communities are heavily dependent on the fisheries, particularly the reef fisheries. The results for biophysical indicators suggest a general decline in fish biomass (Table 7). Fishers in Decalve indicated the major gears they used and the key species they caught during southwest (June to September) and northeast monsoons (November to February) (Table 10 and 11). Relatively, during southwest monsoon, more fishers go out to fish and the catch rate is higher.

Table 7. Major gears and key species caught during southwest monsoon (June to September) in Decalve.

Main Gears		Top 3 Species Caught	No. of Fishers	Min	Max	Mean	SD	Total
						Catch Rate (kg/trip)		
1. Kawil	1	Bisugo	47	0.25	10.00	2.7381	1.76327	128.69
		Kanuping	47	0.50	10.00	2.6017	1.86276	122.28
	2	Lapu	24	0.50	15.00	3.6458	3.63701	87.50
	3	Kalapato	15	0.50	15.00	3.4667	3.79128	52.00
2. Lambat	1	Kamang	14	1.00	10.00	4.6429	2.95107	65.00
	2	Samaral	8	1.00	6.00	2.8800	1.72700	23.00
		Danggit	8	3.00	10.00	7.3750	2.77424	59.00
	3	Banak	7	0.60	10.00	3.5143	3.46190	24.60
3. Bubo	1	Samaral	5	10.00	10.00	10.000	0.00000	50.00
	2	Lapu	3	1.00	3.50	2.1667	1.25831	6.50
	3	Pusit	2	1.00	4.00	2.5000	2.12132	5.00
		Kanuping	2	3.00	4.00	3.5000	0.70711	7.00

Table 8. Major gears and key species caught during northeast monsoon (November to February) in Decalve.

Main Gears		Top 3 Species Caught	No. of Fishers	Min	Max	Mean	SD	Total
						Catch Rate (kg/trip)		
1. Kawil	1	Bisugo	45	0.50	15.00	2.5736	2.31674	118.39
	2	Kanuping	32	0.50	5.00	2.3281	1.24181	74.50
	3	Samaral	13	0.67	15.00	3.3592	3.69968	43.67
		D. Bukid	13	0.50	15.00	4.8077	4.29893	62.50
2. Lambat	1	Kanuping	8	1.00	10.00	5.5000	3.42261	44.00
	2	Samaral	6	0.50	10.00	3.4167	3.63891	20.50
		Danggit	6	2.00	10.00	5.3333	3.07679	32.00
	3	Bisugo	3	2.00	4.00	2.6667	1.15470	8.00
3. Pana	1	Samaral	3	7.00	7.00	7.0000	0.00000	21.00
	2	Lapu	2	0.50	6.00	3.2500	3.88909	6.50
		Danggit	2	1.00	15.00	8.0000	9.89949	16.00
	3	D. Bukid	1	1.00	1.00	1.0000	0.00000	1.00
		Mulmol	1	3.00	3.00	3.0000	0.00000	3.00

3.2 Socioeconomic Indicators

Most of the respondents shared these demographic characteristics: household heads; reached primary level of education; and household size having 4-6 members (Table 12). Economically, most households are heavily dependent on the fisheries given fishing as the primary occupation (Table 13).

Table 9. Selected demographic characteristics of household respondents.

Characteristic	Decalve (n=160)	Bugor-Sand (n=157)	Sagrada-Bogtong (n=107)
Education (in years)			
0-6	56.9	51.6	60.7
7-10	30.5	29.9	27.1
11 and above	11.3	16.6	12.1
Household Head	78.1	89.2	89.7
Household Size (number of members)			
1-3	21.9	27.4	16.8
4-6	50.6	47.8	56.1
7-9	21.9	19.1	24.3
10-11	4.4	3.8	2.8

Note: values in percent

Table 10. Primary occupation of respondents.

Primary Occupation	Decalve		Bugor-Sand		Sagrada-Bogtong	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Fisher (full time)	98	61.3	152	96.8	100	93.5
Fisher (part time)	9	5.6	1	0.6	5	4.6
Others	53	33.1	4	2.5	2	1.8
Total	**160**	**100**	**157**	**100**	**107**	**100**

3.2.1 Local marine resource use patterns (S1)

3.2.1.1 Definition

This indicator refers to the ways people use or affect coastal and marine resources. Understanding local marine resource use patterns would help determine whether or not management strategies are impacting on the livelihood programs and cultural traditions,

among others. The information may likewise be useful to determine what coastal and marine related activities have been affected by the MPAs.

3.2.1.2 Description/analysis

The coastal inhabitants are heavily engaged in the use of their coastal resources and/or marine habitats. Although they utilize coral reefs the most, they also partly depend on mangroves and sea grass beds. The percentage of households interviewed who are involved in either reef fisheries, mangrove gleaning, mangrove capture fisheries or seagrass gleaning is presented in (Figure 8)
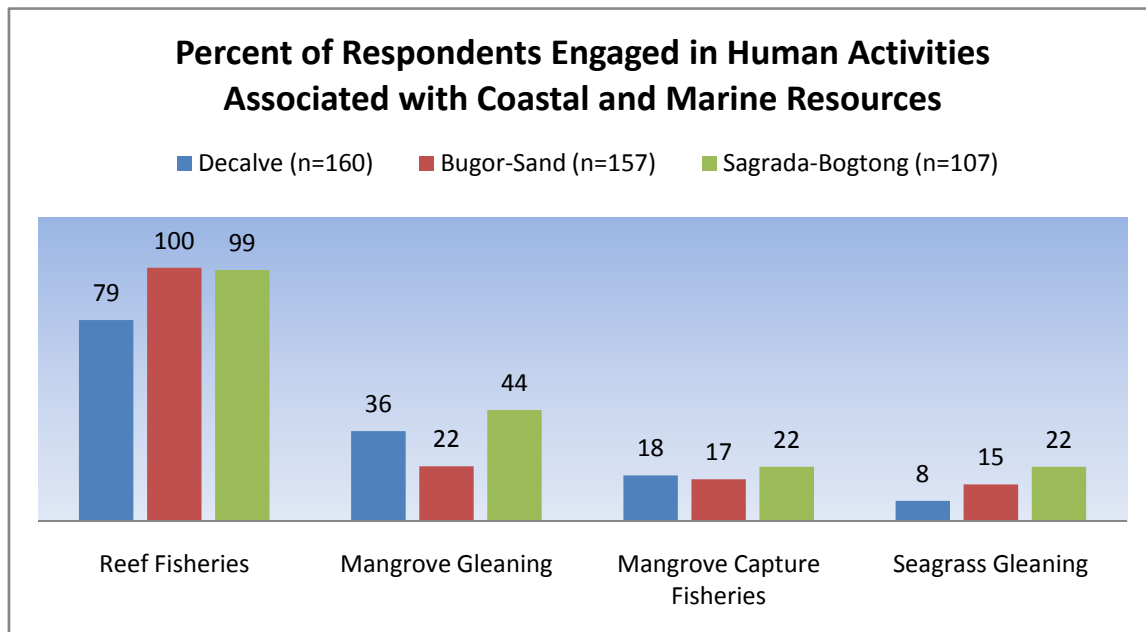
Figure 8. Percentage of respondents engaged in human activities associated with coastal/marine resource.

The coastal habitats are being utilized for various consumption and livelihood activities practically whole year round (Figure 9). In general, economic activities are most intense during the months of June to September. Common to all three MPA sites are the following: (1) the peak months for activities related to reef fisheries are from June to September; (2) mangrove gleaning activities are heavily done during the months from June and December; (3) activities related to mangrove capture fisheries are heaviest during the months of June to August; and (4) those engaged in seagrass gleaning are most active during the month of December. The first quarter of the year is considered lean season for reef fisheries, while the months of January to February are considered as lean months for mangrove capture fisheries.

Coastal and Marine Resource Activities	Site	Months											
		1	2	3	4	5	6	7	8	9	10	11	12
Reef Fisheries	Decalve	B	B	B	B		G	G	G				
	Bugor-Sand	B	B	B		G	G	G	G				
	Sagrada-Bogtong	B	B	B	B		G	G	G	G	G	G	G
Mangrove Gleaning	Decalve	B	B	B	B	G	G	G	G	G			
	Bugor-Sand	G	B	B	B	G							G
	Sagrada-Bogtong		B		G		B	B	B			G	G
Mangrove Capture Fisheries	Decalve	B	B	B	B	G	G	G	G	G			
	Bugor-Sand	B	B				G	G	G				B
	Sagrada-Bogtong	B	B	B			G	G	G				
Seagrass and Algal Beds Gleaning	Decalve	B	B	B	B	G	G	G	G	G	G	G	G
	Bugor-Sand	G	G	G	G	G	G	G	G	G	G	G	G
	Sagrada-Bogtong		G		G		B	B					G

Legend: Peak Months- Green; Lean Months- Blue

Figure 9. Peak and lean months in the use of resources / engagement in human activities.

Most households are engaged in of coastal and marine resource activities almost seven days a week (Table 14).

- Reef fisheries: 3x a week or less in peak and lean months (d); 4x a week of more in peak (bs); 4x a week or more in peak or lean months (sb)
- Mangrove gleaning: 3x a week or less in peak and lean months (d) (bs) (sb);
- Mangrove capture fisheries: 3x a week or less in peak and lean months (d) (bs); 4x a week or more in peak or lean months (sb)
- Seagrass and Algal Beds Gleaning: 4x a week or more in peak or lean months (d); 3x a week or less in peak and lean months (bs) (sb);

At least one household member is engaged in the use of coastal and marine activities (Table 15).

- Reef fisheries and Mangrove capture fisheries: 1 member in peak and lean months (d) (bs) (sb)
- Mangrove gleaning: 2 in peak, 1 in lean (d); 1 member in peak and lean (bs); 2 in peak and lean (sb)
- Seagrass and Algal Beds Gleaning: 2 members in peak or lean months (d); 2 in peak, 1 in lean (bs) ; 1 member in peak and lean months (sb);

Table 11. Frequency of Engagement in of Coastal and Marine Resource Activities During Peak and Lean Months (Number of Working Days, in Percent)

Frequency of Engagement in Human Activities	Decalve								Bugor -Sand								Sagrada-Bogtong							
	Reef Fisheries		Mangrove Gleaning		Mangrove Capture Fisheries		Seagrass and Algal Beds Gleaning		Reef Fisheries		Mangrove Gleaning		Mangrove Capture Fisheries		Seagrass and Algal Beds Gleaning		Reef Fisheries		Mangrove Gleaning		Mangrove Capture Fisheries		Seagrass and Algal Beds Gleaning	
	Peak (n=127)	Lean (n=102)	Peak (n=54)	Lean (n=34)	Peak (n=28)	Lean (n=24)	Peak (n=13)	Lean (n=11)	Peak (n=157)	Lean (n=146)	Peak (n=34)	Lean (n=24)	Peak (n=26)	Lean (n=23)	Peak (n=23)	Lean (n=7)	Peak (n=106)	Lean (n=106)	Peak (n=47)	Lean (n=21)	Peak (n=21)	Lean (n=21)	Peak (n=22)	Lean (n=22)
≤ 3x a week	52.8	58.3	85.2	88.2	67.9	62.5	32.1	32.1	28	52.9	85.3	91.7	53.8	73.9	60.9	100	32.1	32.1	89.4	89.4	42.8	42.8	90.9	90.9
≥ 4x a week	47.2	22	14.8	11.8	32.1	37.5	67.9	67.9	72	40.1	14.7	8.3	46.2	26.1	4.3	0	67.9	67.9	10.6	10.6	57.1	57.1	9.1	9.1

Table 12. Number of Household Members Engaged in the Use of Coastal and Marine Activities During Peak and Lean Months (in Percent)

No of Household Members	Decalve								Bugor -Sand								Sagrada-Bogtong							
	Reef Fisheries		Mangrove Gleaning		Mangrove Capture Fisheries		Seagrass and Algal Beds Gleaning		Reef Fisheries		Mangrove Gleaning		Mangrove Capture Fisheries		Seagrass and Algal Beds Gleaning		Reef Fisheries		Mangrove Gleaning		Mangrove Capture Fisheries		Seagrass and Algal Beds Gleaning	
	Peak (n=127)	Lean (n=102)	Peak (n=57)	Lean (n=34)	Peak (n=28)	Lean (n=24)	Peak (n=13)	Lean (n=11)	Peak (n=157)	Lean (n=146)	Peak (n=34)	Lean (n=25)	Peak (n=26)	Lean (n=23)	Peak (n=23)	Lean (n=7)	Peak (n=106)	Lean (n=82)	Peak (n=47)	Lean (n=34)	Peak (n=21)	Lean (n=22)	Peak (n=22)	Lean (n=18)
1	62.2	67.3	42.1	38.6	67.9	58.3	23.1	45.4	58.6	58.2	55.9	76	61.5	60.9	39.1	57.1	67.9	76.8	68.1	70.6	90.5	86.4	60.9	66.7
2	26	30.4	55.9	32.4	28.6	25	61.5	54.5	27.4	26.7	29.4	16	34.6	30.4	43.5	28.6	23.6	15.9	21.3	23.5	9.5	13.6	17.4	16.7

Perceptions of change in resource condition between before MPA establishment and the current MPA were also assessed (Table 16). They varied among the MPA sites. Respondents from Decalve Strict Protection Zone generally perceived the improving conditions of their coral reefs and mangroves while their seagrass beds remained relatively the same. Respondents from the two other MPA sites perceived the reverse for their coral reefs and mangroves, but the same for their seagrass beds.

