



# Impact Evaluation of the **Camiguin Coastal Resource Management Project (CCRMP)**

## Final Report

# Preface



The National Economic and Development Authority Regional Office X (NEDA – X), in coordination with the Department of Environment and Natural Resources (DENR – X) and the Provincial Government of Camiguin is pleased to present the results on the impact evaluation study conducted for the Camiguin Coastal Resource Management Project (CCRMP), three years after its completion.


The impact evaluation is one of the tools used in Managing for Development Results (MfDR) wherein the effects (impact) of the project especially that of the CCRMP, whether direct or indirect, intended or unintended, positive or negative are assessed. The results of the study, including lessons learned and best practices in project implementation, shall be considered in the planning or project formulation process for the design or implementation of similar interventions in the future.

The CCRMP is a five-year project funded in Grant by the New Zealand Agency for International Development (NZAID). Project implementation focused in the Island Province of Camiguin, covering its five municipalities, namely: Catarman, Guinsiliban, Mambajao, Mahinog, and Sagay. The impetus for the project was based on the urgent need to utilize natural resources in a sustainable manner, and to achieve social and economic equity.

The Project envisioned increased productivity and enhanced integrity of coastal and marine resources of the province while providing sustainable economic activities towards an improved quality of life among the Camiguinons.

With the completion of this impact evaluation study, I would like to convey my heartfelt gratitude to the Province of Camiguin, headed by Governor Ma. Luisa D. Romualdo, for the strong support, cooperation, and collaboration shared particularly with the NEDA-X Project Core Team and the Consultants. We also thank the Integrative Competitive Intelligence Asia (ICI) and Orient Management Consultants (OMC) for taking on the challenge to conduct the impact evaluation study.

More importantly, we thank the New Zealand Agency for International Development (NZAID) for the financial support extended to the Province in the realization of the CCRMP, as well as to the NEDA Central Office particularly the Monitoring and Evaluation Staff (MES), for the approval and support in the conduct of the CCRMP impact evaluation study in Region X.

  
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# Acronyms and Abbreviations

<b>AEV</b>	Annual Economic Value
<b>ALS A&amp;E</b>	Alternative Learning System Accreditation and Equivalency Exam
<b>ASEAN</b>	Association of Southeast Asian Nations
<b>AVP</b>	Audio-Visual Presentation
<b>BFARMCs</b>	Barangay Fisheries and Aquatic Resources Management Councils
<b>CCRMP</b>	Camiguin Coastal Resource Management Project
<b>Coop</b>	Cooperative
<b>CPSC</b>	Camiguin Polytechnic State College
<b>CRM</b>	Coastal Resource Management
<b>CTL</b>	Core Trainees/Learners
<b>DA-BFAR</b>	Department of Agriculture – Bureau of Fisheries and Aquatic Resources
<b>DBM</b>	Department of Budget and Management
<b>DCA</b>	Dead Coral Algae
<b>DENR</b>	Department of Environment and Natural Resources
<b>DENR-PENRO</b>	Department of Environment and Natural Resources Provincial Environment and Natural Resources Office
<b>DID</b>	Difference in Differences
<b>FARMCs</b>	Fisheries and Aquatic Resources Management Councils
<b>FGD</b>	Focus Group Discussions
<b>FVC</b>	Fish Visual Census
<b>GPS</b>	Global Positioning System
<b>HH</b>	Household
<b>HS</b>	High School
<b>ICI Asia</b>	Integrative Competitive Intelligence Asia
<b>IE</b>	Impact Evaluation
<b>IEC</b>	Information Education Campaign



<b>Kg</b>	Kilogram
<b>KII</b>	Key Informant Interview
<b>LGU</b>	Local Government Unit
<b>LHC</b>	Live Hard Coral
<b>LIT</b>	Line Intercept Transect
<b>MAO</b>	Municipal Agriculture Office
<b>MEAT</b>	Management Effectiveness Assessment Tool
<b>MFAT</b>	New Zealand Ministry of Foreign Affairs and Trade
<b>MLGU</b>	Municipal Local Government Unit
<b>MOV<sub>s</sub></b>	Means of Verification
<b>MPAs</b>	Marine Protected Areas
<b>MSN</b>	MPA Support Network
<b>Mun.</b>	Municipality
<b>NEDA</b>	National Economic and Development Authority
<b>NIPAS</b>	National Integrated Protected Areas System
<b>NGO</b>	Non-government Organization
<b>NPV</b>	Net Present Value
<b>OMC</b>	Orient Management Consultants
<b>PENRO</b>	Provincial Environment and Natural Resources Office
<b>PIT</b>	Point Intercept Transect
<b>POs</b>	People's Organizations
<b>TSS</b>	Total Suspended Solid

# Definition of Selected Technical Terms

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## **Benthic Life Form Cover**

The Benthic Community is made up of organisms that live in and on the bottom of the ocean floor. These organisms are known as benthos. Benthos includes worms, clams, crabs, lobsters, sponges, and other tiny organisms that live in the bottom sediments. Benthos is divided into two groups: the filter feeders and the deposit feeders. Filter feeders, such as clams and quahogs, filter their food by siphoning particles out of the water. Deposit feeders, such as snails and shrimp, ingest or sift through the sediment and consume organic matter within it.<sup>1</sup>

Benthic habitats vary widely depending on their location and depth, and they are often characterized by dominant structural features and biological communities.<sup>2</sup>

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## **Biomass**

The amount of living matter in a given habitat, expressed either as the weight of organisms per unit area or as the volume of organisms per unit volume of habitat.<sup>3</sup>

When all of an ecosystem's mass is added up, it is called the biomass of that ecosystem. Biomass refers to the overall mass of an ecosystem. Biomass may be quantified as the total amount of mass in an ecosystem or as an average amount of mass in a given area.<sup>4</sup>

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<sup>1</sup> Estuarine Science. (n.d.). <http://omp.gso.uri.edu/ompweb/doe/science/biology/benth2.htm>. (Retrieved on July 8, 2017)

<sup>2</sup> Invasive Species Compendium. (2017, September 26). <http://www.cabi.org/isc/datasheet/107788>. (Retrieved on July 8, 2017)

<sup>3</sup> Biomass. Dictionary.com Unabridged. <http://www.dictionary.com/browse/biomass>. (Retrieved on July 8, 2017)

<sup>4</sup> What Is Biomass? - Definition & Explanation. (n.d.). <http://study.com/academy/lesson/what-is-biomass-definition-lesson-quiz.html>. (Retrieved on July 8, 2017)

<b>Biophysical</b>	<p>The biophysical environment is the biotic and abiotic surrounding of an organism or population, and consequently includes the factors that have an influence on their survival, development, and evolution. The biophysical environment can vary in scale from microscopic to global in extent.<sup>5</sup></p> <p>Biophysical environment functions are essential in understanding how human activities may impact the environment. The living and non-living features of an environment in which an organism lives is called the biophysical environment.</p>
<b>Dissolved Oxygen</b>	<p>Dissolved oxygen (DO) refers to the concentration of oxygen gas incorporated in water. Oxygen enters water by direct absorption from the atmosphere, which is enhanced by turbulence. Water also absorbs the oxygen released by aquatic plants during photosynthesis. Sufficient DO is essential to growth and reproduction of aerobic aquatic life.<sup>6</sup></p> <p>Dissolved oxygen is necessary to many forms of life including fish, invertebrates, bacteria, and plants. These organisms use oxygen in respiration, similar to organisms on land. Fish and crustaceans obtain oxygen for respiration through their gills, while plant life and phytoplankton require dissolved oxygen for respiration when there is no light for photosynthesis.<sup>7</sup></p>
<b>Ecosystems</b>	<p>Ecosystems are parts of the biosphere and, as a whole, they make up the biosphere. Ecosystems are made up of habitats in which organisms live. Natural ecosystems have seen minimal effects of human activity, while built environments are at the other end of this scale in which there is little biotic activity. Studies of the biophysical environments include atmospheric, marine, or terrestrial and range from microscopic to global.<sup>8</sup></p>
<b>Fish Catch or Fisheries Catch Data</b>	<p>‘Fisheries catch data’ refers to information detailing how much fish is caught per country on a global basis. ‘Catch’ refers to the total amount of whole fish captured. It has a fundamental impact on fish populations and food webs because it represents removal of biomass and individuals from an ecosystem.<sup>9</sup></p>

<sup>5</sup> Biophysical environment. (n.d.). Kemp, David (1998). Environment Dictionary. London, UK: Routledge. (Retrieved on July 8, 2017)

<sup>6</sup> Dissolved Oxygen. (n.d.). [https://www3.epa.gov/caddis/ssr\\_do\\_int.html](https://www3.epa.gov/caddis/ssr_do_int.html). (Retrieved on July 8, 2017)

<sup>7</sup> Fondriest Environmental, Inc. “Dissolved Oxygen.” Fundamentals of Environmental Measurements. (2013, November 19). <http://www.fondriest.com/environmental-measurements/parameters/water-quality/dissolved-oxygen/>. (Retrieved on July 8, 2017)

<sup>8</sup> Biophysical Impacts. (n.d.). <http://www.yukonenvirothon.com/biophysical-environments.html>. (Retrieved on July 8, 2017)

<sup>9</sup> Ocean Health Index. (n.d.). <http://www.oceanhealthindex.org/methodology/components/fisheries-catch>. (Retrieved on July 8, 2017)

<b>Fish Landings</b>	Fish landings are defined as the catches of marine fish landed in foreign or domestic ports. Marine capture fishery landings are subject to changes in market demand and prices, as well as the need to rebuild stocks to maximum sustainable yield levels in order to achieve long-term sustainable use of marine resources. <sup>10</sup>
<b>Habitat Monitoring Team</b>	The habitat monitoring team is the group of people assembled for developing a habitat inventory or monitoring the program at a local planning unit. <sup>11</sup>
<b>Live Coral Cover</b>	Coral cover is a measure of the proportion of reef surface covered by live stony coral instead of sponges, algae, or other organisms. Stony, reef-building corals are the main contributors to a reef's three-dimensional framework—the structure that provides critical habitat for
<b>Macro invertebrates</b>	Benthic (meaning “bottom-dwelling”) macro invertebrates are small aquatic animals and the aquatic larval stages of insects. This category includes dragonfly and stonefly larvae, snails, worms, and beetles. These animals lack a backbone, are visible without the aid of a microscope, and are found in and around water bodies during some period of their lives. Benthic macro invertebrates are often found attached to rocks, vegetation, logs, and sticks or burrowed into the bottom sand and sediments. Benthic macro invertebrates are commonly used as indicators of the biological condition of water bodies. <sup>13</sup>

<sup>10</sup> OECD, Fish landings (indicator). (2017). <https://data.oecd.org/fish/fish-landings.htm>. (Retrieved on July 8, 2017)

<sup>11</sup> Rowland, M.M.; Vojta, C.D.; tech. eds. 2013. A technical guide for monitoring wildlife habitat. Gen. Tech. Rep. WO-89. (Retrieved on July 8, 2017)

<sup>12</sup> Coral Cover. (n.d.). <http://www.healthyreefs.org/cms/coral-cover/>. (Retrieved on July 8, 2017)

<sup>13</sup> Indicators: Benthic Macroinvertebrates. (n.d.). <https://www.epa.gov/national-aquatic-resource-surveys/indicators-benthic-macroinvertebrates>. (Retrieved on July 8, 2017)

<b>Mangrove Tree's Basal Area</b>	<p>Basal area is the area of a given section of land that is occupied by the cross-section of tree trunks and stems at the base. The term is used in forest management and forest ecology. In most countries, this is usually a measurement taken at the diameter at breast height (1.3m or 4.5 ft) of a tree above the ground, and includes the complete diameter of every tree, including the bark. Measurements are usually made for a plot, and this is then scaled up for one hectare of land for comparison purposes to examine a forest's productivity and growth rate.<sup>14</sup></p> <p>Basal area is the cross-sectional area of a tree 4.5 feet above ground. The basal area of all trees in a given land area describes the degree to which an area is occupied by trees, and is generally expressed in square feet per acre (ft<sup>2</sup>/acre).<sup>15</sup></p>
<b>Species Composition</b>	Species composition is the identity of all the different organisms that make up a community. This is important when studying how an ecosystem works, and how important different organisms are to an environment. <sup>16</sup>
<b>Total Suspended Solids</b>	A measure of the suspended solids in waste water, effluent, or water bodies, determined by tests for "total suspended non-filterable solids". <sup>17</sup>

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<sup>15</sup> Making and using measurement tools - basal area. (2013). <http://www.extension.umn.edu/environment/trees-woodlands/forest-management-practices-fact-sheet-managing-water-series/making-and-using-measurement-tools-basal-area/>. (Retrieved on July 8, 2017)

<sup>16</sup> Species Composition: Definition & Explanation. (n.d.). <https://study.com/academy/lesson/species-composition-definition-lesson-quiz.html>. (Retrieved on July 8, 2017)

<sup>17</sup> OECD Business and the Environment: Policy Incentives and Corporate Responses. (2007) . <https://stats.oecd.org/glossary/detail.asp?ID=7219> (Retrieved on March 27, 2018)

<b>Transect</b>	<p>A transect is a path along which one counts and records occurrences of the species of study (e.g., plants). It requires an observer to move along a fixed path and to count occurrences along the path and, at the same time (in some procedures), obtain the distance of the object from the path.<sup>18</sup></p> <p>This method of sampling involves only a small section of a large natural area, yet produces an accurate representative sampling of the biotic and abiotic parts of that community.<sup>19</sup></p>
<b>Trophic Level</b>	<p>In ecology, the trophic level is the position that an organism occupies in a food chain — what it eats, and what eats it.<sup>20</sup></p> <p>Any class of organisms that occupy the same position in a food chain, as primary consumers, secondary consumers, and tertiary consumers. Any of the sequential stages in a food chain, occupied by producers at the bottom and in turn by primary, secondary, and tertiary consumers. Decomposers (detritivores) are sometimes considered to occupy their own trophic level.<sup>21</sup></p>
<b>Quadrat Method</b>	<p>Quadrat sampling is a classic tool for the study of ecology, especially biodiversity. In general, a series of squares (quadrats) of a set size are placed in a habitat of interest, and the species within those quadrats are identified and recorded. Passive quadrat sampling (done without removing the organisms found within the quadrat) can be done either by hand with researchers carefully sorting through each individual quadrat or, more efficiently, can be done by taking a photograph of the quadrat for future analysis. Abundance of organisms found at the study site can be calculated using the number found per quadrat and the size of the quadrat area. Quadrat methods are time-tested sampling techniques that are best suited for coastal areas where access to a habitat is relatively easy.<sup>22</sup></p>

<sup>18</sup> Sampling Techniques. (n.d.). [http://www2.fiu.edu/~troxler/PCB3043L/manual/02-Sampling\\_Techniques.pdf](http://www2.fiu.edu/~troxler/PCB3043L/manual/02-Sampling_Techniques.pdf). (Retrieved on August 7, 2017)

<sup>19</sup> A Line Transect: Surveying Biodiversity on your Club Site. <http://gen.uga.edu/documents/biodiversity/activities/A%20Line%20Transect.pdf>. (Retrieved on July 8, 2017)

<sup>20</sup> Trophic Level. (n.d.). The American Heritage® Science Dictionary. <http://www.dictionary.com/browse/trophic-level>. (Retrieved on August 7, 2017)

<sup>21</sup> Trophic Level. (n.d.). Dictionary.com Unabridged. <http://www.dictionary.com/browse/trophic-level>. (Retrieved on December 5, 2017)

<sup>22</sup> Quadrat Sampling. (n.d.). [http://www.coml.org/investigating/observing/quadrat\\_sampling](http://www.coml.org/investigating/observing/quadrat_sampling). (Retrieved on July 8, 2017)



# Executive Summary

**This study endeavored to determine the impact of the Camiguin Coastal Resource Management Project (CCRMP) three years after its conclusion in September 2014. The impact evaluation determined whether the target outcomes on coastal resource management and alternative livelihood of the CCRMP were achieved.**

To determine the impact and effects of the CCRMP, the evaluation focused on two interrelated aspects, namely: 1) Outcome 1 on the increase in productivity and any enhancement in the integrity of the coastal and marine resources, and 2) Outcome 2 on the increase in the income of fisherfolk.

The impact evaluation examined the changes that occurred over time in these two components. The period of interest covers the two phases of the project that ran from 2008-2014 up to 2017, which is about three years after the project conclusion. The National Evaluation Policy Framework (NEDA-DBM Joint Memorandum Circular No. 2015-01) was applied: (a) Relevance (i.e., alignment and consistency with national priorities and policies, responsiveness to stakeholder needs, complementation with other programs/projects, and programmatic alternatives); (b) Effectiveness (i.e., achievement of objectives, intended results, and timeliness); (c) Efficiency (i.e., delivery of outputs vis-à-vis inputs and operational alternatives); and (d) Sustainability (i.e., continued profitability of ecotourism livelihood projects and complementary services in the declared Marine Protected Areas).

Based on available resources, time, and documents, the study was able to evaluate sample areas and select enrolled and not-enrolled sample respondents who are representative of the project sites. The enrolled respondents were fisherfolk and stakeholders directly involved in the implementation of the CCRMP. While fisherfolk in Camiguin who did not take part in the project represented the not-enrolled respondents.

In terms of Outcome 1, the CCRMP has made significant contributions to biodiversity conservation in Camiguin. By laying down the foundation for longer-term initiatives in collaboration with the local government units (LGU), and other stakeholders, marked improvement in the MPAs covered was realized. The value of stakeholder involvement is further underscored by one of the lessons gained from the evaluation: institutional changes and broader policies introduced by the CCRMP translated to better biodiversity conservation outcomes.

Overall health of reef, fish, sea grass, and mangrove has shown improvement, as indicated by the significant increase in live coral cover, increase in fish density and fish size inside the MPAs,



and increased basal area of mangroves over baseline.

Baseline values for all Outcome 1 indicators were collected during the initial biological assessment conducted by the CCRMP in 2008 in Mantigue Is. in Mahinog, White Island in Mambajao, and Pasil reef in Catarman. Baseline for Alangilan in Sagay and Liong in Guinsiliban were conducted in 2012.

The goal of the CCRMP to improve the overall water quality was achieved, as evidenced by the increase in water clarity and improvement in selected water parameters over baseline values. All water quality indicators evaluated within the MPAs showed better water quality readings - i.e. decrease in total suspended solids, lower oil, grease and fecal coliform contaminants - with all MPAs meeting the DENR standards for SB waters (for recreation and aquaculture).

The stakeholders regarded the development of coastal resource management plans as highly relevant in institutionalizing Coastal Resource Management towards increasing natural productivity and enhancing the integrity of the coastal and marine resources of Camiguin. Following the economic valuation of Philippine coral reefs by Samonte-Tan and Armedilla (UNEP, 2004), the 20-year economic value of the entire Camiguin near shore coastal habitat was estimated and the return on investment (ROI) of the CCRMP Phase 1 was computed at 22 percent.

The established MPAs showed biological and ecological effects both inside and outside their boundaries. Inside the MPAs, the coral cover registered “fair” to “good” with a mean coverage of 45.26 percent. Data collected also

show a positive increasing trend of coral cover in the MPAs, for example, Mantigue Is. MPA shows a 39 percent increase net change between the 2008 baseline and the latest 2017 assessment. Positive changes in fish diversity, density and biomass also indicate that the protection measures installed are translated to better conservation outcomes inside the MPAs. Fish density with a moderate average count of 758/1,000m<sup>2</sup> and an average 5-401 kg/km<sup>2</sup> biomass are also recorded.

Outside the MPAs, the potential positive effects observed include spillover and dispersal of fish eggs and larvae from inside the MPAs. The MPAs contribute to higher fishery production by making this spillover available to catch and by an increase in the reproductive output, thus contributing to more fish and coral larvae settling in the MPAs to become part of the adult population. Majority of the respondents perceived the establishment of the MPAs to be beneficial in the long run since they observed an increase in fish volume.

In terms of Outcome 2, the CCRMP was only partially successful in providing sustainable alternative sources of income.

Reliance on fishing as the main source of income is still evident in Camiguin; 77.69 percent of respondents considered fishing as their primary source of income. The “spillover” effect of the MPAs on the target and contiguous municipalities benefitted the residents of Camiguin, whose main source of income is fishing.

On the other hand, the introduction of alternative livelihood programs as a strategy to reduce reliance on fish catch to enable the coastal resources

to regenerate was generally received positively by the stakeholders. However, the effectiveness of the established enterprises differed greatly between the fishery or agriculture-based and ecotourism-based livelihoods. For the food processing projects, vulnerability to shocks, trends, and seasonality were not anticipated and difficulty in sourcing raw materials was a major challenge. These, coupled with low entrepreneurial mindset-readiness, prompted some fisherfolk to return to fishing after trying the product-processing livelihood projects. On the other hand, ecotourism-based enterprises were observed to be better alternative sources of income. Fisherfolk engaged in the provision of tourism-related services had significantly reduced their reliance on fish catch, as in the case of snorkeling guides in Catarman and pump boat operators in Mahinog. The sustainability of these enterprises will be maintained with the support from the LGUs, other government agencies, non-government organizations (NGOs), and the private sector. Considering the total revenue and user fees generated in the past ten years vis-à-vis the CCRMP Phase 2 project cost, the ROI was considerably high at 416 percent.

In terms of Management Effectiveness, while Camiguin's MPAs contributed to the enhancement of coastal resources resulting to improved outcomes, there is still a need to consider broader ecosystem-based management and expand the conventional fisheries management framework to explicitly consider a wider view of the fishery and its ecosystem, including its human dimension.

Key lessons and recommendations include, among others:

For the MPAs to become effective for conservation and to meet desired fisheries objectives, these should be complemented by strong LGU support and be able to access technical support from the Department of Environment and Natural Resources (DENR), Bureau of Fisheries and Aquatic Resources (BFAR), and other academic institutions. Such groups can converge and discuss common problems and develop appropriate strategies towards meeting effective management of protected areas. Where applicable several fishery management tools can complement MPA management such as coastal zoning, coastal law enforcement, marine pollution management, closed season, reduction in the number of fisherfolk, and rotational or periodically harvested area closures. In establishing new MPAs, the new focus of the LGUs, DA-BFAR, and DENR should be on quality and towards a network of MPAs.

Vital to the long-term sustainability of the MPA is the social buy-in and compliance of all stakeholders. Project buy-in comes from the LGUs' commitment of having jurisdiction over the protected area's management including conservation as well as implementation of community-based projects. The active participation of people's organizations (POs) as major stakeholders for the community-based activities can ensure a formal structure for local participatory decision making and project sustainability.

Community stakeholders suggest that the development of alternative or supplementary livelihood activities should have been undertaken even

before the design and establishment of the MPAs. In the short-run, these advanced livelihood activities will be an important incentive for participation especially for stakeholders who will be directly affected and economically disrupted from fishing.

Policies that support the maintenance of the MPAs already exist however, what is lacking is the stronger implementation and enforcement of these laws. Introduction and use of real-time monitoring and evaluation activities using technology can be effective complementary initiatives - new technologies can enhance integrated data management systems including monitoring and surveillance such as drone and vessel tracking system for commercial boats.

# Introduction

## Establishment of the Camiguin Coastal Resource Management Project (CCRMP)

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The impetus of the CCRMP was the immediate need to utilize natural resources in a sustainable manner and to hasten social and economic equity in the process. Residents in the island-province of Camiguin were heavily reliant on fishing and farming, but the island was threatened by worsening social, economic, and environmental conditions. Decline in the overall economic well-being of the residents was evident with low fish catch and the lack of livelihood opportunities.

Two core coastal resource management (CRM) problems were identified in Camiguin: 1) the declining integrity of coastal and marine ecosystems manifested by poor coral cover and low fish density and biomass indicating a decrease in natural productivity, and 2) the acute poverty and widening social inequity; the Province recorded a 41 percent poverty incidence among families in 2012 as reported by the Philippine Statistics Authority (PSA).

The underlying factors that contributed to these core issues included: 1) the weak institutional capability for CRM, 2) the destruction and degradation of limited near-shore and coastal habitats, 3) the occurrence of natural

hazards, 4) the absence of conscious resource enhancement and conservation strategies, 5) the unharmonized or conflicting development activities, 6) the population pressure wherein there are more and more people depending on fisheries for their subsistence and livelihood, and 7) the inequitable access to and control of productive resources among residents, especially for the women and youth. Because of the impact of these factors to the overall situation, these became the additional driving force to create the CCRMP - to address the complex issues of sustainable management of coastal resources and to provide sustainable economic activities in Camiguin Province.

## CCRMP Intervention

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The CCRMP began in 2007 with the aim of institutionalizing the CRM as a basic service of the LGUs, thereby increasing natural productivity and enhancing the integrity of the coastal and marine resources in the island-province. The project was funded by the New Zealand Agency for International Development (NZAID), which commissioned the CCRMP Phase I management services to Tetra Tech EM Inc. The CCRMP interventions were implemented in coordination with the municipal LGUs of the Province, and spearheaded by the Department of Environment and Natural Resources

(DENR), NZAID, and other national government agencies.

The CCRMP envisioned the increased productivity and enhanced integrity of coastal and marine resources (Outcome 1), while providing sustainable economic activities towards an improved quality of life among the fisherfolk communities (Outcome 2) in Camiguin. The Project reported that sustainable mechanisms were in place for the management of the 31 MPAs established in Camiguin, and CRM awareness increased through different approaches conducted by the implementers. In the enterprise development component, alternative and conservation-based enterprises were implemented, including marine-based value-adding livelihood activities such as seaweed farming and ecotourism, to name a few.

The objective of Phase I was the institutionalization of an integrated coastal resource management system at the barangay, municipal, and provincial levels in five years. Another objective was to strengthen the capacities of Camiguin coastal communities, LGUs, and other institutions involved to protect and manage the municipal waters and the limited productive near-shore ecosystems and resources.

Republic Act 8550 or the Philippine Fisheries Code of 1998 and the municipal ordinances support the implementation of the MPAs in target coastal marine zones in Camiguin. Moreover, other coastal law enforcement had complementary fishery-related laws which include illegal quarrying, municipal ordinance on the establishment of a marine sanctuary, barangay ordinance on fish sanctuary,

coastal clean-up activities, barangay ordinance on illegal fishing activities and illegal quarrying, and waste segregation and disposal.