Table 13. Change in individual perception of resource conditions before MPA establishment and current MPA.

	Decalve			Bugor-Sand			Sagrada-Bogtong		
	Reef (n=154)	Mangrove (n=158)	Seagrass (n=156)	Reef (n=156)	Mangrove (n=157)	Seagrass (n=157)	Reef (n=106)	Mangrove (n=106)	Seagrass (n=93)
Worst now than before	19.5	28.5	5.8	43.6	42.7	15.3	58.5	50.9	17.2
Same now as before	24.7	33.5	61.5	29.5	37.6	63.7	20.8	31.1	66.7
Better now than before	54.8	38.0	32.7	26.9	19.8	21.0	20.8	17.9	16.1

A t-test was conducted to test the perceptions of the respondents concerning resource conditions before MPA establishment and current MPA (Table 17). In Sagrada Bogtong, the respondents perceived the conditions have worsened for the three habitats. In Bugor Sand, however, the deteriorating habitat conditions were applicable only for coral reefs and mangroves. In the case of Decalve, the improvement in habitat condition is only statistically significant for coral reefs and seagrass beds.

Table 14. T-Test of the perceptions of respondents concerning resource conditions before MPA establishment and current MPA.

| | | Paired Samples Test Paired Differences | | | | |
		Mean	Std. Deviation	t	df	Sig (1-tailed)
	Sagrada-Bogtong					
Pair 1	CMR_Reef_Before MPA - CMR_Reef_Present	-0.698	1.346	5.338	105	0.00
Pair 2	CMR_Mangrove_Before MPA - CMR_Mangrove_Present	-0.538	1.164	4.755	105	0.00
Pair 3	CMR_Seagreass_Before MPA - CMR_Seagrass_Present	-0.217	0.936	2.386	105	0.02
	Decalve					
Pair 1	CMR_Reef_Before MPA - CMR_Reef_Present	0.513	1.344	-4.736	153	0.00
Pair 2	CMR_Mangrove_Before MPA - CMR_Mangrove_Present	0.114	1.345	-1.065	157	0.29
Pair 3	CMR_Seagreass_Before MPA - CMR_Seagrass_Present	0.333	0.986	-4.223	155	0.00
	Bugor-Sand					
Pair 1	CMR_Reef_Before MPA - CMR_Reef_Present	-0.282	1.304	2.701	155	0.01
Pair 2	CMR_Mangrove_Before MPA - CMR_Mangrove_Present	-0.433	1.178	4.606	156	0.00
Pair 3	CMR_Seagreass_Before MPA - CMR_Seagrass_Present	0.032	0.796	-0.501	156	0.62

p<.05

3.2.2 Level of understanding of human impacts (S3)

3.2.2.1 Definition

Level of understanding of human impacts on resources is a measure of the degree to which local stakeholders understand basic ecological relationships and the impacts that human activities have on the natural environment. An understanding of individual perceptions of factors influencing the status of marine resources can be used to identify the distribution of faulty, as well as accurate, perceptions. The knowledge about these distributions can then be used to structure interventions designed, for example, to involve the community in the management of its resources, and to evaluate the resulting changes. This could lead to improved human use patterns and help to target environmental education programs at user groups and stakeholders.

3.2.2.2 Description/analysis

Various human activities continue to threaten the MPA areas' coastal ecosystems. There are several threats that are impacting on the MPAs. Some threats are specific to the coastal and marine resources, while others are 'generic' in nature (Table 18). All of the threats identified prior to the MPA establishment still exist up to the present. There is a reduction, however, in terms of the perception of the level of threats for all sites.

Table 15. Summary of Resource System Threats Cited by Respondents Before and Present (Frequency)

Coastal and Marine Resource	Threats	Decalve		Bugor-Sand		Sagrada-Bogtong	
		Before (f)	Present (f)	Before (f)	Present (f)	Before (f)	Present (f)
Reefs	1. Compressor Use and Cyanide Fishing	133	8	123	50	86	31
	2. Dynamite Fishing	105	2	108	12	68	27
	3. Use of Active Gears/ Fine Mesh Nets	115	42	110	47	62	29
	4. Use of 'Tubli" and other Organic Substances	94	17	82	26	53	19
	5. Degradation/ destruction/ loss of Habitat	94	3	65	11	43	28
Mangroves	1. Mangrove cutting for charcoal, firewood, and housing materials	128	48	107	51	89	65
	2. Degradation/destruction/loss of habitat	79	9	54	11	45	22
Seagrass and Algal Beds	1. Pollution (oil spills, fertilizer use in forms, etc.)	46	1	31	9	19	4
	2. Kaingin resulting to soil erosion	73	30	70	33	56	48
Others	1. Declining fish catch	85	39	66	69	33	62
	2. Pearl farm expansion restricting fishing and navigation access	70	25	80	50	27	23
	3. Improper waste disposal	62	8	63	41	25	22
	4. LGU policies allow certain fishing operation perceived to be destructive.	57	8	54	8	24	7
	5. Unregulated coastal development	58	10	45	7	15	4
	6. Intrusion of commercial fishing in municipal waters	69	12	57	20	27	16
	7. Small scale mining	55	3	54	27	24	11

In terms of threats to the reefs, majority of the respondents signified that the threats have considerably diminished (Table 19). At present, only an average of 30-40 percent live coral cover have been assessed to exist in most of the coastal waters of the three Barangays, except in several areas where a higher and more diverse coral cover have been recorded (MPA Management Plan 2006). Compressor use and cyanide fishing was considerably reduced in Decalve and Sagrada Bogtong. Particularly in Decalve, the use of compressor (sodium cyanide) in the past was prevalent among local or transient fishers from nearby Barangays (Decalve Strict Marine Protected Zone Management Plan 2006). In Bugor-Sand, however, there was a considerable reduction in terms of dynamite fishing.

Table 16. Net change in the percentage of reef threats cited by respondents at present and before the establishment of MPA.

Reef Threats	Decalve (n=160)	Bugor-Sand (n=157)	Sagrada-Bogtong (n=107)
1. Compressor Use and Cyanide Fishing	-82.2	-46	-52.1
2. Dynamite Fishing	-69.1	-60.9	-38.7
3. Use of Active Gears/ Fine Mesh Nets	-50.9	-39.2	-31.9
4. Use of 'Tubli" and other Organic Substances	-56.0	-35.6	-32.2
5. Degradation/ destruction/ loss of Habitat	-72.2	-37	-15.1

The establishment of MPAs appear to have overall positive influence. More than four-fifths of respondents across sites have attributed the threats reduction due to the MPAs (Figure 10).
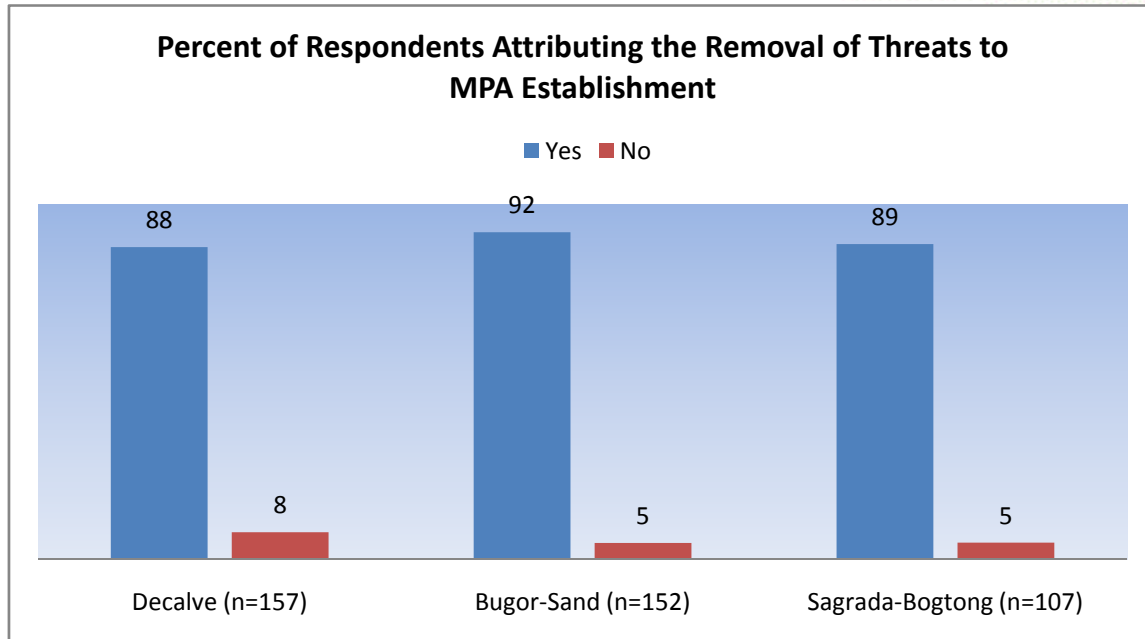
Figure 10. Attribution to MPA in removal/reduction of threats.

3.2.3 Perceptions of local resource harvest (S5)

3.2.3.1 Definition

This is a measure of what local fishers think about the availability of target fish species and changes in the availability of fish.

3.2.3.2 Description/analysis

The majority of fishers felt that target species were less available (lower catch per unit effort) now than before the MPAs were implemented. This agrees with the empirical evidence that overall fish biomass has declined in the past few years, but conflicts with the empirical evidence that the abundance and biomass of target species has increased. In the first few years following the establishment of a closed area, it is normal to expect some level of decrease in CPUE, as displaced fishing effort is crowded into a smaller area. However, if the MPA functions according to plan, spillover should at some point increase biomass outside the MPA to the point where CPUE begins to increase.

3.2.4 Perceptions of non-market and non-use value (S6)

3.2.4.1 Definition

Non-market values are the economic value of activities that are not traded in any market, which includes direct uses, such as divers who have traveled to the Calamianes MPAs by

private means; and indirect uses, such as biological support in the form of nutrients and fish/species habitat.

Non-use values represent values that are not associated with any use. These include the following: existence value (the value of knowing that the resource exists in a certain condition), option value (the value of being able to use the resource in the future) and bequest value (the value of ensuring the resource will be available for future generations).

This information is useful to: (1) understand the value of the Calamianes MPAs in non-monetary terms, which can be used to evaluate the tradeoffs between alternative development, management and conservation scenarios; (2) demonstrate the importance of the Calamianes MPAs to the larger population by calculating the value of the resources to people; and (3) understand the changing value of the Calamianes MPAs to stakeholders over time.

3.2.4.2 Description/analysis

The stakeholders tended to value the coastal resources beyond their direct use values. People perceived that coastal and marine resources are more than products to be traded and sold. The perceived existence value for the coastal and marine resources rate high among the three communities (Figure 11). People generally percieved that coral reefs and seagrass beds have more important uses and value than utilizing the resources only for fishing and diving. Likewise, more than 80% of respondents across the three MPA sites agree that fishing activities should be restricted in certain areas to allow the coastal and marine resources to rehabilitate, improve or grow.

Perception of Existence Non-Use Value of Coastal and Marine Resources (Percent Agreement)

Decalve (n=160) Bugor-Sand (n=157) Sagrada- Bogtong (n=106)
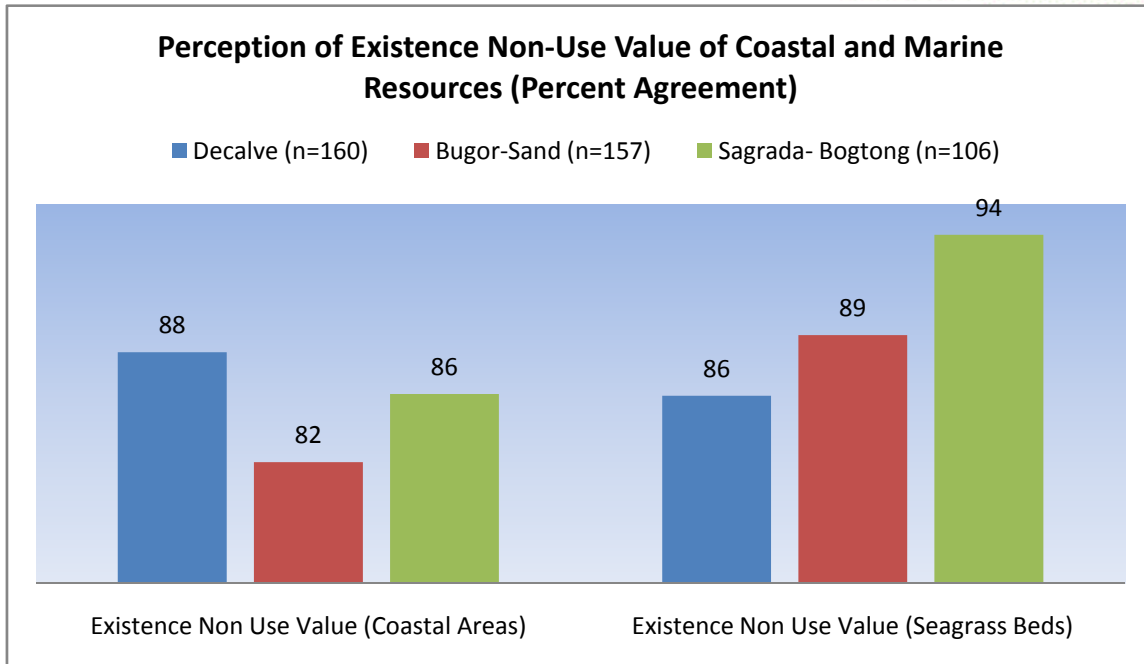
Figure 11. Perception of existence non-use value of coastal and marine resources.

With regard to the bequest value of the coastal and marine resources, people generally favored that these resources and the natural environment are conserved and preserved for future generations. More than four-fifths of the community agreed to the importance of ensuring that the reefs and coastal areas will exist and are enjoyed by future generations in their time.
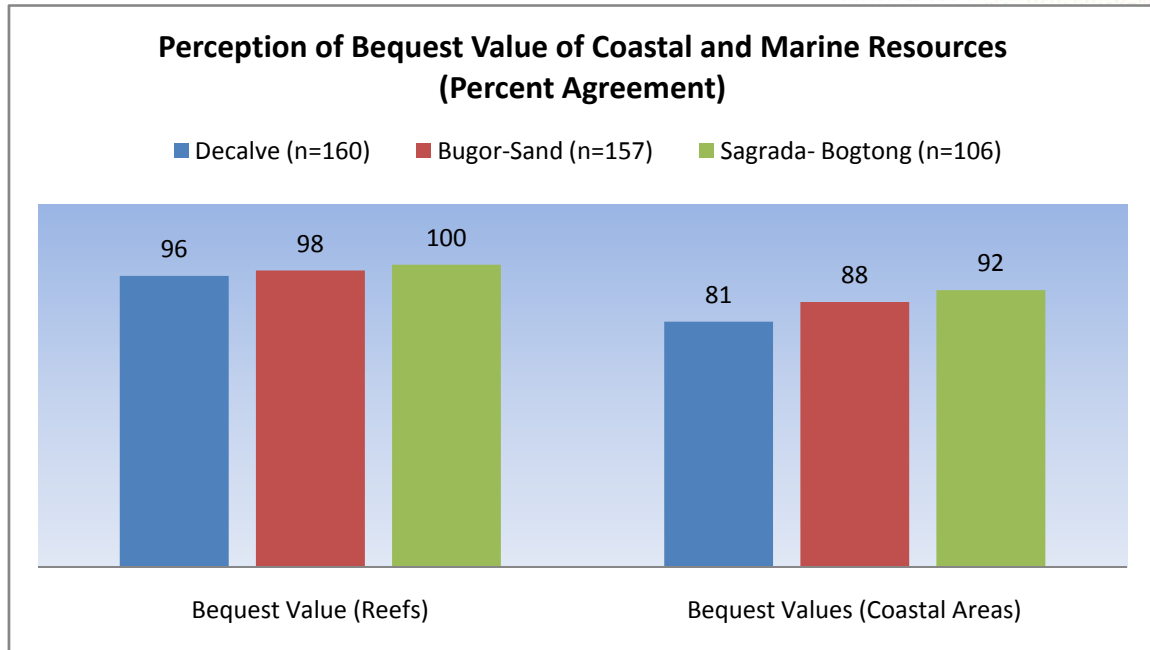
Figure 12. Perception of bequest value of coastal and marine resources.

More than three-fourths of the residents across the three MPA sites realize that the reefs and mangroves have indirect uses like coastline protection and fish habitat (Figure 13).

Perception of Indirect Non--Market Value of Coastal and Marine Resources (Percent Agreement)

■ Decalve (n=160)   ■ Bugor-Sand (n=157)   ■ Sagrada- Bogtong (n=106)
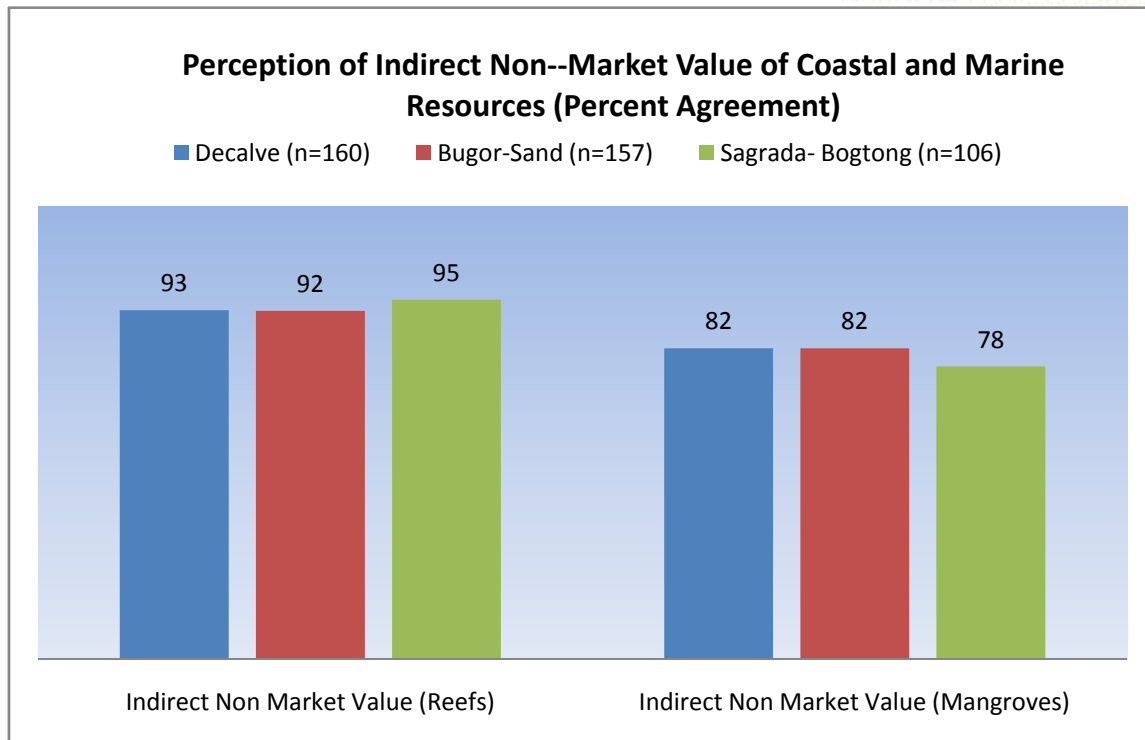
Figure 13. Perception of indirect market value of coastal and marine resources.

3.2.5 Household income distribution by source (S9)

3.2.5.1 Definition

This is a measure of the principal sources of income for households in the community. Sources of livelihood and/or income provide a measure on the impacts of the MPAs – either negatively or positively – to the local households. Understanding income sources may enable the MPA management boards to determine the levels of community dependency on the coastal and marine resources. Such information can be used then to make changes to diversify occupational and income structures.

If households perceive a decrease and/or reduction in the sources of household income over time, then this information can be used to institute the necessary economic changes in the management of the MPAs – either individually or as a network - to ensure that local households are obtaining adequate livelihoods and incomes. If households perceive an increase in the sources of household income over time, then this information can be used in support of the MPAs.

3.2.5.2 Description/analysis

Typical to most coastal rural communities in the Philippines, there is multiplicity of livelihood activities in the Calamianes area. The key marine based occupations include capture fisheries, seaweed farming, gleaning, fish culture, pearl farm laborer, fish processing and fish trading (Figure 14). Capture fisheries is the topmost in all three in descending order of importance: Bugor-Sand, Sagrada-Bogtong and Decalve.
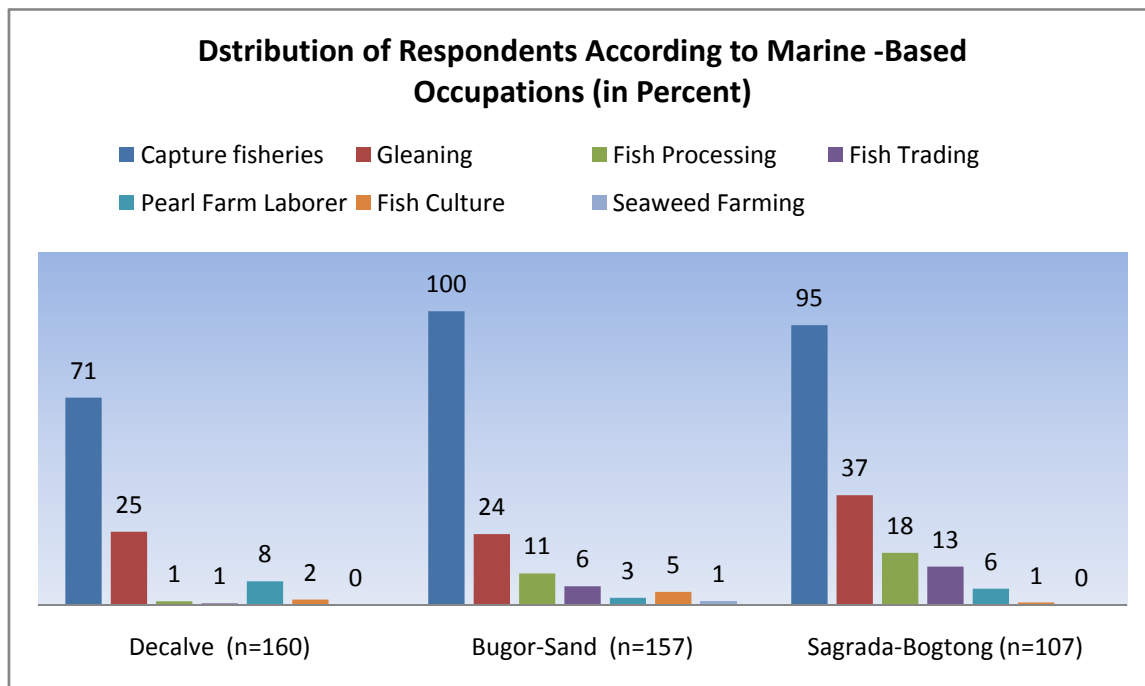
Figure 14. Percentage of respondents engaged in marine-based occupations.

The peak and lean months for marine–based occupations vary (Figure 15). Capture fisheries is most pronounced around the middle of the year until December. Pearl farm labor as an economic activity is done practically all-year round in the three sites. Other year-round economic activities include fish processing (Bugor-Sand and Sagrada-Bogtong), fish trading (Sagrada-Bogtong), fish culture and seaweeds farming (Bugor-Sand).

Figure 3. Peak and Lean Months for Marine–based Occupations (legend: B = blue, G = green, blank = none)

Marine-Based Occupations	Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Capture Fisheries	Decalve	B	B	B	B		G	G	G	G			
	Bugor-Sand	B	B	B	B	G	G	G	G	G			
	Sagrada-Bogtong		B	B			G	G	G	G	G	G	G
Gleaning	Decalve	B	B	B	B	B	G	G	G	G	G	G	G
	Bugor-Sand	B	B	B	B	B	G	G	G	G	G	G	G
	Sagrada-Bogtong												G
Fish Processing	Decalve						B						
	Bugor-Sand	G	G	B	B	B	B	B	G	G	G	G	B
	Sagrada-Bogtong	G	G	G	G	G	G	G	G	G	G	G	G
Fish Trading	Decalve												
	Bugor-Sand						G						B
	Sagrada-Bogtong	G	G	G	G	G	G	G	G	G	G	G	G
Pearl Farm Laborer	Decalve	G	G	G	G	G	G	G	G	G	G	G	G
	Bugor-Sand	B	G	G	G	G	G	G	G	G	G	G	G
	Sagrada-Bogtong	G	G	G	G	G	G	G	G	G	G	G	G
Fish Culture	Decalve												
	Bugor-Sand	B	B	B	B	G	G	G	G	G	G	G	G
	Sagrada-Bogtong	G		G		B							
Seaweed Farming	Decalve						G	G	G	G	G	G	G
	Bugor-Sand	B	G	G	G	G	G	G	G	G	G	G	G
	Sagrada-Bogtong												

The majority of those engaged in capture fisheries earned net monthly income below the income range of PhP 2000-2999 (Table 20).