Since the establishment of the MPAs, most barangays have been very receptive to the Project. There has been cooperation between the project implementers and the local stakeholders, particularly the people's organizations (POs) and the municipal and barangay governments. Regulations have been set to protect the MPAs, and patrolling and monitoring activities were regularly conducted. Community acceptance has been documented through public consultations and the passage of barangay resolutions.

On the other hand, the objective of Phase II was the development of the business or private sector, LGUs, and the entrepreneurial capacities of local communities in sustainable and marine resource-based economic enterprises.

In recent years, the coastal regions also became the focus of tourism development. The beauty of seascapes, the wide range of habitats in the marine environment, as well as the diversity of marine life prompted tourists to make Camiguin a priority destination. The need to protect and sustain the integrity and productivity of these resources was therefore one of the important strategies for ensuring food production, livelihood, and improvement in rural income.

Establishment of the MPAs was proven beneficial to fisherfolk and had a direct impact on their income. At the end of Phase I, 26 percent of the appropriate near shore coastal habitats were established as MPAs.

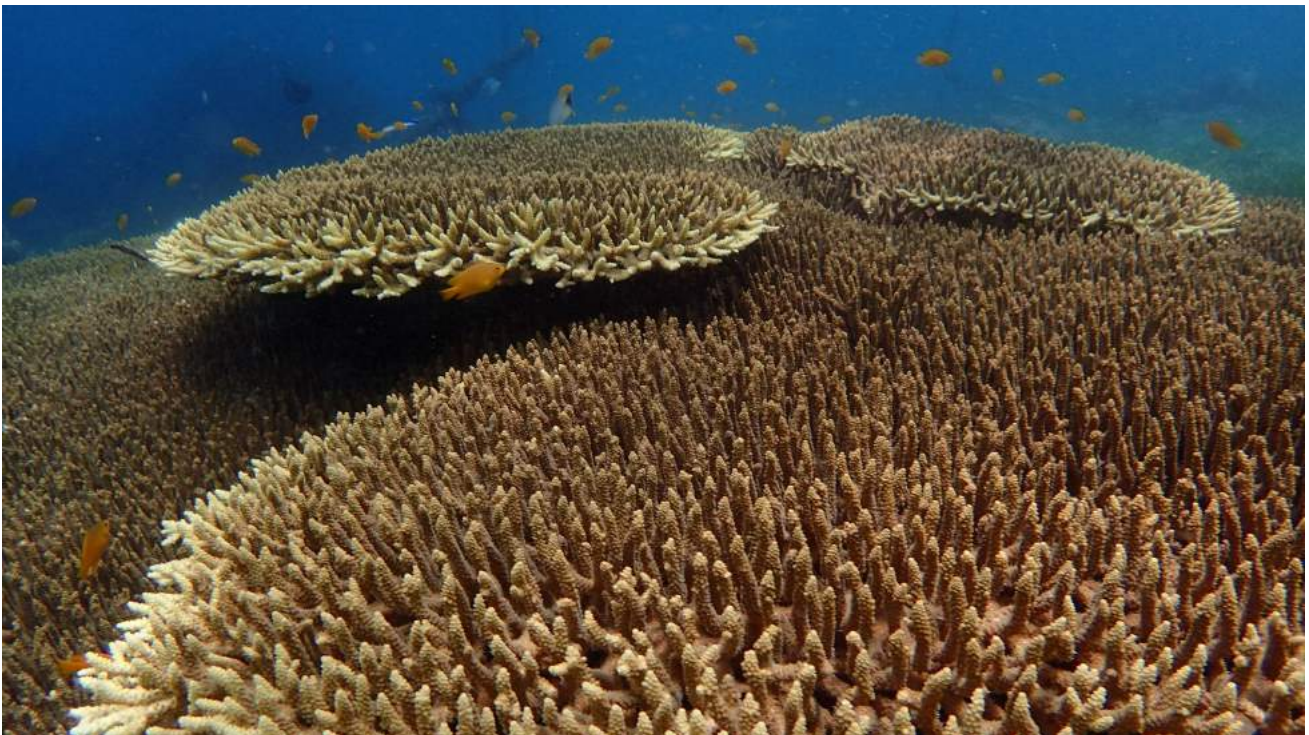


Overall, there was an increase, on average, of about 10.89 percent in the densities of target species inside the MPAs, but this was offset by a 13.70 percent decrease in the surveyed areas immediately outside these MPAs. Interventions provided by the Camiguin LGUs for the fisherfolk included, but were not limited to, livelihood projects such as livestock production, seaweed farming, artificial coral reef, banana chip making, fish shelter, mangrove reforestation, clam nursery, marine sanctuary, fish sanctuary, and fishing boats. Economic benefits listed include alternative livelihood from fish catch and reported increase in the income of beneficiaries. From 134 individuals earning PHP5000 and below (including those not earning anything) in 2008, only 40 individuals remain in these income categories. These respond to the major goals of the management plan such as the improvement in habitat

condition and the effective monitoring and surveillance of the MPAs.

Although not highlighted in the management plan, the participation of women in CRM was observed. Fisherfolk organizations had both male and female members. The existence of women's organizations showed an effect on women's participation in CRM. The introduction of enterprise activities helped empower the communities, particularly the women.

Overall, the CCRMP intervention has contributed to the improvement in the condition of Camiguin's coastal and marine resources, as well as in improving its productivity. In addition, the intervention has paved the way for key alternative and conservation-based enterprises that contributed to the improvement in the income of the fisherfolk.



*Healthy Acropora table staghorn coral growing at the edge of the reef in Mantigue Is. MPA, Mahinog, Camiguin*

# Background of the Impact Evaluation Study

## Objectives of the Study

The impact evaluation study of the CCRMP intends to evaluate the following:

- a. Achievements of the development objectives of the project;
- b. Benefits and gains (both planned and unplanned) and impact (intended and unintended) of the project to the beneficiaries; and
- c. Effectiveness of the sustainability mechanism that was put in place.

The impact evaluation study also aims to identify and validate innovative and effective approaches and strategies, including lessons learned in the implementation of the project that could be adopted in the design or implementation of similar or related interventions in the future.

## Evaluation Framework

The National Evaluation Policy Framework of the Philippines aims to provide a framework for the purposive conduct of evaluations in the public sector in support of good governance, transparency, accountability, and

evidence-based decision making.<sup>23</sup>

Evaluations cover four areas: (a) **Relevance** (i.e., alignment and consistency with national priorities and policies, responsiveness to stakeholder needs, complementation with other programs/projects, and programmatic alternatives); (b) **Effectiveness** (i.e., achievement of objectives, intended results, and timeliness); (c) **Efficiency** (i.e., delivery of outputs vis-à-vis inputs and operational alternatives); and (d) **Sustainability** (i.e., continued profitability of ecotourism livelihood projects and complementary services in the declared MPAs).

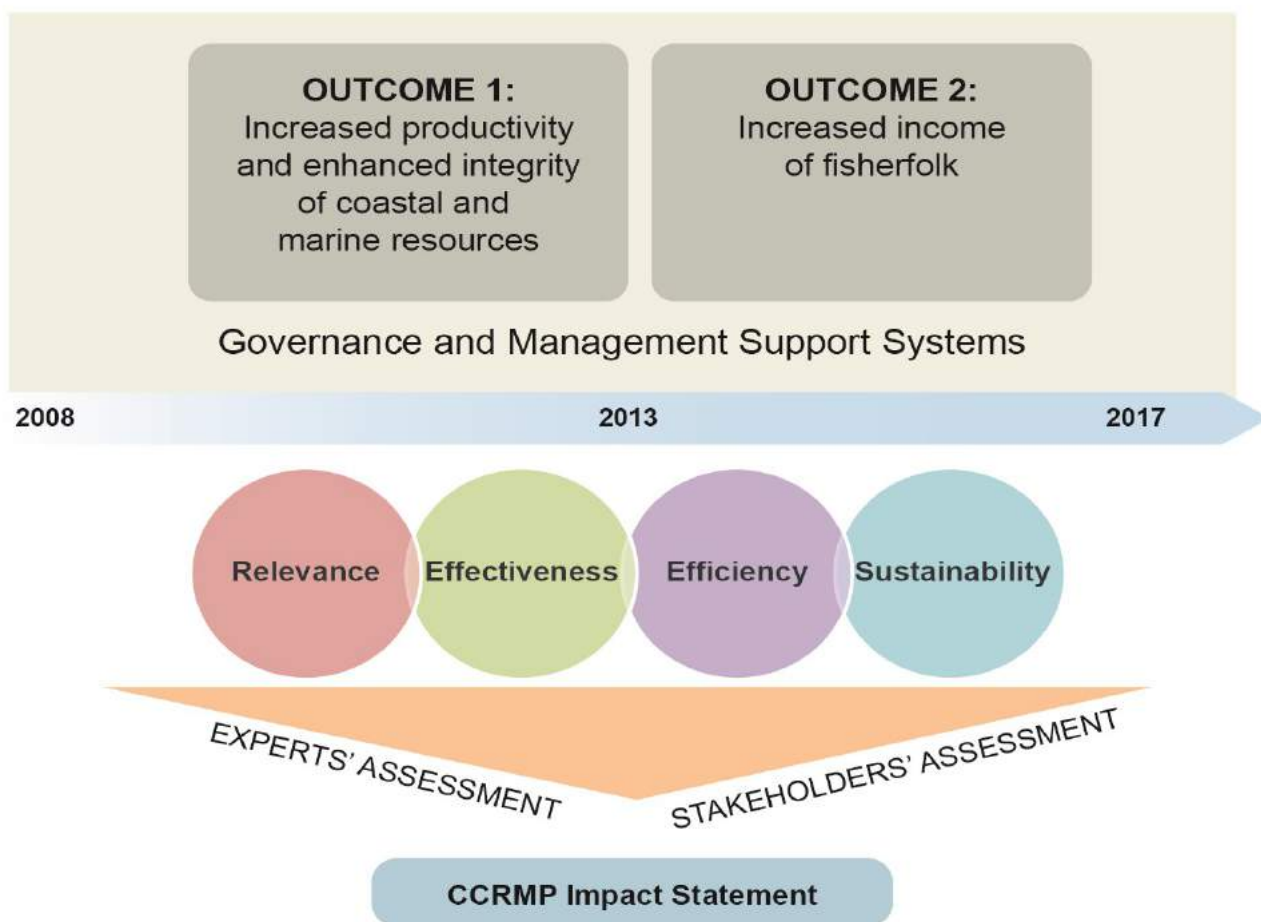
To determine the impact and effects of the CCRMP, the evaluation focused on two interrelated aspects (Figure 1), namely: 1) Outcome 1 on increased productivity and enhanced integrity of the coastal and marine resources, and 2) Outcome 2 on increased income of fisherfolk as shown in Figure 1.

Part of Outcome 1's evaluation looks into how well the MPAs were managed using the MPA Management Effectiveness Assessment Tool (MPA MEAT).

The results of the assessment provided the extent of the CCRMP's effect on the coastal ecosystem and on the economic condition of the fisherfolk as beneficiaries of the project.

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<sup>23</sup> National Evaluation Policy Framework of the Philippines. Republic of the Philippines National Economic and Development Authority and Department of Budget and Management Joint Memorandum Circular No. 2015-01



**Figure 1.** Impact Evaluation Framework

Moreover, the impact evaluation examines the changes that happened over time in the above-indicated aspects. The period of interest is from 2008 to 2017 which covers the two phases of the project, Phase 1 (from 2008 to 2011) and Phase 2 (from 2012 to 2014), and the three years following its completion.

### Key Evaluation Questions

In determining the impact of the CCRMP, the assessment focused on the following key evaluation questions:

1. Has the project addressed the emerging issues and concerns of the artisanal fisherfolk in Camiguin such as poverty, depleted marine resources, among others and to what extent? (*Relevance*)
2. Has the project contributed to increasing the incomes of the artisanal fisherfolk in Camiguin and to improving its coastal ecosystem or marine resources? How? To what extent can changes be attributed to the CCRMP? (*Effectiveness*)
3. Have resources (including human, logistical, and funds) been optimally used in the conduct of the project activities and in the delivery of the expected outcomes? (*Efficiency*)
4. How will the gains and benefits brought about by the project be sustained on a longer term? What



mechanisms for sustaining them have been installed? Were the stakeholders' capacities built toward greater sustainability? (*Sustainability*)

5. What lessons have been learnt from the project in terms of:
  - a. The enabling and disabling factors that facilitated or prevented the CCRMP from addressing the needs of the artisanal fisherfolk and the need to improve the condition of the coastal ecosystem or marine resources. (*Relevance*)
  - b. The unintended outcomes (positive and negative) that the CCRMP produced. (*Effectiveness*)
  - c. The effectivity of the project modality or strategy in the attainment of intended outcomes. (*Effectiveness*)
  - d. The factors that contributed to or hindered the attainment of the intended outcomes. (*Efficiency*)
  - e. The things that will be done differently and the things that will be pursued even more to maximize output at minimal cost. (*Efficiency*)
  - f. The future prospects for broadening and scaling up of the project in other areas with a similar situation/context. (*Sustainability*)

## Scope and Limitations of the Study

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Based on available resources, time, and documents reviewed, the impact study was able to evaluate sample areas and select enrolled and not-enrolled sample respondents who are representatives of the project sites. The enrolled respondents were fisherfolk and stakeholders who were directly involved in the implementation of the CCRMP. The enrolled and not-enrolled respondents were identified from the barangays covered by the CCRMP. In addition, the study looked into the management and governance aspects of the MPAs, among key result areas of the project. Using the standardized MPA MEAT, this study was able to evaluate trends and changes in management indicators, and processes that helped promote and achieve the MPAs' effectiveness.

Among the challenges encountered during the evaluation are the 1) availability of baseline information, and 2) information recall challenge. As such, the absence or lack of baseline, monitoring, and end line data limited the extent to which the project was able to determine the impact of the CCRMP in certain components and areas. Program details, including baseline and monitoring results are culled out from information and project documents that were made available to the consulting team by the NEDA-X, the Department of Environment and Natural Resources (DENR), Provincial Environment and Natural Resources Officer (PENRO), Camiguin Polytechnic State College (CPSC), and the municipal LGUs of the covered MPAs.

In addition, key informants had difficulty recalling sequences of events and time periods. The CCRMP Phase 1 started in 2008 while Phase 2 ended in 2014. Some key participants of the project, especially those who worked in the LGUs and government institutions were no longer available for interviews, due to transfer to new assignments or migration. Given this situation, the impact study exhausted all possible means to search for the right key informants who could provide information and program implementation details needed.

Another constraint was the limited availability of information on environmental variation in the years before and after the establishment of the MPAs. This may have obscured the trends resulting from protection. For example, variable recruitment in fishery due to change in climatic and oceanic conditions may affect either positively or negatively the apparent recovery of a stock after the closure of an area.

## Evaluation Methodologies

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### Outcome 1

This study used two general approaches to evaluate whether MPAs have particular ecological impacts relative to its original goals of improving productivity and integrity of habitats. The first approach determined the habitat's baseline, before the implementation of the project, and its condition three years after project has been implemented. In the second approach, changes in the MPAs were evaluated; conditions inside the protected area were compared to

conditions in a similar area outside the MPA borders. Comparisons of the MPAs or a no take-zone area over a non-protected area established effectiveness on the strategies in managing the area in enhancing and attaining desired fisheries goals.

Employing the same operational variables as the habitat's baseline, variables or indicators evaluated in the MPAs for this evaluation were live hard coral (LHC), reef fish species richness, density and biomass. LHC as an indicator is assumed to have direct link on the progress of management in terms of its goal in restoring ecologically healthy benthic habitat. An increased in LHC means an improved and healthier benthic habitat. Fish biomass as an indicator is also a direct measure of natural productivity, expressed in terms of number of kilos (average) of all reef fish species in a given area at a particular given time. Also, an increased in the number of fish species (species richness) and density indicates an enhanced biodiversity and improvement in density's productivity. All of the three variables are key measures on the effectiveness of the MPAs in enhancing fisheries productivity.

Cover and species richness of seagrass and mangroves are also crucial productivity indicators. Its distribution and condition including associated faunal species present can also indicate its value and productivity. An increase in seagrass and mangrove-associated faunal communities are directly linked to better biodiversity and an effective protection and management.

The biophysical assessment of the five MPAs were based on the following standard methodologies (English, et. al., 1997):

1. Benthic survey for coral reefs using line intercept transect (LIT) and point intercept transect (PIT) with specific parameters on benthic cover and coral lifeforms.
2. Fish visual census (FVC) for fish community with specific parameters on fish species richness (variety), density (individuals/500m<sup>2</sup>) and biomass (metric tons/km<sup>2</sup>).
3. Seagrass transect-quadrat (TQ) method with specific parameters on seagrass cover, species composition (variety), height, sediment type, density and other flora and fauna.
4. Mangrove belt-transect (BT) method with specific parameters on percentage cover, species composition (variety), substrate type.

**Data Analysis** included benthic cover using coral condition index by Gomez et al., 1994 and reef condition index (Manthachitra, 1994, Ben-Tzvi et al., 2004) was used to further describe the reef. While fish data was analyzed using Hilomen et al., 2000 as reference.

Furthermore, data analysis included t-test (Microsoft excel edition) to determine the difference between inside and outside the MPA results for corals and fish only since they have management interventions while seagrass and mangroves were in random areas. Trend analyses from 2008 data to 2017 (subject to availability of data) were also subjected to t-test.

**Water quality monitoring (WQM)** in 2017 included the following parameters: pH, dissolve oxygen (DO), salinity, temperature, total suspended

solids (TSS), oil and grease (O&G) and fecal coliform (FC). All these parameters were compared to the DENR standard based on the Department Administrative Order (DAO) No. 2016-08 or the Water Quality Guidelines and General Effluent Standards of 2016.

The **Management Effectiveness Assessment Tool (MPA MEAT)** is an 84-item rating tool currently being adopted by the MPA Support Network to gauge and keep track how the MPAs in the country are doing. It is designed to objectively evaluate performance and effectiveness of the MPAs according to the four different levels: (1) established, (2) strengthened, (3) sustained, and (4) institutionalized. These four levels described the progression of the MPAs over time. It is expected that MPAs from the time it is “established” will sequentially mature and achieve higher levels of development, reaching an “institutionalized” status as desired socio-economic and environmental outcomes are achieved. The tool’s indicators, a mixture of technical and governance indicators, correspond to pre-defined thresholds with minimums cores to achieve in every level. MPAs level up after fulfilling the minimum threshold requirements set for each level. The highest level to achieve is level 4 (institutionalized).

## Outcome 2

Data collection for Outcome 2 was accomplished through three methods: 1) survey, 2) FGDs, and 3) KIIs.

For the survey, fisherfolk enrolled and not-enrolled in the implementation of

the project were randomly selected from the list provided by the Coastal Resource Management Office and Municipal Agriculture Office (MAO). A total of 252 respondents from the municipalities of Catarman, Guinsiliban, Mahinog, Mambajao, and Sagay were involved in the evaluation; 141 were enrolled and 111 were not-enrolled. Respondents were allocated proportionally by the number of MPAs in the municipality. However, when the list of the enrolled beneficiaries were retrieved from the LGUs, some were no longer staying in the area as in the case of Guinsiliban which lowered the number of respondents from the municipality.

The survey was conducted by field enumerators from Camiguin and ably assisted by their supervisors. Questionnaire used in the data gathering was translated to local dialect (Bisaya) for easy understanding of the questions. To minimize time in answering the questionnaire, an interviewer-administered strategy was used. Data gathering was conducted from August 1 -8, 2017.

A total of five FGDs were conducted, one for each of the municipalities of Camiguin. Participants in these FGDs were the direct beneficiaries of the project, barangay chairpersons where the MPAs are located and other stakeholders involved in the implementation of the CCRMP.

The Stata software was used for the statistical analysis of the survey responses; final datasets included frequencies and cross tabulations.

Qualitative data was analyzed through thematic analysis methods—recurring, overriding themes shall be used to identify major trends, patterns in the responses. FGD and KII data were processed by categorizing/clustering the factors to determine increase in income and impact of project.

Difference-in-differences (DID), widely used in impact evaluation studies, is a quasi-experimental tool that uses treatment and control groups as subjects to evaluate impact of a specific intervention. It is evaluated by comparing the changes in outcomes over a period of time between groups who are enrolled in a particular program and a group that is not. This study wanted to assess if the initiated alternative livelihood programs affected the living condition of the beneficiaries. The intervention group are those who were enrolled in the livelihood programs; those not-enrolled are classified into the control group. Since DID requires pre and post intervention data, each individual was asked to recall both their current income and their income ten years ago. These income were then processed to determine whether the livelihood programs made an impact within the ten-year period.

# Data Presentation and Discussion

## Results of the CCRMP in terms of Outcome 1 - Increased Productivity and Enhanced Integrity of the Coastal and Marine Resources

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After going through the impact evaluation data gathering phase, primary and secondary data sources are collected which helped in determining the effects of the CCRMP. The following are the presentation of the data for Outcome 1 which helped determine the increase in productivity and enhanced integrity of coastal and marine resources.

### Sites evaluated

A total of five MPAs (Figure 2) were assessed namely: Mantigue Is. (Mahinog), White Is. (Mambajao), Pasil reef (Catarman), Alangilan (Sagay), and Liong (Guinsiliban). Each MPA has two sampling stations: inside to represent managed area, and outside the MPA for absence of management or to serve as control data.

For mangrove and seagrass, only three municipalities, namely, Mahinog, Mambajao, and Guinsiliban, were sampled based on habitat presence since none were observed in Catarman and Sagay.

### Coral cover status and trends

All the five MPAs registered “fair” to “good” coral cover with a mean cover of 45.26 percent inside the MPA. Coral condition ratings are based on the percentage of hard coral cover of a given area. An excellent rating means that hard corals cover 76-10 percent of the area, good if 51-75 percent, fair if 26-50 percent, and poor if the corals cover only 0-25 percent (Gomez et. al., 1994). Remarkably, the area outside the MPAs registered around the same coral cover, with a mean “fair” condition at 37 percent (Figure 3). Of the five sites, inside Mantigue Island MPA registered the highest coral cover of 67 percent, far from the poor coral condition outside MPA at 17 percent. Two sample t-tests registered the difference at  $p=0.004$  and confidence level at 95 percent, suggesting the unique benthic profile of the inside reef from outside (Table 1). Inside the MPA, the back reef is composed of extensive sea grass beds that transition to a distinctive contiguous reef wall. Meanwhile, the back reef outside the MPA gently slope towards the wall, which is generally composed of patches of sea grass beds, sand, pavement, and rubble.

White Island MPA registered poor coral condition both inside and outside, as the area is naturally a sandy flat where corals are patchily distributed. Net difference registered at -2.3, although the difference is not significant at



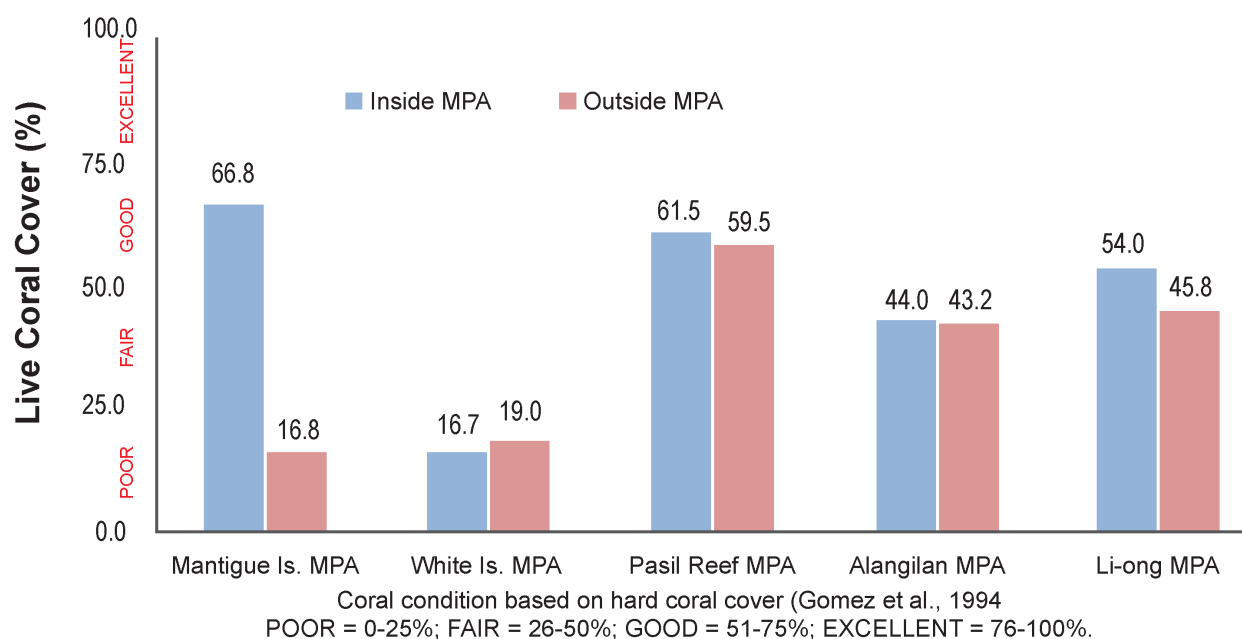


**Figure 2.** Proximity location of the MPAs and sampling sites for seagrass and mangroves

(1-mpa) Magsaysay “Mantigue Island”, San Roque, Mahinog	(8-sg ) Brgy. South Poblacion, Guinsiliban
(2-mpa) Medano “White Island”, Agoho, Mambajao	(9-sg) Brgy. North Poblacion, Guinsiliban
(3-mpa) Pasil Reef Marine Sanctuary “Sunken Cemetery”, Bonbon, Catarman	(10-sg) Brgy. Magting, Mambajao
(4-mpa) Alangilan MPA, Alangilan, Sagay	(11-sg) White Island, Agoho, Mambajao
(5-mpa) Liong MPA, Liong, Guinsiliban	(12-mg) Brgy. Benoni, Mahinog
(6-sg) Mantigue Island, Mahinog	(13-mg) Brgy. North Poblacion, Guinsiliban
(7-sg) Brgy. San Roque, Mahinog	(14-mg) Brgy. Magting, Mambajao

$p=0.50$ . The remaining MPAs in Pasil Reef, Alangilan, and Liong indicated “fair” to “good” coral cover (44-62 percent) both inside and outside the MPA, although the difference between stations indicated no significant difference at 0.43, 0.47, and 0.24, respectively.