Table 17. Estimated net monthly income derived from capture fisheries of three MPA sites in Calamianes Islands, Palawan, Philippines.

Estimated Net Monthly Income	Decalve		Bugor-Sand		Sagrada-Bogtong	
	Peak Months (n=160)	Lean Months (n=160)	Peak Months (n=157)	Lean Months (n-134)	Peak Months (n=102)	Lean Months (=89)
< 1000	23	25	7	21	6	29
1000-1999	27	35	23	40	16	40
2000-2999	24	10	23	16	22	12
3000-3999	10	5	15	7	20	10
4000-4999	4	3	5	6	16	1
5000-7999	9	1	16	10	9	2
8000-11999	2	1	6		7	2
12000-16999		1	3	1	2	2
17000-24999	1		3		2	
25000-40000			1		1	

Note: Frequencies of respondents engaged in capture fisheries

Most of the stakeholders obtain substantial proportion of their income from fisheries (Table 21).

Table 18. Percentage of income from fisheries for subsistence.

Percentage of Income from - Capture Fisheries	Decalve		Bugor-Sand		Sagrada-Bogtong	
	Peak Months (n=113)	Lean Months (n=85)	Peak Months (n=157)	Lean Months (n=134)	Peak Months (n=102)	Lean Months (n=90)
Up to 10%	5	4	2	2	3	1
10.01-20%	1	1	7	3	3	
20.01-30%	3	5	4	2	6	3
30.01-40%	2	1	2	2	1	3
40.01-50%	20	17	23	16	16	24
50.01-60%	1	1	2	3	3	
60.01-70%	5	5	5	4	6	2
70.01-80%	7	8	17	19	16	20
80.01-90%	4	2	9	10	14	3
90.01-100%	47	57	30	40	35	42

3.2.6 Number and nature of markets (S12)

3.2.6.1 Definition

The number and nature of markets measures the number and types of markets where marine products/services from the area of the MPA are purchased and sold. The market may be visualized as the connection between the producer (eg fishers, reef gleaners, etc) and the consumer (eg resident, tourist, hotel owner, etc). The market serves as a physical function, such as buying, selling, storage and processing. It also serves an economic function, such as pricing and consumer behavior.

3.2.6.2 Description/analysis

Nine key species are caught in the three MPA sites (Table 11). The prices of catch are generally highest for groupers (*lapu-lapu*) and mud crabs/blue-swimming crabs (*alimango/alimasag*). The catches of the fishers are mainly sold in the local market through either the retailer or wholesaler. Distribution of formal knowledge to community (S14)

3.2.6.3 Definition

Distribution of formal knowledge to community is a measure of the degree of awareness of information generated by the scientific community held by stakeholder and user groups about MPA use and ecosystem impacts.

The information generated may help to contribute to improve scientific understanding of local ecosystems. Moreover, it may facilitate interactions with stakeholders by ensuring the stakeholders have confidence in the scientific information. It can also facilitate accurate communication and data collection by ensuring that managers, scientists and stakeholders use the same terms. As a result, rewritten, interpreted, translated, disseminated/communicated, and ideally understood scientific information can lead to improving the IEC programs in the MPA sites.

3.2.6.4 Description/analysis

Only about half of the respondents were aware of information generated about the MPA (Figure 16). This is surprising considering the extensive studies undertaken in the area since 2004. With Bugor-Sand as exception, more than half of the total respondents from Decalve (59%) and Sagrada-Bogtong (55%) sites were not aware of any information generated by a research community about the MPA and ecosystem impacts.
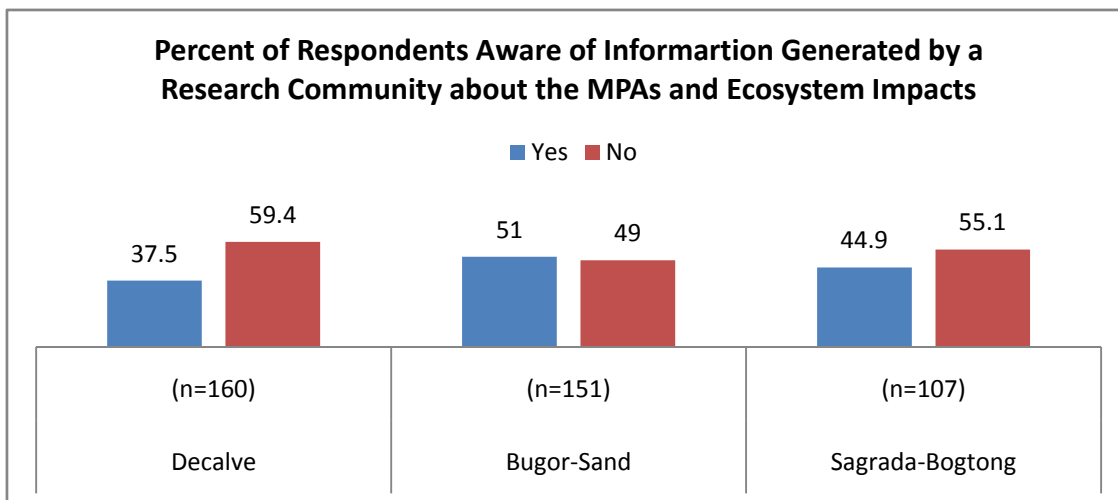
Figure 4. Percentage of respondents aware of information generated about the MPA.

From the types of information that 45% of all respondents were aware of, biophysical information is perceived to be most useful in decision –making (Figure 17). It implies two things. One, there is weak IEC. Two, the results of scientific studies / researchers are not transformed into formats that are directly usable to stakeholders.
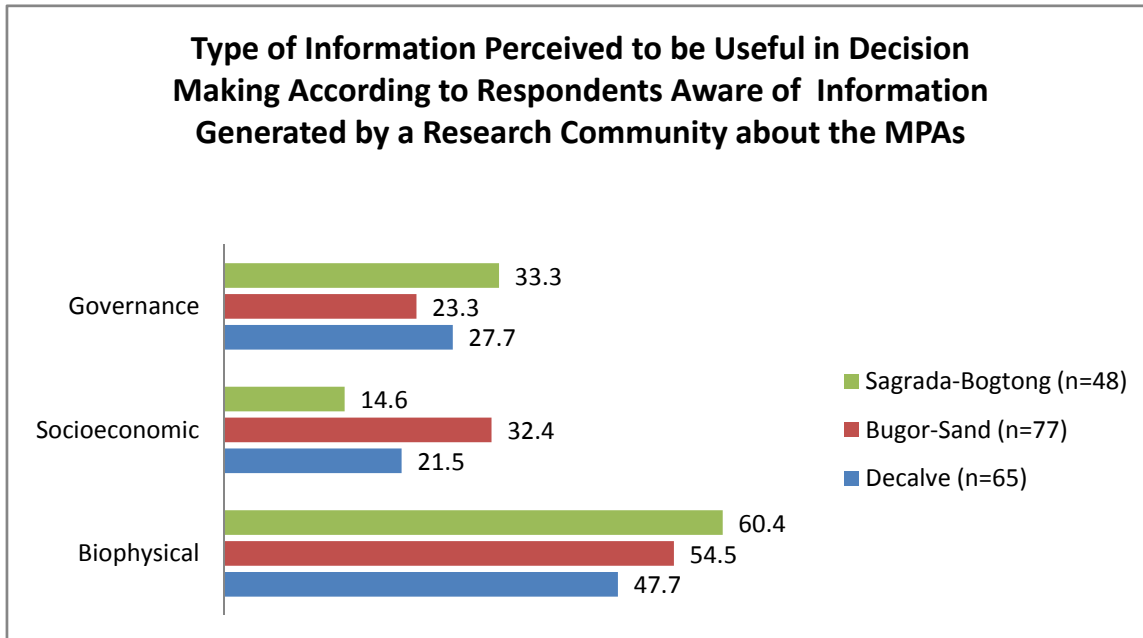
Figure 5. Type of Information Perceived as Useful in Decision Making as cited by Respondents (aware of Information Generated by a Research Community about the MPAs.

3.2.7 Changes in conditions of ancestral and historical sites, features, and/or monuments (S16)

3.2.7.1 Definition

It is a measure of the importance, existence and use of material features that maybe important to the stakeholders culture and history. This indicator may measure the impacts of MPA-related activities, such as eco-tourism activities on the ancestral and historical sites. The ultimate aim is to maximize the compatibility of MPA-related activities with that of the local culture.

3.2.7.2 Description/analysis

People are generally not aware of what are considered as ancestral and historical sites, features, and/or monuments. Shipwrecks were considered as historical sites within and around the MPA areas.

3.2.8 Number of tourists

3.2.8.1 Definition

This indicator quantifies through time the frequency of visitors to the Calamianes MPAs. An increasing number of tourists means that an MPA is becoming a popular tourist destination. This indicator is not part of the MPA guidebook.

3.2.8.2 Description/analysis

In Bintuan/Decalve, Japanese ship wrecks are found scattered around its marine waters. These wrecks serve as tourist attraction as snorkeling and/or dive sites, including the nearby or adjacent beaches. Tourist visitation provide additional income.

The respondents from Decalve indicated that the peak months for tourist visit to the ship wrecks are from March to May. Between 300-400 tourists per day visits during these peak months. The user fee is 200/person/day.

Only Decalve is generating income from tourism-related activities, through a user fee system, particularly snorkeling and diving.

3.3 Governance Indicators

3.3.1 Level of resource conflict (G1)

3.3.1.1 Definition

This indicator refers to the nature and characteristics associated with planning, management and decision-making for the MPA. Generically, conflict can be taken to mean of any situation in which there is a clash of interests or ideas (Pomeroy et al 2004).

3.3.1.2 Description/analysis

Five types of conflicts have been identified, all of which relate to the fishery resources (Table 22). Such types of conflicts are patterned after Charles (200?) classification/typology of conflicts. Fisheries conflicts regarding access and enforcement are most common in Decalve and Sagrada Bogtong; however, conflicts about enforcement and between fishers and other users are more common in the two other MPA sites.

Table 19. Type of resource use conflicts identified at three MPA sites in Calamianes Islands, Palawan, Philippines.

Type of Resource Use Conflict Issues	Decalve (n=83)	Bugor-Sand (n=77)	Sagrada-Bogtong (n=47)
1. Access Issues in Fisheries and other Coastal Resources	26.5	13	23.4
2. Enforcement Issues in Fisheries and other Coastal Resources	31.3	24.7	27.7
3. Conflicts between Fishery Users	18.1	19.5	34
4. Conflicts between Fishers and other Resource Users	12	33.8	12.8
5. Conflicts between Fishers and Non-Fishery Issues	4.8	9.1	2.1

Note: conflict categories after Charles (?)

Access issues in fisheries and other coastal resources pertain to the perceived delimitation and/or reduction in their fishing grounds with the establishment of the MPAs. Enforcement issues in fisheries and other coastal resources relate to the continuing destructive fishing activities in or around the MPA areas. These include the use of cyanide and blast fishing, as well as the use of prohibited gears.

Conflicts between fishery users largely relates to conflicts between the commercial and municipal fishers. Commercial fleets intrude within the municipal fishing grounds, i.e. within the 15 km limit. Conflicts between fishers and other resource users refer to the fisheries conflicts with other economic sectors, particularly tourism. Conflicts between fishers and non-fishery issues may relate to policy issues, such as those which favor other sectoral groups, such as the indigenous peoples.

3.3.2 Existence of a decision-making and management body (G2)

3.3.2.1 Definition

The existence of such a body is a measure of the recognition of an institution that governs how the MPA is managed and used. Having such a body likewise provides such as a process for management planning, establishing rules and regulations, as well as their enforcement.

3.3.2.2 Description/analysis

In the context of the Calamianes MPAs, the decision-making and management body is referred to as the MPA Management Board. Each Management Board was established

after the MPA was enacted. As an organizational entity, it provides both policy direction and operational oversight. A Management Board has four management committees: (1) law enforcement committee; (2) tourism and planning committee; (3) information, education and monitoring committee; and (4) finance, audit and secretariat committee. There is a Special Enforcement Team (SET) that deals with enforcement issues.