The condition index inside Mantigue, Liong, and Pasil Reef in both inside and outside stations indicated a high proportion of live coral cover relative to the cover of dead corals, algae, and other fauna (Figure 4A-E). This means that even the adjacent reefs outside the MPAs have high proportions of live



**Figure 3.** Live coral cover status in percentage of the five MPA sites in Camiguin, 2017

**Table 1.** Comparison of live coral cover inside and outside the five MPAs in Camiguin, 2017

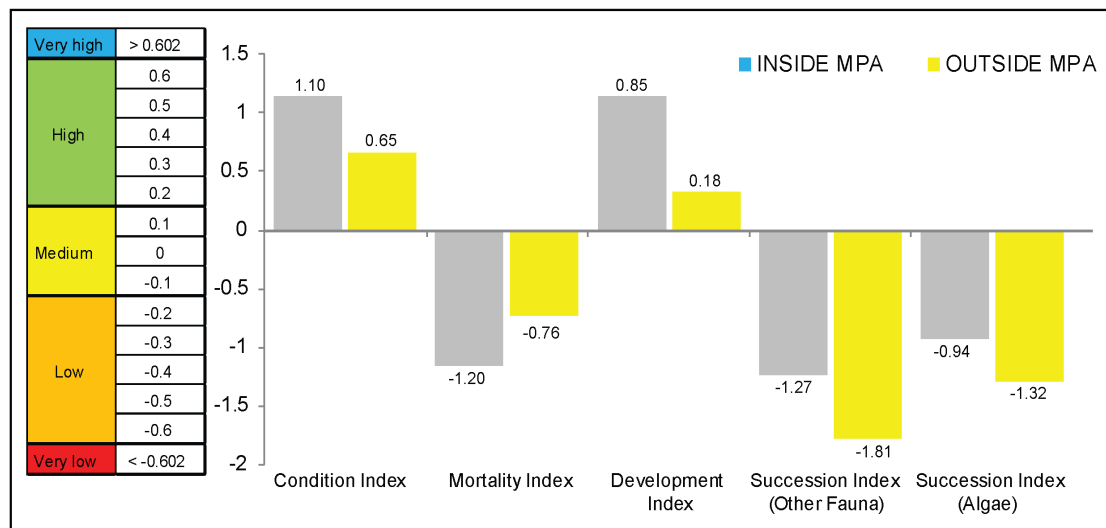
MPA	Coral cover Inside MPA (%)	Coral cover Outside MPA (%)	Net difference (%)	pvalue
<b>1. Magsaysay “Mantigue Island” MPA</b>				
Location: Brgy. San Roque, Mahinog Legal instrument: M.O. # 054 Series of 2000 Area: 8.81 hectares	66.8	16.8	50	0.004
<b>2. Medano “White Island” MPA</b>				
Location: Brgy. Agoho, Mambajao Legal instrument: M. O. # 03, s 2000 Area: 19.67 hectares	16.7	19	-2.3	0.50
<b>3. Pasil Reef “Sunken Cemetery” MPA</b>				
Location: Brgy. Bonbon, Catarman Legal instrument: M. O. # 3 Series of 2004 Area: 27.262 hectares	61.5	59.5	2.0	0.43
<b>4. Alangilan MPA</b>				
Location: Brgy. Alangilan, Sagay Legal instrument: B.R. # 01 Series of 2010 Area: 6.41 hectares	44.0	43.2	1.2	0.47
<b>5. Liong MPA</b>				
Location: Brgy. Liong, Guinsiliban Legal instrument: M.O. #63 Series of 2010 Area: 4.21 hectares	54.0	45.8	8.2	0.24

*Note: Information on MPA location, coverage area, and legal instruments for establishment are provided for context*

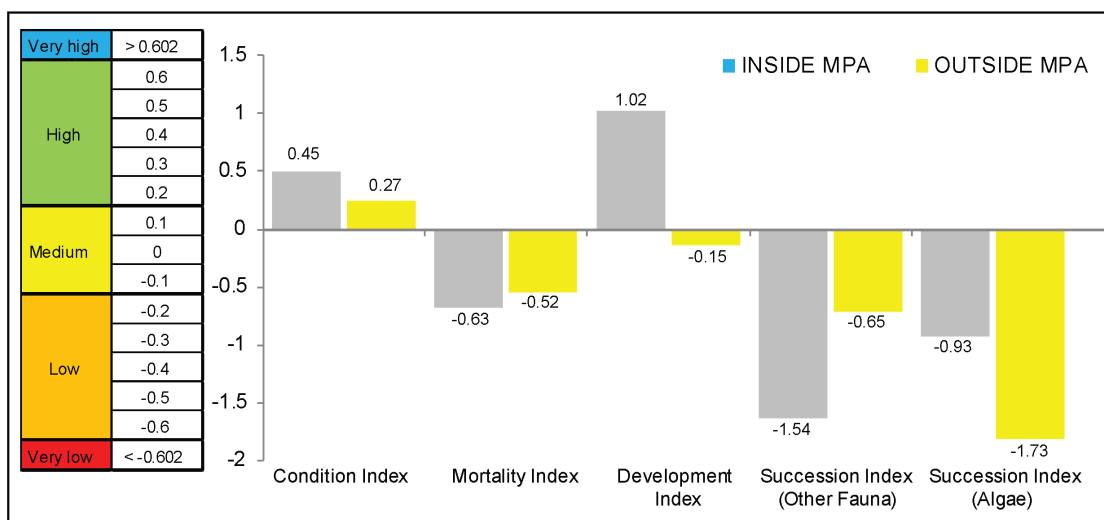
coral cover, perhaps indicative of the MPAs having gained from the protection and management afforded within the MPA. The high development index, inside as well as outside the MPAs, also signifies the diversity and abundance of living components present that contribute to the development and improvement of the reef. This means that all the MPAs still have “space” to expand, improve, and develop. Expansion means providing more “space” for corals to grow and more “room” for depleted fish stocks to bounce back and spill over into fishing grounds. Expanding the protected core

zone to include the buffer zone can help increase biodiversity and productive capacity of the MPA; this can also contribute to reef resiliency by providing higher buffering capacity of the reef to maintain its rich genetic pool, especially during climate-induced calamities.

The “very low” mortality index and succession rate for algae and other fauna in all sites also indicate a less likely chance for coral-algal phase shift (McManus et al., 2000) to occur or the succession of other fauna to negatively invade the reef.