The performance of the Management Boards were assessed in five areas: (1) planning; (2) monitoring; (3) information, education and communication or IEC; (4) user fee collection; and (5) enforcement (Figure 18). The stakeholders perceived that these governance bodies are performing best in terms of planning and monitoring. Although they also perform well in the areas of information dissemination and enforcement they need improvement in these aspects. They need to improve on their user fee system, particularly in Bugor sand that obtained a negative net rating.

Management Board Functions/ Activities (Net Rating)

■ Decalve (N=160) ■ Bugor-Sand (N=157) ■ Sagrada-Bogtong (N=107)

Category	Decalve	Bugor-Sand	Sagrada-Bogtong
Planning	44	55	45
Monitoring	39	49	45
IEC	8	17	31
User Fee Collection	4	-13	12
Enforcement	13	17	8
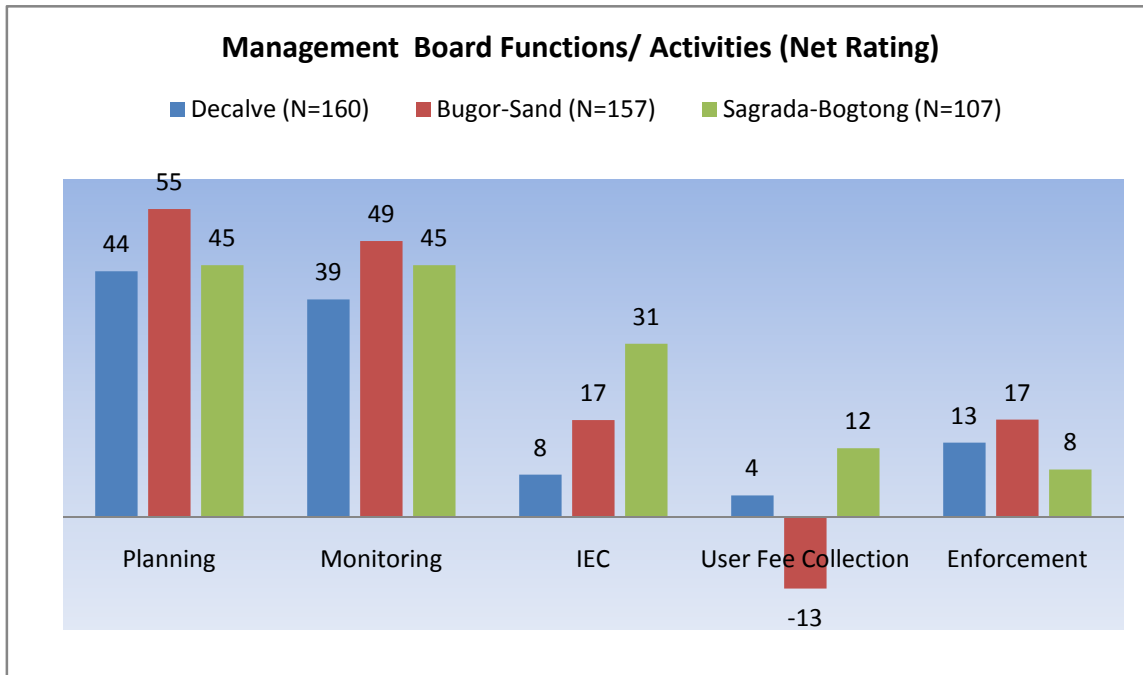
Figure 68. Net Rating on performance of the MPA management boards.

3.3.3 Existence and adoption of a management plan (G3)

3.3.3.1 Definition

This indicator pertains to the existence of a document which guides the operation of the MPA. Among others, the management plan contains the MPA's goals and objectives, the governance structure and the array of management measures to be instituted. All of these management plans were duly adopted in 2006.

3.3.3.2 Description/analysis

All key informants (KIs) were aware about the existence of the management plans in their respective MPAs. Their perceptions, however, varied in terms of the plan's adequacy. There was a 100% agreement with the KIs in Sagrada-Bogtong (n=7). Meanwhile, the percent agreement in Decalve (n=11) and Bugor-Sand (n=10) were 82% and 70%, respectively.

3.3.4 Local understanding of MPA rules and regulations (G4)

3.3.4.1 Definition

This indicator measures the stakeholders level of awareness of the MPA rules and regulations. Such rules and regulations define the various types of activities that are required, permitted or prohibited within the confines of the MPA.

3.3.4.2 Description/analysis

Details of formal MPA rules and regulations are found in the respective management plans; however, respondents are generally aware of those that pertain to the fisheries. They are aware the fishing is prohibited within the core zones. Some 69% are aware of the rules and regulations concerning fishery laws and the laws governing the use of MPA in Decalve and Bugor-Sand; the level of awareness of Sagrada-Bogtong about fishing rules and regulations are below 50%. Informal rules exist in Bugor-Sand Island Marine Protected Area (eg, every village has its own fishing area) and Sagrada-Bogtong Marine Reserve (fishing allowed within 100 m distance away from MPA).

3.3.5 Existence and adequacy of enabling legislation (G5)

3.3.5.1 Definition

This indicator is a measure of formal legislation in place to provide the MPA with sound a sound legal foundation and/or a solid legal framework as the basis for recognizing and attaining the MPA goals and objectives. Enabling national and local legislations related to MPAs exist.

3.3.5.2 Description/analysis

Establishment of the three MPAs were formalized through resolutions. These started at the village levels, and were elevated later at the municipal levels. More than 72% of respondents in the three sites are aware of the existence of local and national laws that support MPAs. The respondents perceived that both the local legislations (Figure 19) and national legislations (Figure 20) are adequate to support the MPA objectives. At the national level, the main laws that deal with MPAs are the NIPAS Act of 1992, Local Government Code of 1991, and Fisheries Code of 1998.

Percent of Respondents Citing that Local Laws are Adequate to Support MPA Objectives

■ Yes ■ No

79	86	83
7	5	3
Decalve (n=160)	Bugor-Sand (n=152)	Sagrada-Bogtong (n=92)
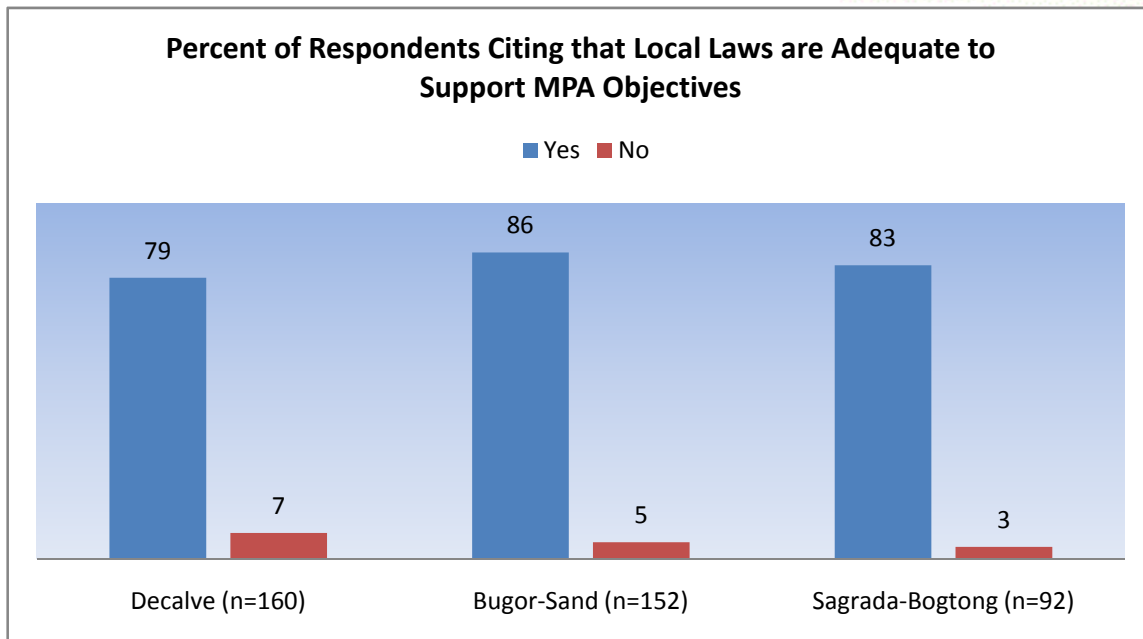
Figure 197. Percent agreement on adequacy of local laws to support MPA objectives.

Percent of Respondents Citing that National Laws are Adequate to Support MPA Objectives

■ Yes ■ No

66	80	82
15	5	3
Decalve (n=160)	Bugor-Sand (n=151)	Sagrada-Bogtong (n=90)
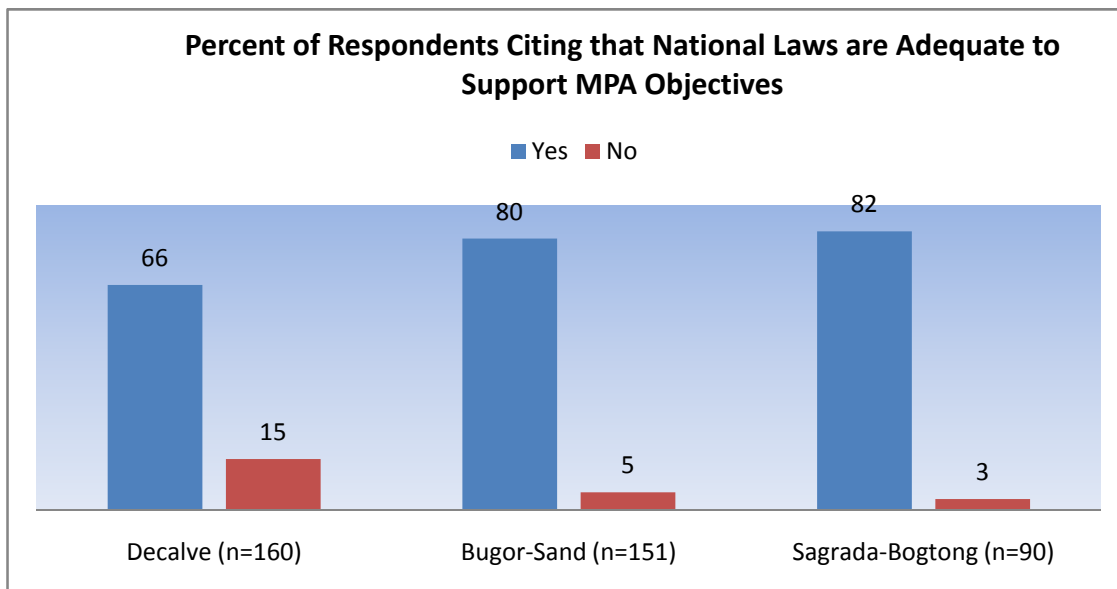
Figure 20. Percent agreement on adequacy of national laws to support MPA objectives.

3.3.6 Availability and allocation of MPA admin resources (G6)

3.3.6.1 Definition

This indicator is a measure of the capacity of the management and/or administering body to administer and complete its various MPA activities. The operation of an MPA involves an array of activities including education, enforcement, monitoring, planning and training.

3.3.6.2 Description/analysis

Available and actually allocated MPA administrative resources are rather limited (Table 23). Motorized and non-motorized boats are being used for all MPA-related activities. Equipment/supplies are taken from various sources, particularly local governments, private sector (pearl farm) and FISH Project (Table 24). Available personnel and funds are even more limited (Table 25). Private institutions and externally-funded projects that support the MPA operations may be crucial for long-term sustainability of the MPAs. The municipal governments do not specifically allocate funds to support MPA operations.

Table 20. Available and actually allocated MPA administrative resources.

Equipment/ Supplies	Planning			Monitoring			Research			Enforcement			Info/Education		
	D	B	S	D	B	S	D	B	S	D	B	S	D	B	S
Motorized Boat	1	1	1	1		1	1			1	1				
Non Motorized Boat	1			1	1		1			1		1	1		
Guardhouse	1				2	1							1		
Cellular Phone													1		
Fuel/ Gasoline				1	1					1					
Handheld Radio										1					1

Note: D = Decalve; B = Bugor-Sand; S = Sagrada Bogtong; number refers to number of units

Table 21. Source of equipment/supplies for operations of the MPAs.

Source of Equipment/ Supplies	Motorized Boat			Non Motorized Boat			Guardhouse			Cellular Phone			Handheld Radio			Fuel/ Gasoline		
	D	B	S	D	B	S	D	B	S	D	B	S	D	B	S	D	B	S
Barangay	√	√	√		√	√												
Municipality				√			√											
FISH	√			√		√												
Private	√	√	√	√			√	√		√			√		√	√		
NGAs																		
Other NGO				√														
MPA Fees				√			√									√		

Table 22. Available personnel and funds for MPA operations.