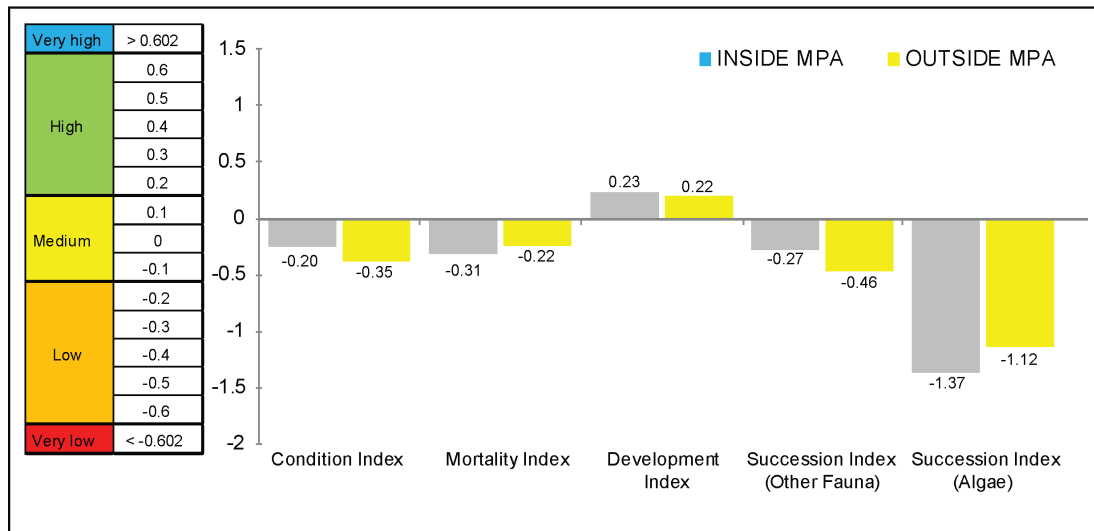


**Figure 4A.** Reef condition index - Magsaysay “Mantigue Island” MPA

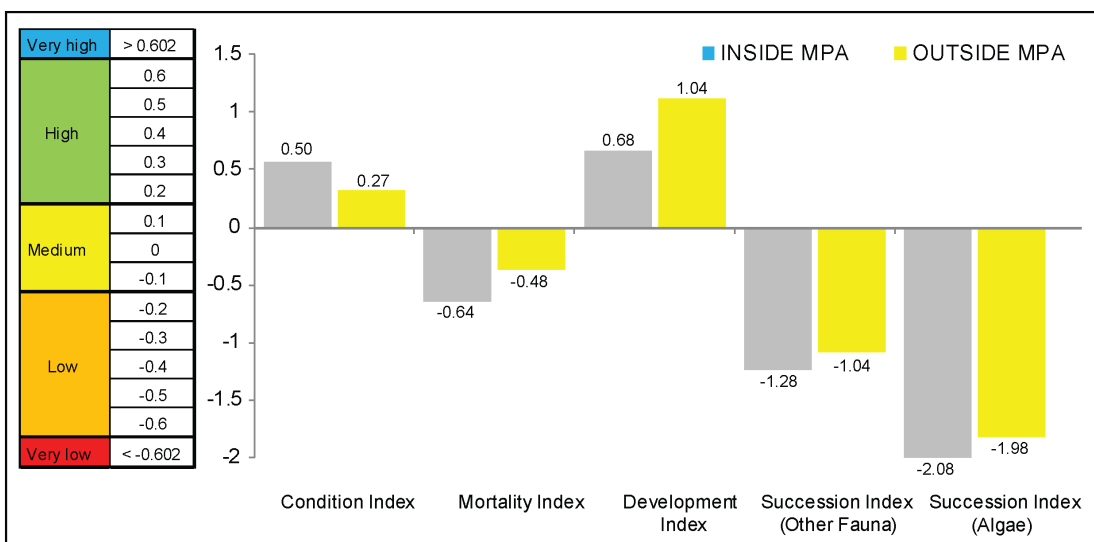


**Figure 4B.** Reef condition index - Liong MPA

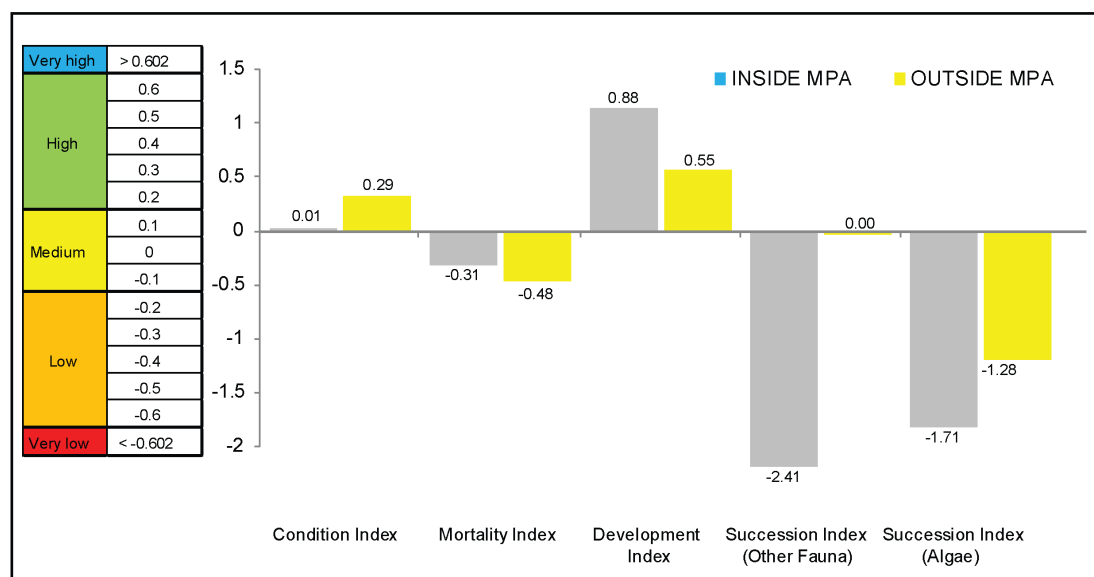




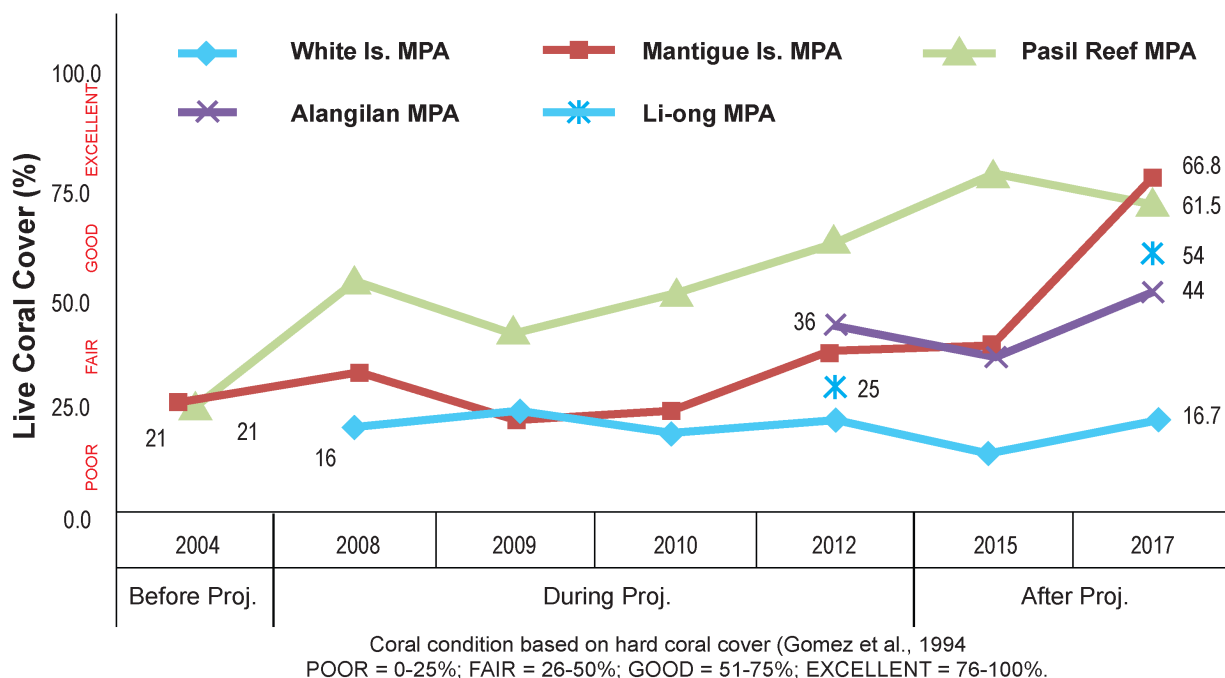
**Figure 4C.** Reef condition index - Medano "White Island" MPA



**Figure 4D.** Reef condition index - Pasil Reef "Sunken Cemetery" MPA



**Figure 4E.** Reef condition index - Alangilan MPA



**Figure 5.** Live coral trends in the five MPAs sites in Camiguin from 2004 to 2017

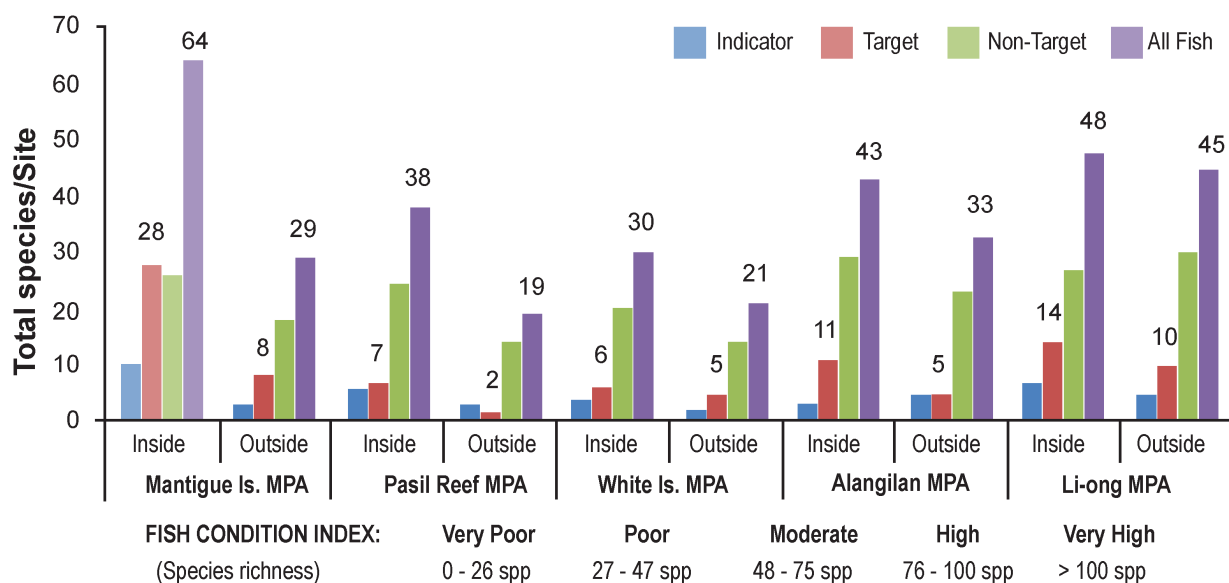
**Table 2.** Comparison of percentage of live coral cover before and after the CCRMP implementation, 2004 and 2017

MPA	Timeline	Before CCRMP coral cover (%)	After CCRMP coral cover (%)	Net change (%)	pvalue
1. Magsaysay “Mantigue Island” MPA	2004-2017	28	67	39	.001
2. Medano “White Island” MPA	2008-2017	16	17	1	0.14
3. Pasil Reef “Sunken Cemetery” MPA	2004-2017	46	62	16	0.0001
4. Alangilan MPA	2012-2017	36	44	8	.004
5. Liong MPA	2012, 2017	25	53	28	0.11

Historical trends in coral cover vary across the five MPAs evaluated, although results generally show positive increasing trends. The Mantigue Island MPA, for instance, showed a significant increase of 39 percent from the 2008 baseline against the 2017 data, the highest net change among sites evaluated (Figure 5). Significant increases were also noted at 16 percent ( $p=0.0001$ ) and 8 percent ( $p=0.004$ ) in Pasil Reef and Alangilan MPA, respectively, indicating that protection measures in place have translated into better conservation outcomes for the reef (Table 2).

### Fish diversity (species richness), density, and biomass status and trends

A mean of 45 reef fish species is recorded inside the MPAs during the latest evaluation conducted in the third quarter of 2017, compared to only 29 species outside the MPAs. However, only very few of these were target species considered commercially important and favored by local fisherfolk with a mean of 13 target species inside the MPAs compared to only five species outside the MPAs (Figure 6).



**Figure 6.** Species richness inside and outside the five MPAs evaluated in Camiguin, 2017

The low recorded values indicate that fish populations have dwindled and/or high fishing pressure existed within the areas. Of the five sites, Mantigue Island MPA registered the highest species diversity, with 64 species inside and 29 species outside, followed by Li-ong MPA with 48 species inside and 45 outside, and Alangilan MPA with 43 species inside and 33 outside.

In terms of species density, Mantigue Island MPA showed the highest density with  $1178 \pm 197$  fish/1,000m<sup>2</sup> inside and  $661 \pm 124$  fish/1,000m<sup>2</sup> outside the MPA. Li-ong MPA tallied next, with  $872 \pm 132$  fish/1,000m<sup>2</sup> inside and  $615 \pm 56$  fish/1,000m<sup>2</sup> outside the MPA, contributed mainly by damselfish (*Pomacentridae*) and fairy basslets (*Anthiinae*). Significant difference, however, was recorded especially in

Mantigue Island MPA and Alangilan MPA, at  $p=0.07$  and  $p=0.01$ , respectively (Table 3). These two MPAs actually exhibited more complex and diverse coral life forms over the first three MPAs. As it is, many reef fish can confine, shoal, and school themselves in the reef crevices formed from the complex coral life form systems. The “moderate” density count inside Mantigue Island MPA was contributed by the target species of school of jacks (*Caranx sexfasciatus*) and rudderfish (*Kyphosus sp.*). Meanwhile, fish biomass registered highest in Mantigue Island MPA with 401 mt/km<sup>2</sup> contributed mostly by the large-sized body of jacks (*Caranx sexfasciatus*) and rudderfish (*Kyphosus sp.*) where each species measured approximately 40-50cm in length.

**Table 3.** Comparison of species richness, density, and biomass inside and outside the five MPAs in Camiguin, 2017.

MPA	Diversity (Species richness/Site)				Density (Ave. count/1,000m <sup>2</sup> )			Biomass (Ave. MT/Km <sup>2</sup> )		
	In	Out	Net dif- ference	pvalue	In	Out	pvalue	In	Out	pvalue
1. Magsaysay "Mantigue Island" MPA	64	29	35	0.02	1178±197	661±124	0.07	401±20 <sub>2</sub>	10±2.3	0.09
2. Medano "White Island" MPA	30	21	9	0.02	585±50	450±103	0.15	6.1±2	3±1.3	0.02
3. Pasil Reef "Sunken Cemetery" MPA	38	19	19	0.11	865±96	479±16	0.10	12±3.2	5.3±1.2	0.05
4. Alangilan MPA	43	33	10	0.08	288±43	333±20	0.01	11±2	4±1	0.04
5. Liong MPA	48	45	3	0.90	872±132	615±56	0.11	16±6	8.3±2	0.02

However, the MPAs can contribute to higher fishery production only by their effect on the amount of fishery resources available to fisherfolk outside the MPA. The lower ratings outside the MPAs for fish biomass and fish density and diversity are evidence that high extraction of fishes outside the MPAs prevents recruitment and spillover to take full effect and for stock to bounce back and recover. The increasing number of fisherfolk competing for fish beyond MPA boundaries is among the primary reasons cited for the lower fish density and biomass values since fishing pressure is still going on.

Historical trend before and after the project shows that overall, the reef's fish health and productivity in terms of diversity, density, and biomass have improved, especially in the MPAs established during the CCRMP, specifically in Alangilan and Liong (Table 4). Medano White Island MPA, meanwhile, registered a negative net difference owing to its location in a natural sandbar. The reef is patchily distributed within fine coarse sandy bottomed with coral rubble that limits corals from growing, hence the difficulty for fishes to thrive and establish a home base and nursing ground.

**Table 4.** Comparison of species richness, density, and biomass of the five MPAs in Camiguin before and after the CCRMP implementation, 2008-2017

MPA	Diversity (Species richness/Site)				Density (Ave. count/1,000m <sup>2</sup> )			Biomass (Ave. MT/Km <sup>2</sup> )		
	Before	After	Net difference	pvalue	Before	After	pvalue	Before	After	pvalue
1. Magsaysay "Mantigue Island" MPA	46	64	18	0.000 <sub>1</sub>	787	1178±19 <sub>7</sub>	0.01	21	401±20 <sub>2</sub>	0.03
2. Medano "White Island" MPA	49	30	-19	0.003	799	585±50	0.01	6	6.1±2	0.006
3. Pasil Reef "Sunken Cemetery" MPA	41	38	-3	0.000 <sub>1</sub>	666	865±96	0.01	2	12±3.2	0.003
4. Alangilan MPA	11	43	32	0.04	60	288±43	0.07	1	11±2	0.16
5. Liong MPA	14	48	24	ID	88	872±132	ID	ND	16±6	ID

Note: ID – insufficient data, ND- No data

### Sea grass cover status and trends

Sea grass beds are often disregarded and are the least conserved as most rehabilitation and restoration projects focused on mangroves and the coral reefs. With the growing human population and the need for coastal

development, sea grass communities are also heavily exploited.

Three of the five municipalities were surveyed for the sea grass community structure, namely: Mahinog, Guinsiliban, and Mambajao.

Table 5 shows the percentage cover of macro-algae and epiphytes, which

**Table 5.** Sea grass density, canopy height, and percentage cover of algae and epiphytes in Mahinog,Guinsiliban, and Mambajao, 2017

Site	Density Shoots/m <sup>2</sup>	Canopy Height (cm)	% Algae Cover	% Epiphyte Cover	Seagrass Species
Mahinog	4,659	8.63	13.61	51.50	<i>Thalassia hemprichii</i> <i>Cymodocea rotundata</i> <i>Halodule uninervis</i> <i>Halophila ovalis</i> <i>Halophila decipiens</i> <i>Syringodium isoetifolium</i> <i>Enhalus acoroides</i> (2008)
Guinsiliban	6,564	9.36	0.91	18.18	<i>Thalassia hemprichii</i> <i>Cymodocea rotundata</i> <i>Halodule pinifolia</i> <i>Enhalus acoroides</i> (2008)
Mambajao	ND	ND	ND	ND	ND

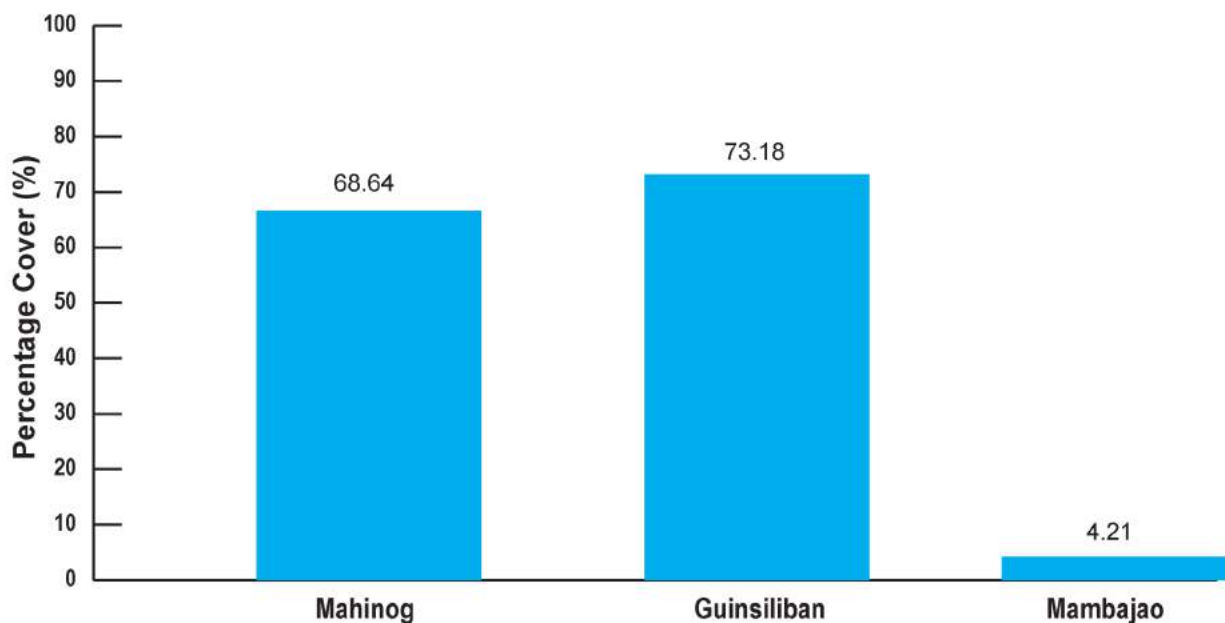
Note: ND- No data

appears highest in Mahinog. About 80 percent cover of epiphytes is observed in Barangay San Roque. Epiphytes have ecological advantages in shallower areas as these promote better growth rate and prevent desiccation of seagrasses (Aho and Beck, 2011). They also contribute to the high productivity of the sea grass habitat (Meñez et al., 1983). However, the presence of a massive cover of epiphytes in the area can also indicate stress, signifying that the water is highly nutrient-enriched due to human produce and activities, prompting epiphytes to bloom.