MPA 0perations	Decalve		Bugor-Sand		Sagrada-Bogtong	
	Personnel	Funds	Personnel	Funds	Personnel	Funds
Planning	5				0	
Monitoring	5				1	
Research	0				0	
Enforcement	15	Barangay			3	Barangay
Awareness	0				0	

3.3.7 Degree of interaction between managers and stakeholders (G9)

3.3.7.1 Definition

This is a measure of the number of regularly-scheduled meetings between MPA managers/staff and stakeholders. Regular interactions between MPA managers/staff and stakeholders provide opportunities for timely discussions of plans and programs, as well as information exchange.

3.3.7.2 Description/analysis

In terms of degree of interaction between managers and stakeholders, most respondents indicated that they were aware of MPA-related meetings (Figure 21). Majority of those who signified awareness actually participated in the meetings (Decalve – 55%; Bugor-Sand – 63%; Sagrada-Bogtong – 78%). Hence, the level of interactions in the three sites may be rated as fairly high. There is a regular meeting being held at least once a month. In the past, the FISH project conducted a series of meetings involving the MPA managers and stakeholders concerning various topics and/or subject matters. These included MPA orientation, IEC planning for establishment of MPA network, utilizing scientific data

from oceanographic study, and larval dispersal study to emphasize importance of MPAs in recruitment of fish and coastal habitats for tourism.
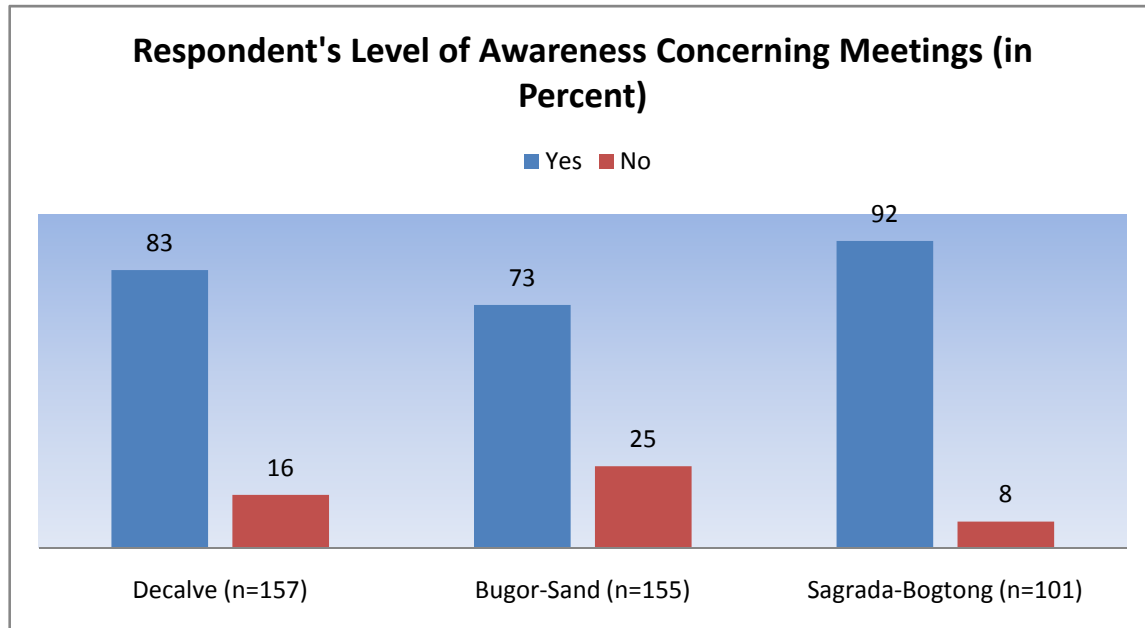
Figure 21. Level of awareness of respondents concerning MPA-related meetings.

3.3.8 Clearly defined enforcement procedures (G14)

3.3.8.1 Definition

This is a measure of "the existence and description of guidelines and procedures developed for staff charged with enforcement responsibilities and how they are to act depending on the type of offence encountered" (Pomeroy et al 2004). In Philippine MPAs, enforcement is one of the most crucial management functions.

3.3.8.2 Description/analysis

In Calamianes, the so-called Special Enforcement Team (SET) was established in each MPA site that forms the MPA network. Formal enforcement guidelines exist, many of which are contained in the management plan. According to the KIs, these enforcement guidelines are regularly updated. Staff are also trained in using these guidelines.

3.3.9 Degree of information dissemination to encourage stakeholders compliance (G16)

3.3.9.1 Definition

This is a measure of the "number and effectiveness of capacity-building efforts for stakeholders on the objectives and benefits, rules, regulations and enforcement arrangements of the MPA" (Pomeroy et al 2004). Having adequate training and/or education will eventually increase the stakeholders knowledge, as well as compliance to MPA rules and regulations.

3.3.9.2 Description/analysis

The FISH Project has conducted a series of training and/or capacity-building activities to the stakeholders to enhance their level of awareness and encourage their compliance to MPA rules and regulations. Such training and IEC activities included fishery survey, fish monitoring, enforcement, MPA zoning and fish farming.

These IEC activities were similarly cited by community members during the survey. It was noted that there were more IEC activities participated in by people in Sagrada-Bogtong compared to those in Decalve and Bugor-Sand. However, there are not many respondents who participated in the training and/or capacity building activities. Hence, it is difficult to quantitatively assess their perceptions in terms of participation, satisfaction and relevance.

4 Discussions / Management Implications

Most of the biophysical findings are consistent with the results of household surveys and key informant interviews. The relative decline in fish biomass is corroborated by the general perception of fishers regarding their declining fish catch. There are mixed results in terms of marine habitats status: the recorded improvement in coral cover in Decalve is validated by the stakeholder responses concerning their improving coral reef conditions; in Bugor-Sand, however, the respondents perceived that the coral conditions have worsened but the actual habitat condition has remained relative constant over the years. Such divergent results between perceptions and biophysical surveys could have been influenced by human factors, such as bias in terms of recollection and geographical orientation within and outside MPA. Note that except of Decalve, the two other MPAs have relatively large areas.

Substantial studies and/or researches have been undertaken in the Calamianes Islands over the last five years, yet these information appear not to be widely known to the coastal community members. There may be a need for more intensified information and

education campaign to disseminate the results. Spatial modeling is needed to correlate the temporal and geographic factors in fisheries-related activities.

A key challenge is to transform the results of biophysical, socioeconomic and governance indicators into 'common metrics' for a simplified measurement of an MPA's management effectiveness. Development of evaluation ratings and/or indices (such as '+' for positive rating, '-' for negative rating, '0' for no change rating, and '?' for indeterminate rating due to insufficiency of information) for individual and cluster of indicators is on-going.

Moreover, the results suggest that the 23 indicators tested may be prioritized in terms of their relative importance. Hence, a lesser number of indicators may be used for future MPA monitoring and evaluation.

It appears that a multi-disciplinary approach, involving various institutional partners and using an appropriate mix of indicators, provides a more complete assessment for measuring the success of MPAs with results that could be utilized for adaptive management.

EVALUATION TABLES – BIO-PHYSICAL INDICATORS

Code	Indicator category/Name	Indicator Rating (+, 0, -, ?)	Remarks/ Notes
B1	Focal species abundance	+	increased abundance and biomass of target species (but decreasing biomass of all species combined)
B2	Focal species population structure	?	decreasing average size/weight (but may be due to recruitment of juvenile fishes)
B3	Habitat distribution and complexity	0	no significant changes
B5	Recruitment success within the community	?	no difference between sites, inside/vs outside MPAs, or habitats; no baseline to determine temporal change
B6	Food web integrity	?	no baseline to determine temporal change, low abundance in upper and lower trophic levels
B7	Type, level, and return on fishing effort	-	no baseline to determine quantitative temporal change; fisher perception is that CPUE is declining

Cluster conclusions and/or recommendations: the increased abundance and biomass of target species is an important result that suggests the management of the 3 MPAs is working. The decreasing mean size may indicate that larger fish are leaving the MPAs and being replaced by recruitment of juveniles. This may eventually lead to enhancement of adjacent fisheries by spillover but the process may take several years or even decades. Thus, it can be expected that CPUE will decrease in the first few years as displaced fishers concentrate their effort into smaller areas.

EVALUATION TABLES - SOCIOECONOMIC INDICATORS

Code	Indicator category/Name	Indicator Rating (+, 0, -, ?)	Remarks/ Notes
S1	Local marine resource use patterns		
	REEFS		
	Decalve	+	• People from Decalve perceived that the conditions of coral reefs in their area are better at present than before the establishment of their MPA.
	Bugor-Sand	-	• People from Bugor Sand perceived that the conditions of coral reefs in their area have worsened at present than before the establishment of their MPA.
	Sagrada-Bogtong	-	• People from Sagrada-Bogtong perceived that the conditions of coral reefs in their area have worsened at present than before the establishment of their MPA.
	General		
	MANGROVES		
	Decalve	+	• People from Decalve perceived that the conditions of mangroves in their area are better at present than before the establishment of their MPA.
	Bugor-Sand	-	• People from Bugor Sand perceived that the conditions of mangroves in their area have worsened at present than before the establishment of their MPA.
	Sagrada-Bogtong	-	• People from Sagrada-Bogtong perceived that the conditions of mangroves in their area have worsened at present than before the establishment of their MPA.
	General		
	SEAGRASS and ALGAL BEDS		• People perceived that the conditions of seagrass and algal beds in

Code	Indicator category/Name	Indicator Rating (+, 0, -, ?)	Remarks/ Notes
			their areas remained the same regardless whether the MPAs were established.
	Decalve	0	
	Bugor-Sand	0	
	Sagrada-Bogtong	0	
	General		
	Coastal and Marine Resources (CMR) by Site		
	Decalve	+	
	Bugor-Sand	-	
	Sagrada-Bogtong	0	
	General		
S3	Level of understanding of human impacts		• There is a high degree of agreement among the communities that threats to coastal and marine resources were reduced because of the establishment of MPAs.
	REEFS	+	• People cited that there are fewer threats to coral reefs at present than before the establishment of the MPAs
	MANGROVES	+	• People cited that there are fewer threats to mangroves at present than before the establishment of the MPAs
	SEAGRASS and ALGAL BEDS	+	• People cited that there are fewer threats to seagrass and algal beds at present than before the establishment of the MPAs
	OTHER THREATS	+	• People cited that there are fewer other threats that existed at present than prior to the establishment of MPAs. • The decline in fish catch was cited as a threat by fisherfolks in Bugor-Sand and Sagrada-Bogtong,

Code	Indicator category/Name	Indicator Rating (+, 0, -, ?)	Remarks/ Notes
S5	Perceptions of local resource harvest		
S6	Perceptions of non-market and non-use value	+	• People perceived that coastal and marine resources are more than products to be traded and sold
	INDIRECT NON MARKET VALUE (Reefs)	+	
	INDIRECT NON MARKET VALUE (Mangroves)	+	
	EXISTENCE NON USE VALUE (Reefs)	+	
	EXISTENCE NON USE VALUE (Mangroves)	+	
	EXISTENCE NON USE VALUE (Seagrass)	+	
	BEQUEST VALUE (Reefs)	+	
	BEQUEST VALUE (Coastal Areas))	+	
S9	Household income distribution by source		
S12	Number and nature of markets		
S14	Distribution of formal knowledge to community	-	• With Bugor-Sand as exception, more than half of the total respondents from Decalve (59%) and Sagrada-Bogtong (55%) sites were not aware of any information generated by a research community about the MPA and ecosystem impacts. • From the types of information that 45% of all respondents were aware of, biophysical information is perceived to be most useful in decision – making. • Overall, more than half (55%) of the respondents were not aware of information generated by research communities about the MPA sites.

Code	Indicator category/Name	Indicator Rating (+, 0, -, ?)	Remarks/ Notes
S16	Changes in conditions of ancestral and historical sites, features, and/or monuments	?	• People are generally not aware of what are considered as ancestral and historical sites, features, and/or monuments • this indicator maybe dropped as not critical

Cluster conclusions and/or recommendations: Stakeholders at 2 of the 3 MPA sites indicated that the ecosystem was still being degraded. However, stakeholders also felt that the threats to the ecosystem were declining since the establishment of the MPAs, indicating that the rate of degradation may be less now. Stakeholders had a clear understanding of the non-market uses and values of ecosystem services, possibly indicating a sense of stewardship being fostered by the MPAs. Stakeholders felt that formal knowledge (e.g. scientific results of MPA monitoring were not sufficiently communicated to the public.