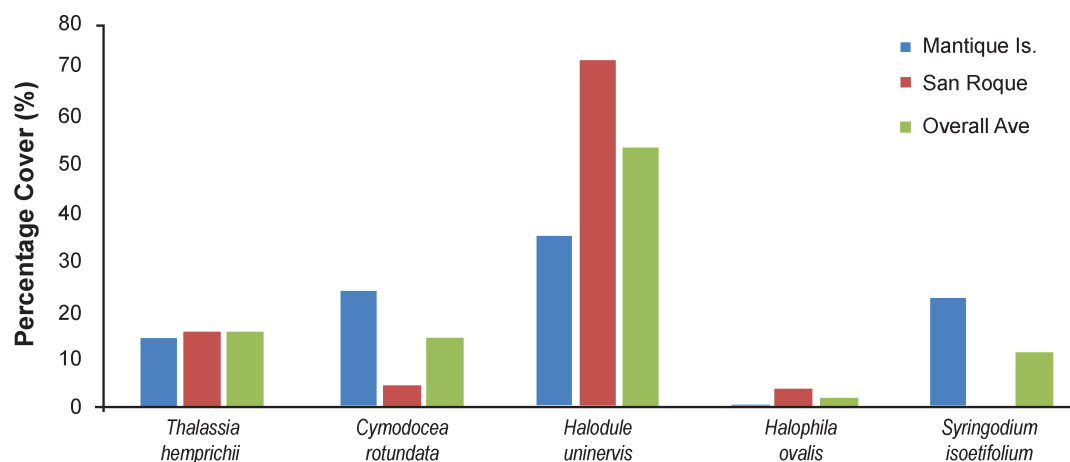
Both Mahinog and Guinsiliban areas shows extensive sea grass covers of 68.64 percent and 73.18 percent, respectively, with a dense population of 4,659 shoots/m<sup>2</sup> and 6,564 shoots/m<sup>2</sup>, respectively (Figure 7). Mambajao, on

the other hand, only has 4.21 percent. The most dominant sea grass species found in all areas are from the genus *Halodule*, with an average canopy height of 9cm. *Halodule uninervis* obtained good cover of over 70 percent in Barangay San Roque in Mahinog and in Barangay Magting, Mambajao, while *Halodule pinifolia* is abundant in South Poblacion of Guinsiliban with 60.5 percent (Figures 8 and 9). *Thalassia hemprichii* (Sickle or Turtle Grass) and *Cymodocea rotundata* (Smooth Ribbon Grass) are also common in areas in Mahinog and Guinsiliban.

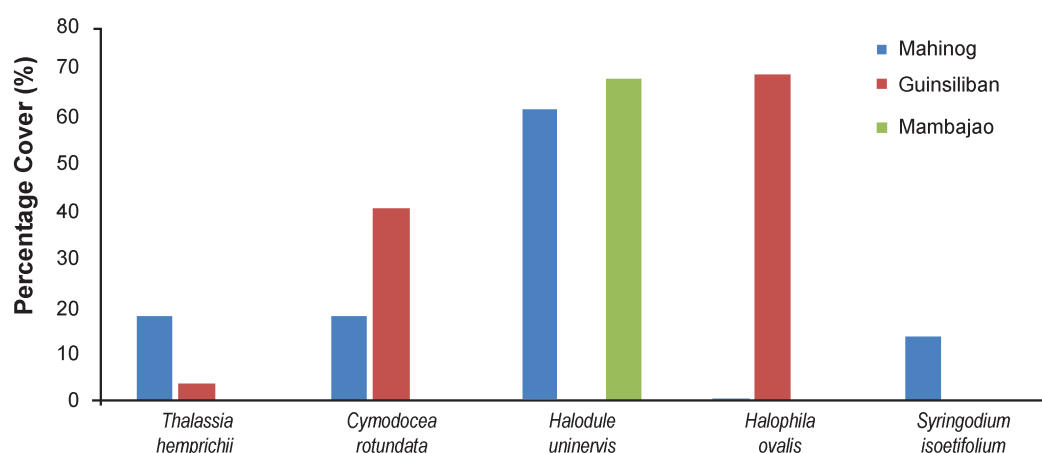
Comparison of data between the 2008 baseline and the latest assessment showed the same number of sea grass species in Mahinog, specifically in Mantigue Island (Figure 10). The latest



**Figure 7.** Percentage of sea grass cover in Mahinog, Guinsiliban, and Mambajao, 2017



**Figure 8.** Sea grass composition of the two sites assessed in Mahinog, 2017

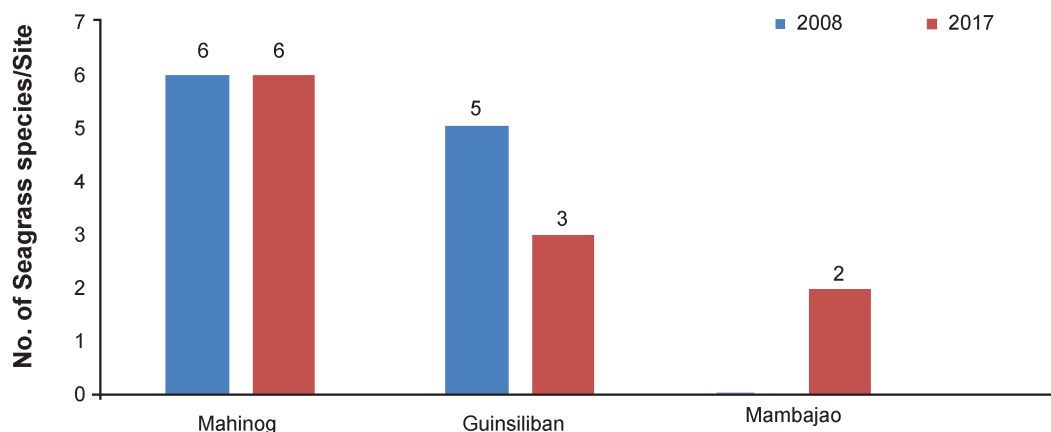


**Figure 9.** Sea grass composition in Mahinog, Guinsiliban, and Mambajao, 2017

survey also noted a rare flowering seagrass, with scientific name *Syringodium isoetifolium*, in the area. The robust sea grass species of *Enhalus acoroides* was recorded in the 2008 survey conducted by the CCRMP; however, this was not observed in the recent survey. Of the five species recorded in Guinsiliban (North Poblacion) in 2008, only three species are recorded in the latest assessment. On the other hand, in Magting, Mambajao, the team recorded two species of sea grass in the latest

assessment, over none in the 2008 baseline. These are the minute and fine species of *Halophila ovalis* and *Halodule spp.*, not the *Thalassia spp.* and *Enhaus acoroides* initially identified by locals during the survey scoping. The difference in results may be attributed to the limited information made available to the team as to location of sampling sites, coverage of baseline assessment, and copies of technical reports.

In terms of sea grass cover, Mantigue Island has a similar percentage cover of

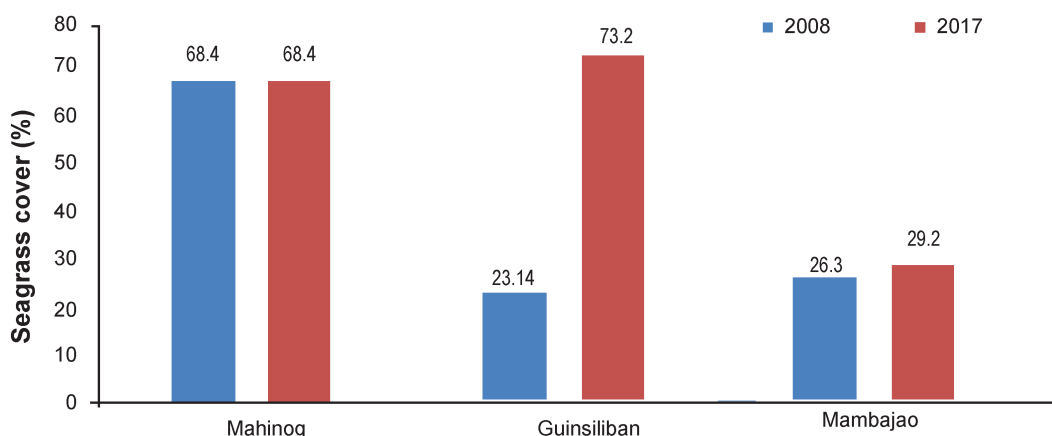


**Figure 10.** Sea grass species richness in the five selected MPAs in Camiguin, showing 2008 and 2017 data

68 percent under good conditions between the two periods of evaluation. This is the most diverse sea grass community recorded, with “Narrow leaf sea grass” or *Halodule uninervis* as the most dominant species. A rare flowering “Noodle sea grass” or *Syringodium isotifolium* is also observed, making the site unique for scientific studies. The sea grass community also transitions slowly with the coral reef area, making the site a productive biological “ecotone” where two ecosystems meet. Guinsiliban (North Poblacion) recorded an increase from 23 percent cover in 2008 to 73 percent cover in 2017. Finally, Magting in Mambajao had a 26 percent cover in

2008 with a similar amount of cover in 2017 at 29 percent (Figure 11). The “Narrow leaf sea grass” or *Halodule uninervis* is the most dominant species in the latest assessment interspersed with “Spoon grass” or *Halophila ovalis*, a staple food of dugongs. Green sea turtle or *Chelonia mydas* is also observed in the survey.

Overall observations showed no major changes in the sea grass communities which have remained intact over time. Good sea grass condition remained intact in Mantigue Island as well as in Guinsiliban (North Poblacion). Since 2008, no major development occurred in known seagrass areas in the province.



**Figure 11.** Sea grass cover in the five selected MPAs in Camiguin, showing 2008 and 2017 data



## Mangrove community structure status and trends

Mangroves are important habitats that serve as breeding and nursery ground to various organisms. They also protect the coast from strong waves and surges. In fact, mangrove protection and rehabilitation are key components in mitigating climate change. They absorb up to five times more carbon than the tropical forest. From the 1970s to 1990s, a decline of mangrove forest cover was recorded, due to conversion to fish ponds and coastal development.

Of the 35 mangrove species in the Philippines, nine species were observed in the province of Camiguin, as enumerated in Table 6. Six mangrove species are recorded in both Mahinog and Guinsiliban, Mambajao has two, and Sagay with only one. Based on the recent survey, the island-province is surrounded by the most resilient mangrove species *Sonneratia alba*, locally called “pagatpat”. In Benoni,

Mahinog, century-old and large trunk diameter *Sonneratia spp.* dominated the area. The site is actually a “Katungan” Park, declared protected but at the same time promoted by the LGU as an ecotourism site. In Guinsiliban, aside from pagatpat dominating North Poblacion, sampling plots also recorded species of *Rhizophora mucronata* seedlings and saplings of *Bruguiera* species. A few stands of pagatpat were also recorded in Mahinog, Mambajao.