EVALUATION TABLES - GOVERNANCE INDICATORS

Code	Indicator category/Name	Indicator Rating (+, 0, -, ?)	Remarks/ Notes
G1	Level of resource conflict	+	• Resource conflicts were reduced to only five areas. • Based from relative ranking top three indicators are: access issues; enforcement issues; and conflict between fishery users
	Decalve	+	
	Bugor Sand	+	
	Sagrada Bogtong	+	
G2	Existence of a decision-making & management body	+	Positive rating for all except in the user fee collection. ANALYSIS: • There are two main decision-making bodies (management board and enforcement) • These bodies was positively rated by the respondents except on its performance in the user-fee collection. RESEARCH AGENDA: Assess any change in the ratings of the 2 bodies particularly on the IEC activities and user fee collection.
G3	Existence and adoption of a management plan	+	• 100% are aware that there is MPA Plan. • In the 3 sites, more than 70% answered that the plan is adequate and only 24% said the plan is not adequate
G4	Local understanding of MPA rules & regulations	-	• 69% are aware of the rules and regulations concerning fishery laws and the laws governing the use of MPA in Decalve and Bugor-Sand; • Below 50% is the awareness of Sagrada-Bogtong fishers.
G5	Existence and adequacy of enabling legislation	+	Laws are adequate (more than 60% answered YES)
G6	Availability & allocation of MPA admin resources	-	• No regular funds are allocated to MPA operations.

Code	Indicator category/Name	Indicator Rating (+, 0, -, ?)	Remarks/ Notes
G9	Degree of interaction between managers & stakeholders	-	• Awareness of meeting is high for Decalve and BS (more than 70%) but low in Sagrada-Bogtong (10%); • Level of participation is low (below 60%).
G14	Clearly defined enforcement procedures	+	• 82% and more are aware that there are enforcement guidelines; • more than 50% said that it is updated and coordinated
G16	Degree of information dissemination to encourage stakeholders compliance	-	• Majority responded that IEC activities are relevant. • Few responded when asked on their participation to IEC activities.
Cluster conclusions and/or recommendations: The MPA management system reduced user conflicts in most areas and the majority of stakeholders felt the existing management plan was adequate. Most stakeholders felt that existing legislation and enforcement procedures were adequate, but the knowledge of specific MPA rules and regulations was low at the Sagrada-Bogtong site. Stakeholders at Sagrada-Bogtong were unaware of manager-stakeholder meetings and communications. More emphasis needs to be placed on involving stakeholders in management at the Sagrada-Bogtong site and more funds are needed for MPA operations at all sites.			

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APPENDIX 1
MPA SURVEY QUESTIONNAIRE /
INTERVIEW SCHEDULE

This interview forms part of the project titled "Capacity Building to Enhance MPA Management Effectiveness for the MPA Networks at Selected Provinces in the Philippines". The project aims to train MPA evaluation teams in the assessment of MPA management effectiveness in Calamianes Islands. With funding from the United States National Oceanographic and Atmospheric Administration and the Philippines Department of Science and Technology (DOST), this is a collaborative undertaking among the WorldFish Center, the Bureau of Fisheries and Aquatic Resources (BFAR), and selected State Universities and Colleges (SUCs).

This research is fully endorsed by the MPA management bodies, as well as relevant local and national government agencies. All the information you shall provide will be treated as confidential, and you will not in any way be identified.

QUESTIONNAIRE CONTENT

This document is divided into 6 sections:

Section 1 concerns 1 some interview information

Section 2 will ask about the respondent's profile

Section 3 pertains to the bio-physical indicators

Section 4 refers to the socio-economic indicators

Section 5 covers the governance indicators

Section 6 asks questions about MPA management problems/issues, proposed solutions and opportunities to improve management

INSTRUCTION

For each question, the interviewer must either tick the bracketed items or fill in the blank spaces, unless specified. Only fishers will be asked the questions in section 3 (biophysical indicators).

6 - INTERVIEW INFORMATION

Respondent ID No. _____

Location: (Barangay/Town) _____

Interviewer name/position: _____

7 - RESPONDENT'S PROFILE

7.1 Name _____
(List)

7.2 Stakeholder group/affiliation
(Tick one)

[ ] academe
[ ] local governments units
[ ] national government agencies
[ ] non-governmental organization
[ ] fishing association / people's organization
[ ] private sector
[ ] research agency
[ ] fisher without organization
[ ] others, specify _____

7.3 Position_____ and name of organization/association
_____
(Complete blank items)

7.4 Household head
(Tick one)

[ ] Yes   [ ] No

7.5 Gender

[ ] Male   [ ] Female

7.6 Household size (including respondent)
(Tick one)

[ ] 2	[ ] 3	[ ] 4
[ ] 5	[ ] 6	[ ] 7
[ ] 8	[ ] 9	[ ] > 9

7.7 Educational attainment
(Tick one)

[ ] no formal schooling   [ ] elementary level   [ ] elementary graduate

[ ] high school level   [ ] high school graduate   [ ] college level

[ ] vocational graduate   [ ] college graduate   [ ] post graduate

7.8 How many years have you used the areas within and/or around the MPA? (Tick one)

[ ] 1   [ ] 2   [ ] 3   [ ] 4   [ ] 5

[ ] 6   [ ] 7   [ ] 8   [ ] 9   [ ] > 9

8 BIO-PHYSICAL INDICATORS

8.1 Type, level and return on fishing effort (B7)

8.1.1 What are the types of fishing gears/methods and their spatial coverage that influence fisheries management in the study areas?

(Use a base map of the MPA area and locate/label the fishing grounds. Indicate where the fishing gears are being used following the list of gears and their codes. Follow the figure below.)

Initial list of major gears and number codes:

1. Hook & line (simple)
2. Hook & line (multiple)
3. Gill net (surface)
4. Gill net (bottom set)
5. Fish traps
6. Squid jigger
7. Fish corrals
8. Seine nets
9. Crab pots
10. Others 1
11. Others 2
12. Others 3

Figure 1. Spatial distribution of fishing gears at the MPA site during Habagat/SW Monsoon (June to September).

Figure 2. Spatial distribution of fishing gears at the MPA site during Amihan/NE Monsoon (November to February).

8.1.2   What top three fishing gears/methods do you use, your estimated volume of catch and the major catch composition?

(Indicate the season each gear is used (i.e. amihan or habagat) and the estimated volume caught by each gear in years 2000, 2005 and 2009.)

Season used		Habagat/SW Monsoon (June to September)								
Name of gear		Gear 1: _____			Gear 2: _____			Gear 3: _____		
Catch Composition		Estimated volume of catch per species (kg per trip) in 2000, 2005 and 2009								
		2000	2005	2009	2000	2005	2009	2000	2005	2009
Species, (genera or families)	Local name									
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
1. Other species										
Total catch (kg):										

Season used		Amihan/NE Monsoon (November to February)								
Name of gear		Gear 1: _____			Gear 2: _____			Gear 3: _____		
Catch Composition		Estimated volume of catch per species (kg per trip) in 2000, 2005 and 2009								
		2000	2005	2009	2000	2005	2009	2000	2005	2009
Species, (genera or families)	Local name									
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
2. Other species										
Total catch (kg):										

8.1.3 Has/have your fishing area/s changed since you started fishing?

(Tick one)

[ ] Yes   [ ] No

If yes, is/are your fishing area/s now further from the shoreline? Yes _____ No _____

[ ] Yes, Explain

[ ] No

9 SOCIO-ECONOMIC INDICATORS

9.1 Local Marine Resource Use Patterns (S1)

9.1.1 What are the coastal and marine resources and their conditions?

(Locate on the MPA map and complete table)

Coastal and Marine Resources	Perceived condition before the establishment of the MPA (1=Very Poor; 2=Poor; 3=Fair; 4=Good; 5=Very Good)	Perceived condition at present (1=Very Poor; 2=Poor; 3=Fair; 4=Good; 5=Very Good)
1. Reef		
2. Mangrove		
3. Seagrass/ Algal bed		

9.1.2 4What are the human activities associated with the coastal / marine resources and their relative importance?

(Complete table)

Coastal and Marine Resources	Human activities associated with resource	*tick applicable activity*	Rank importance by resource system *(use 1= most important; 2 = second most important, etc)*
Reef	1. Fisheries		
	2. Tourism		
	3.Others 1, _____		
	4.Others 2, _____		
Mangrove	1.Capture fisheries		
	2. Fish culture		
	3. Gleaning		
	4. Wood cutting for subsistence use (eg, charcoal, house materials)		
	5. Others 1,_____		
	6. Others 2,_____		
Seagrass/ Algal beds	1. Seahorse gathering		
	2. Gleaning		
	3. Others 1,_____		
	4. Others 2,_____		

9.2 Level of Understanding of Human Impacts on Resources (S3)

9.2.1 What are the threats that affect coastal / marine resources?

(Complete table below)

Coastal and Marine Resources and related Threats	Before MPA *(tick if applicable)*	At Present *(tick if applicable)*	If the threat still persists, indicate reason(s)
I. Reef			
1. Compressor use and cyanide fishing			
2. Dynamite fishing			
3. Use of active gear/fine mesh net			
4. Fishing using "tubli" and other organic substance			
5. Degradation/destruction/loss of habitat			
6. Pollution from terrestrial (eg nutrients, sediments, etc.)			
7. Pollution from marine (eg oil spill, chemical pollution, etc.)			
8. Others 1, _____			
9. Others 2, _____			
II. Mangrove			
1. Mangrove cutting for charcoal, firewood, and housing materials			
2. Degradation/destruction/loss of habitat			
3. Pollution from terrestrial (eg nutrients, sediments, etc.)			
4. Pollution from marine (eg oil spill, chemical pollution, etc.)			
5. Others 1, _____			
6. Others 2, _____			
III. Seagrass/ Algal Beds			
1. Gleaning activities			
2. Sea horse collection			
3. Pollution from terrestrial (eg nutrients, sediments, etc.)			
4. Pollution from marine (eg oil spill, chemical pollution, etc.)			
5. Others 1, _____			
6. Others 2, _____			
IV. Others / cross-cutting threats			
1. Pearl farm expansion restricting fishing and navigation access			
2. Declining fish catch			
3. Improper waste disposal			
4. LGU policies allow certain fishing operation perceived to be destructive.			
5. Unregulated coastal development			
6. Intrusion of commercial fishing in municipal Waters			
7. Small scale mining			
8. Others 1, _____			
9. Others 2, _____			

9.2.2   Would you attribute the removal or reduction of threats to the establishment of the MPA?

(Tick one option and specify reason)

[ ] Yes, why? _____

[ ] No, why?   _____

[ ] Not sure/uncertain

9.3 Perceptions of Non-Market and Non-Use Values (S6)

9.3.1   How do you perceive the non-market and non-use values of coastal/marine resources?

(Complete table below)

Statements	Perception *(Tick one per statement)*				
	1	2	3	4	5
	Very strongly disagree	Disagree	Neither disagree or agree	Agree	Very strongly agree
Indirect non-market value					
1. The reefs are important for protecting land from storm waves.					
2. In the long-run, fishing would be better if we cleared the coral					
3. Unless mangroves are protected, we will not have any fish to catch					
Existence non-use value					
1. Coral reefs are only important if you fish or dive.					
Bequest non-use value					
1. I want future generations to enjoy the coral reefs.					
2. We should restrict development in some coastal areas so that future generations will be able to have natural environment					
Existence value					
1. Seagrass beds have no value to people					
2. Fishing should be restricted in certain areas even if no one ever fishes in those areas just to allow the fish and coral to grow					

9.4 Household Income Distribution by Source (S9)

9.4.1   What are your primary sources of income from marine-based activities?

(Complete table below)

Activities	*tick applicable items*	Average household weekly income from activity (gross)
1. capture fishing		
2. fish culture		
3. fish processing		
4. fish trading		
5. gleaning		
6. seaweed farming		
7. fish farm laborer		
8. passenger boat operator		
9. firewood gathering		
10. Others 1 specify _____		
11. Others 2 specify _____		
12. Others 3 specify _____		

9.4.2   What are your other sources of income from land-based activities?

(Complete table below)

Activities	*tick applicable items*	Average household weekly income from activity (gross)
1. Farming		
2. Handicraft-making		
3. Labor or Construction		
4. Tourism-related services		
5. Others 1 specify _____		
6. Others 2 specify _____		
7. Others 3 specify _____		

9.5 Perceptions of Local Resource Harvest (S5)

9.5.1 How would you assess your harvest of marine products before and after the establishment of MPAs?

(Complete table below ,refer to gears and species in 3.1.2)

Gear used	Local Name of Top Five target species *(list local or common name)*	Catch per day or quantity (kg)		Size of target species (inches)	
		Pre-MPA	MPA	Pre-MPA	MPA
1.	1.				
	2.				
	3.				
	4.				
	5.				
2.	1.				
	2.				
	3.				
	4.				
	5.				
3.	1.				
	2.				
	3.				
	4.				
	5.				

9.5.2 Are there species caught today that were not caught before the MPA establishment?

(Tick one option)

[ ] Yes, specify species _____   [ ] No

9.6 Number and Nature of Markets (S12)

9.6.1 How would you describe the number and nature of markets in your MPA sites?

Target species	Peak months	Buyer	Value	Market
What are the 5 most important fish species / resources harvested? *(List, refer to gears and species in 3.1.2)*	What time of the year is the resource harvested? *(List)*	To whom is the product sold? *(list applicable options: 1=wholesaler, 2=retailer, 3=direct to household)*	What is the value of this resource? *(indicate price range per kg unit)*	Where is the market located? *(list applicable options: 1=local, 2= outside locality 3=export)*
1.				
2.				
3.				
4.				
5.				

10 GOVERNANCE INDICATORS

10.1 Existence and Adequacy of Enabling Legislations (G5)

10.1.1 Are you aware of the existing local and national laws that support the MPA?

(Tick one)

[ ] Yes   [ ] No   [ ] Not sure / uncertain

10.1.2 Are local laws adequate to support the objectives of the MPA?
(Tick one)

[ ] Yes   [ ] No   [ ] Not sure / uncertain

10.1.3 Are national laws adequate to support the objectives of the MPA?
(Tick one)

[ ] Yes   [ ] No   [ ] Not sure / uncertain

10.2 Existence of Decision–Making and Management Body [G2]

10.2.1 What is/are the name/s of the MPA decision making body/ies?
(Specify name/s)

Body 1_____

Body 2_____

10.2.2 Do you think that the MPA management and decision making body is performing well in undertaking its functions?

(Complete table below)

Name of decision-making body and/or management authority / relevant MPA activities / management functions	Performance of MPA management and decision making body *(Tick appropriate box based on Scale: 5= very well, 4= well, 3=neither well, nor poor, 2= not well, 1= poor)*						Comments/ Remarks
	5	4	3	2	1	Not sure / uncertain	
1. Name of Management Body/Authority: _____							
1. Advisory							
2. Advocacy							
3. Decision-making							
4. Enforcement							
5. Extension							
6. Information, education and communication							
7. Monitoring and evaluation							
8. Planning							
9. Policy making							
10. Project development							
11. Regulatory							
12. Research							
13. Sustainable financing							
14. Technical assistance							
15. Others1, _____							
16. Others2, _____							
2. Name of Management Body/Authority: _____							
1. Advisory							
2. Advocacy							
3. Decision-making							
4. Enforcement							
5. Extension							
6. Information, education and communication							
7. Monitoring and evaluation							
8. Planning							
9. Policy making							
10. Project development							
11. Regulatory							
12. Research							
13. Sustainable financing							
14. Technical assistance							
15. Others1, _____							
16. Others2, _____							

10.3 Level of Resource Conflict (G1)

10.3.1 Which of these resource use conflicts exist in the MPA area?

(Complete table below)

Issues at stake in conflict	*Tick relevant conflict*	Remarks/comments
1. Access Issues in fisheries and other coastal resources		
2. Enforcement Issues in fisheries and other coastal resources		
3. Conflicts between the fishery users *(eg. Small- vs Large -scale fishers)*		
4. Conflicts between fishers and other resource users *(eg. Tourism vs Conservation vs Industrial dev't)*		
5. Conflicts between fishers and non-fishery issues *(eg. Corruption, Politics)*		
6. Others 1, specify _____ (eg Encroachment of foreign fleets)		
7. Others 2, specify _____		

10.4 Degree of Interaction between Managers and Stakeholders (G9)

10.4.1 Are there regularly scheduled meetings between MPA managers and/or staff and stakeholders to discuss MPA issues?

(Tick one)

[ ] Yes   [ ] No   [ ] not sure / uncertain

10.4.2 If yes, how often do the members of the MPA management body/ies meet?

(Complete table below)

Name of management body *(list management)*	*Tick one option per management body*							
	once a week	once a month	once a quarter	once every six months	once a year	do not regularly meet	not sure / uncertain	others, specify
1.								
2.								

10.4.3 Do you participate in these meetings as member of the MPA management body?

(Tick one)

[ ] Yes, regularly
[ ] Yes, occasionally
[ ] No

10.5 Existence and Adoption of management Plan (G3)

10.5.1 When was the MPA management plan enacted?
(List name of plan and cite year) _____

10.5.2 Do you think that the current MPA management plan is adequate to attain the MPA objectives?
(Tick one)

[ ] Yes   [ ] No   [ ] Not sure / Uncertain

10.5.3 Do you know the goals and/or objectives contained in the MPA management plan?
(Tick one)

[ ] Yes, I know all   [ ] Yes, but not all   [ ] Not sure / Uncertain

10.6 Availability of and allocation of MPA Administrative Resources (G6)

10.6.1 What resources are allocated and/or made available to manage the MPA?
(Complete table below; resources for columns 3 to 5 on annual basis)

Name of management body /organizational entity *(list)*	Capital outlay (eg guard house, patrol boat, etc) *(Specify quantity and cost)*	Maintenance and other operating expenses (eg fuel, field supplies, etc) *(Specify quantity and cost)*	Personnel *(Specify number and cost)*	Other resources allocated *(Specify amount or unit)*	Comments/ Remarks
1.					
2.					
3.					

11 OTHER CONCERNS

11.1 What are the issues/concerns associated with MPA management and your proposed measures/solutions?

(Complete table below)

	tick if applicable	*Measures/ Solutions (list or describe)*	*Notes / remarks*
Generic issues			
1. capture of prohibited species			
2. depleted fishery resources			
3. degraded coastal habitats/ecosystems			
4. intensified resource use competition and conflict			
5. marine pollution			
6. post-harvest losses			
7. terrestrial pollution			
8. others1, specify_____			
9. others2, specify_____			
10. others3, specify_____			
Institutional issues			
1. limited institutional capabilities			
2. inadequate/inconsistent policies			
3. weak institutional partnerships			
4. unclear property rights			
5. others1, specify_____			
6. others2, specify_____			
7. others3, specify_____			

11.2 What aspects of your lifestyle and/or your livelihood were changed (both positively and negatively) by the establishment of the MPA?

(Complete table below)

Effects of MPA	*tick if applicable*
1. Reduced fishing ground (spatial change)	
2. Higher volume of catch	
3. Improved diversity of catch including high-value species	
4. Bound by regulations to follow	
5. No change at all	
6. Others1, specify_____	
7. Others2, specify_____	
8. Others3, specify_____	

6.3 What are the opportunities to improve or enhance the management of MPA?

(Complete table below; follow examples provided)

Opportunities *(list)*	*tick if applicable*	Comments / remarks *(describe; examples given below)*
1. establishment of fees		User fee may be developed for sustainable financing mechanism
2. MPA network		Establishment of social and ecological network of MPAs
3. others1, specify_____		
4. others2, specify_____		
5. others3, specify_____		

APPENDIX 1A. Matrix of questions, re: data gathering instrument and potential respondents (used to decide which people will be asked which questions).

No.	Questions	Academe	LGU	NGA	NGO	Fishing org./PO	Private sector	Research agency	Fisher w/o org.	Others
1	Interview Information	√	√	√	√	√	√	√	√	√
2	Respondent's Profile	√	√	√	√	√	√	√	√	√
2.1	Name	√	√	√	√	√	√	√	√	√
2.2	Stakeholder group/affiliation	√	√	√	√	√	√	√	√	√
2.3	Position __ and name of organization/association_____	√	√	√	√	√	√	√	√	√
2.4	Household head	√	√	√	√	√	√	√	√	√
2.5	Gender	√	√	√	√	√	√	√	√	√
2.6	Household size (including respondent)	√	√	√	√	√	√	√	√	√
2.7	Educational attainment	√	√	√	√	√	√	√	√	√
2.8	How many years have you used the areas within and/or around the MPA?					√	√		√	
3	*BIO-PHYSICAL INDICATOR*									
3.1	**Type, level and return on fishing effort (B7)**									
3.1.1	What are the types of fishing gears/methods and their spatial coverage that influence fisheries management in the study areas?					√			√	
3.1.2	What top three fishing gears/methods do you use, your estimated volume of catch and the major catch composition?					√			√	
3.1.3	Has/have your fishing area/s changed since					√			√	

No.	Questions	Academe	LGU	NGA	NGO	Fishing org./PO	Private sector	Research agency	Fisher w/o org.	Others
	you started fishing?									
4	*SOCIO-ECONOMIC INDICATORS*									
4.1	**Local Marine Resource Use Pattern (S1)**									
4.1.1	What are the coastal and marine resources and their conditions?	√	√	√	√	√	√	√	√	√
4.1.2	What are the human activities associated with the coastal / marine resources and their relative importance?	√	√	√	√	√	√	√	√	√
4.2	**Level of Understanding of Human Impacts on Resources (S3)**									
4.2.1	What are the threats that affect coastal / marine resources?	√	√	√	√	√	√	√	√	√
4.2.2	Would you attribute the removal or reduction of threats to the establishment of the MPA?	√	√	√	√	√	√	√	√	√
4.3	**Perception of Non-Market and Non-Use Values (S6)**									

No.	Questions	Academe	LGU	NGA	NGO	Fishing org./PO	Private sector	Research agency	Fisher w/o org.	Others
4.3.1	How do you perceive the non-market and non-use values of coastal/marine resources?	√	√	√	√	√	√	√	√	√
4.4	**Household Income Distribution by Source (S9)**									
4.4.1	What are your primary sources of income from marine-based activities?					√	√		√	
4.4.2	What are your other sources of income from land-based activities?					√	√		√	
4.5	**Perceptions of Local Resource Harvest (S5)**									
4.5.1	How would you assess your harvest of marine products before and after the establishment of MPAs?					√			√	
4.5.2	Are there species caught today that were not caught before the MPA establishment?					√			√	
4.6	**Number and Nature of Markets (S12)**									

No.	Questions	Academe	LGU	NGA	NGO	Fishing org./PO	Private sector	Research agency	Fisher w/o org.	Others
4.6.1	How would you describe the number and nature of markets in your MPA sites?					√			√	
5	*GOVERNANCE INDICATORS*									
5.1	**Existence and Adequacy of Enabling Legislation (G5)**									
5.1.1	Are you aware of the existing local and national laws that support the MPA?	√	√	√	√	√	√	√	√	√
5.1.2	Are local laws adequate to support the objectives of the MPA?	√	√	√	√	√	√	√	√	√
5.1.3	Are national laws adequate to support the objectives of the MPA?	√	√	√	√	√	√	√	√	√
5.2	**Existence of Decision-Making and Management Body (G2)**									
5.2.1	What is/are the name/s of the MPA decision making body/ies?	√	√	√	√	√	√	√	√	√
5.2.2	Do you think that the MPA management and decision making body is performing well in	√	√	√	√	√	√	√	√	√

No.	Questions	Academe	LGU	NGA	NGO	Fishing org./PO	Private sector	Research agency	Fisher w/o org.	Others
	undertaking its functions?									
5.3	**Level of Resource Conflict (G1)**									
5.3.1	Which of these resource use conflicts exist in the MPA area?	√	√	√	√	√	√	√	√	√
5.4	**Degree of Interaction between Managers and Stakeholders (G9)**									
5.4.1	Are there regularly scheduled meetings between MPA managers and/or staff and stakeholders to discuss MPA issues?	√	√	√	√	√	√	√	√	√
5.4.2	If yes, how often do the members of the MPA management body/ies meet?	√	√	√	√	√	√	√	√	√
5.4.3	Do you participate in these meetings as member of the MPA management body?	√	√	√	√	√	√	√	√	√
5.5	**Existence and Adoption of Management Plan (G3)**									
5.5.1	When was the MPA management plan enacted?	√	√	√	√	√	√	√	√	√
5.5.2	Do you think that the current MPA management plan is adequate to attain the	√	√	√	√	√	√	√	√	√

No.	Questions	Academe	LGU	NGA	NGO	Fishing org./PO	Private sector	Research agency	Fisher w/o org.	Others
	MPA objectives?									
5.5.3	Do you know the goals and/or objectives contained in the MPA management plan?	√	√	√	√	√	√	√	√	√
5.6	**Availability of and Allocation of MPA Administrative Resources (G6)**									
5.6.1	What resources are allocated and/or made available to manage the MPA?	√	√	√	√	√	√	√	√	√
6	*OTHER CONCERNS*									
6.1	*What are the issues/concerns associated with MPA management and your proposed measures/solutions?*	√	√	√	√	√	√	√	√	√
6.2	*What aspects of your lifestyle and/or your livelihood were changed (both positively and negatively) by the establishment of the MPA?*	√	√	√	√	√	√	√	√	√
6.3	*What are the opportunities to improve or enhance the management of MPA?*	√	√	√	√	√	√	√	√	√