Figures 12a and 12b show the Stand Basal Area (SBA) of *Sonneratia alba* or “pagatpat”, which is the only mature tree species recorded in the three different sampling sites. SBA value appeared high in all three sites, which means that all mangrove trees accounted were the large and old growths. The maximum girth recorded was 470cm or 4.7m. In Figure 12, higher SBA was recorded in 2008 by the CCRMP team, with 938m<sup>2</sup>/ha SBA of “pagatpat” in Benoni, Mahinog. About 54 plots were deployed, accounting to 92 *Sonneratia*

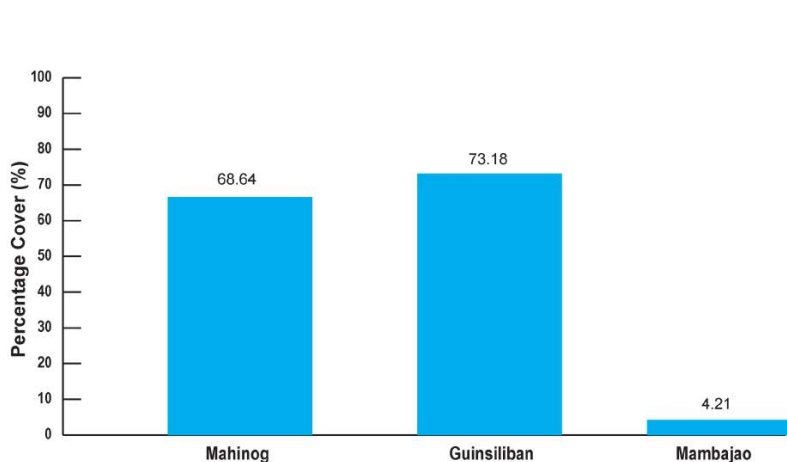
**Table 6.** Mangrove species in the Province of Camiguin and presence in the five municipalities, 2017

Mangrove species	Local name	Mahinog	Sagay	Guinsiliban	Catarman	Mambajao
1 <i>Nypa fruticans</i>	Nipa		A			AB
2 <i>Avicennia sp.</i>	Bungalon; Piapi	A		AB		
3 <i>Excoecaria agallocha</i>	Lipata; Buta-buta	AB				
4 <i>Pemphis acidula</i>	Bantigi			AB		
5 <i>Xylocarpus sp.</i>	Tabigi	AB			no data	
6 <i>Bruguiera sp.</i>	Pototan			A		
7 <i>Rhizophora apiculate</i>	Bakhaw-laki	AB		AB		
8 <i>Rhizophora mucronata</i>	Bakhaw-bayi	AB		A		
9 <i>Sonneratia alba</i>	Pagatpat	A		A		A

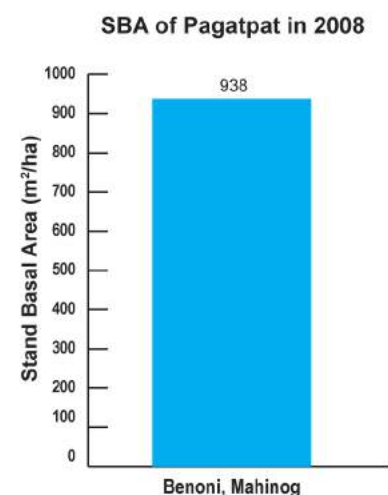
Note: A = species found during 2008 baseline survey, AB = species found during 2017 baseline survey

*alba* trees in 2008. Figure 13 also compares the mangrove species richness in Mahinog, Guinsiliban, and Mambajao before and after the implementation of the CCRMP. The technical design of the 2008 baseline survey was not available, thus, the extent of sampling coverage for the mangrove baseline cannot be established. This prevents the impact evaluation from determining if there is a decreasing or increasing trend of mangrove trees population since 2008. Nevertheless, anecdotal accounts from the locals reveal that the mangrove cover in the Province has remained intact, with no significant disturbance except for a few mangrove patches in

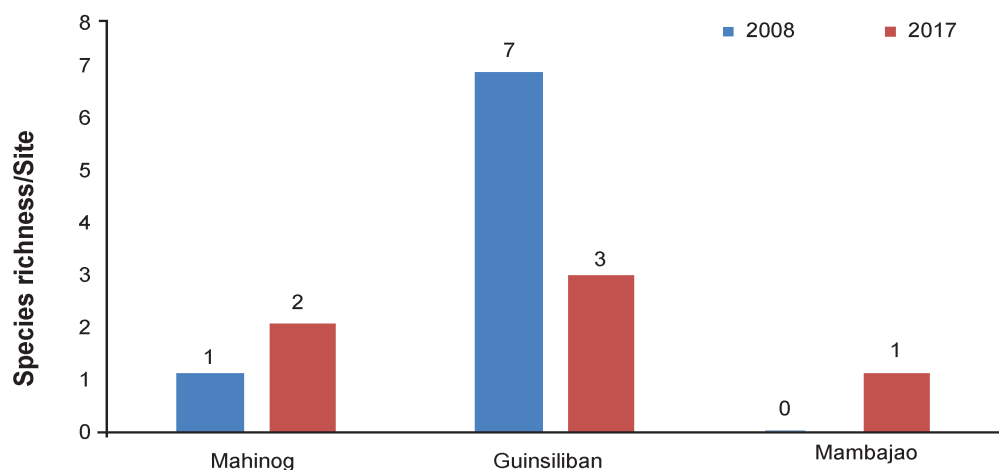
Benoni that were affected by the ongoing land expansion and reclamation. In fact, LGUs have availed of support from the DENR's National Greening Program for mangrove reforestation and rehabilitation in their areas. However, the drawback was that one mangrove species, *Rhizophora spp.*, was favored over local species that would have grown naturally and are more suitable to the area. In South Poblacion, Guinsiliban, the species *Rhizophora spp.* was planted in inappropriate areas such as on sea grass beds, despite poor potential for survival. In North Poblacion, the species was planted along old growth *Sonneratia alba* foreground, beyond the lower intertidal region.



**Figure 12a.** Stand Basal Area of *Sonneratia alba* (pagatpat) in 2017



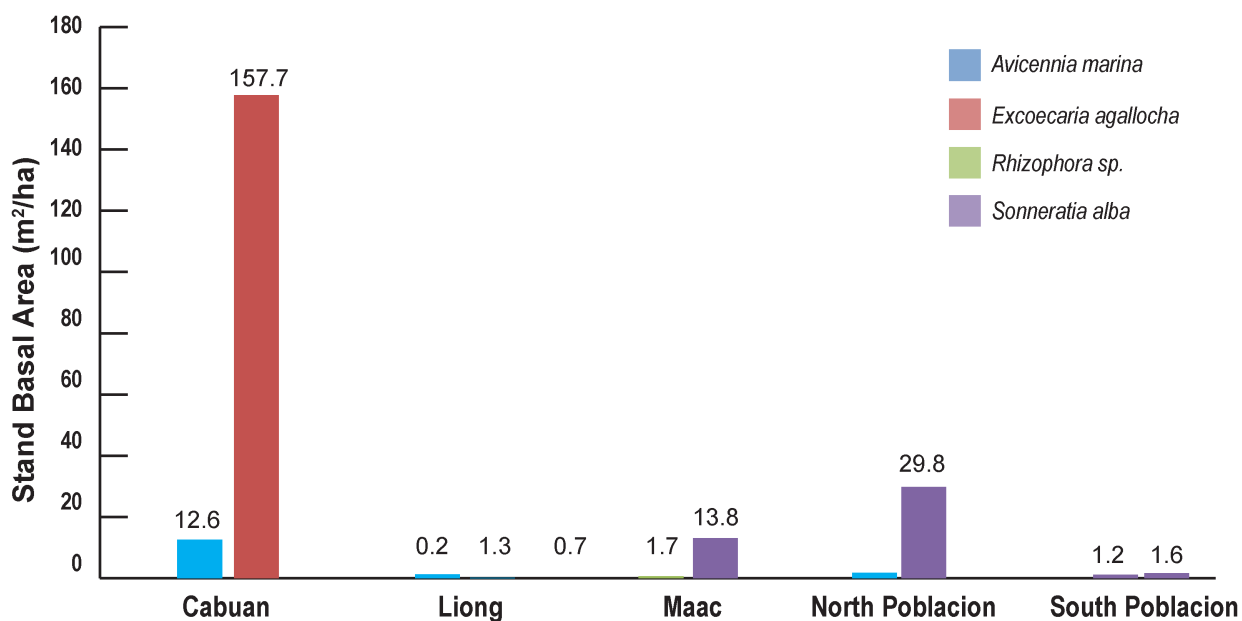
**Figure 12b.** Stand Basal Area of *Sonneratia alba* (pagatpat) in 2008



**Figure 13.** Richness of mangrove species in Mahinog, Guinsiliban, and Mambajao, 2008 and 2017

Figure 14 shows the results of the 2008 assessment in the five barangays in Guinsiliban. Remarkably, higher SBA of *Excoecaria agallocha* or “lipata/butabuta” was observed, which registered 157.7m<sup>2</sup>/ha in Barangay Cabuan. Of the five barangays, only Barangay Cabuan has the *Avicennia marina* species, with an SBA of

12.6m<sup>2</sup>/ha. Meanwhile, North Poblacion claimed higher *Sonneratia alba*, with 29.8m<sup>2</sup>/ha. In the recent survey, the team’s rapid assessment focused primarily on a denser population of pagatpat at the coast of North Poblacion. The rest of the barangays in Guinsiliban have sparse cover of mangroves.



**Figure 14.** Mangrove species presence in the five *barangays* of Guinsiliban: *Avicennia marina*(piapi/bungalon), *Excoecaria agallocha* (lipata/butabuta), *Rhizophora sp.* (bakhaw), and *Sonneratia alba* (pagatpat)



Centennial “Pagatpat” *Sonneratia alba* being measured for girth circumference in Katunggan Park, Binoni, Mahinog, Camiguin



## Water quality

Water quality monitoring (WQM) is important for the Camiguin province because majority of the population relies on fisheries and eco-tourism.

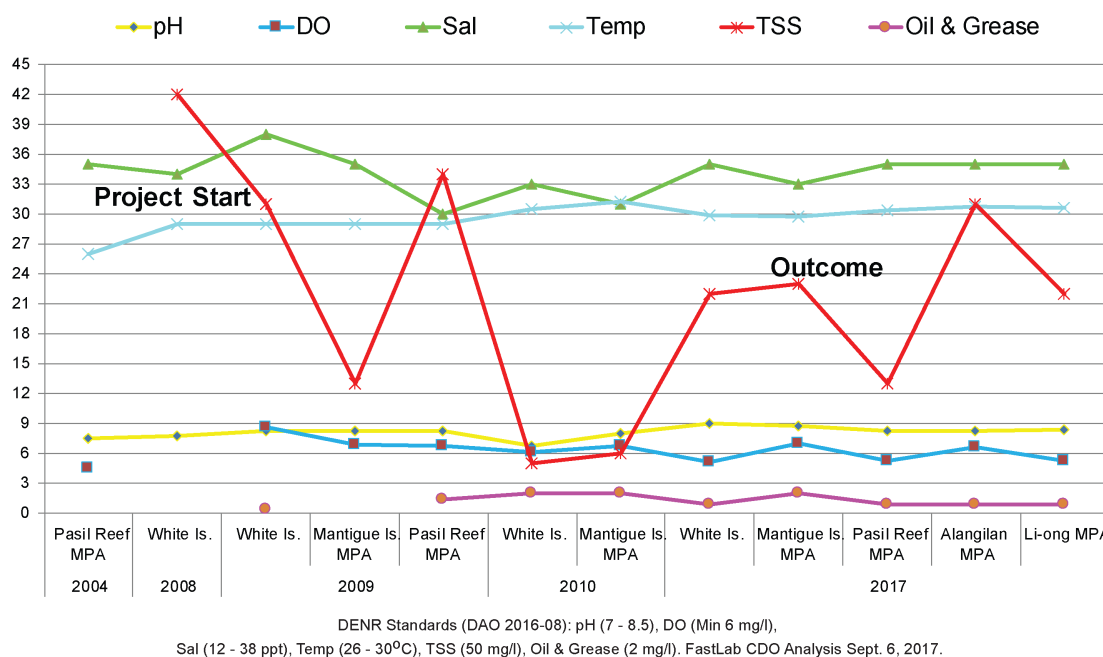
Water quality is measured by collecting water samples in situ in the sampling stations established by the DENR-Camiguin representing inside and outside the five chosen MPAs. Using portable probes, physico-chemical parameters such as temperature, dissolved oxygen (DO), acidity (pH), and salinity were measured, while water samples for grease or oil, total suspended solid (TSS), and fecal coliform were brought to Fast Lab Cagayan de Oro for laboratory analysis on September 6, 2017.

Data collected are compared to a range of guidelines that the DENR sets for SB waters (water classification for recreation and aquaculture) and water quality monitoring. Recent conditions were also compared to previous results and established patterns over time.

Water quality tests of the samples inside the MPAs reveal that TSS has dramatically decreased since 2009, especially in Mantigue Island, White Island, and Pasil Reef, owing to adherence to the set guidelines and regulations on waste and sewage in the area. High concentrations of suspended solids can cause many problems for stream health and aquatic life. The remarkable decrease of the population in Mantigue Island due to re-settlement to the mainland as regulated by the LGU, coincides with the decreasing TSS trend. The decrease in 2010 values in White Island Reef at 5mg/l from the 42mg/l in 2004 is also notable, including Pasil Reef which also showed a drop from 34mg/l in 2009 to 13mg/l in 2017. Overall, TSS is now way below the maximum limit of 50mg/l set by DENR standards in all sites. Meanwhile, oil and grease for all sites and time periods have been within the limits of 2mg/l. This is also true for other physico-chemical parameters like pH, DO, salinity, and temperature (Figure 15).



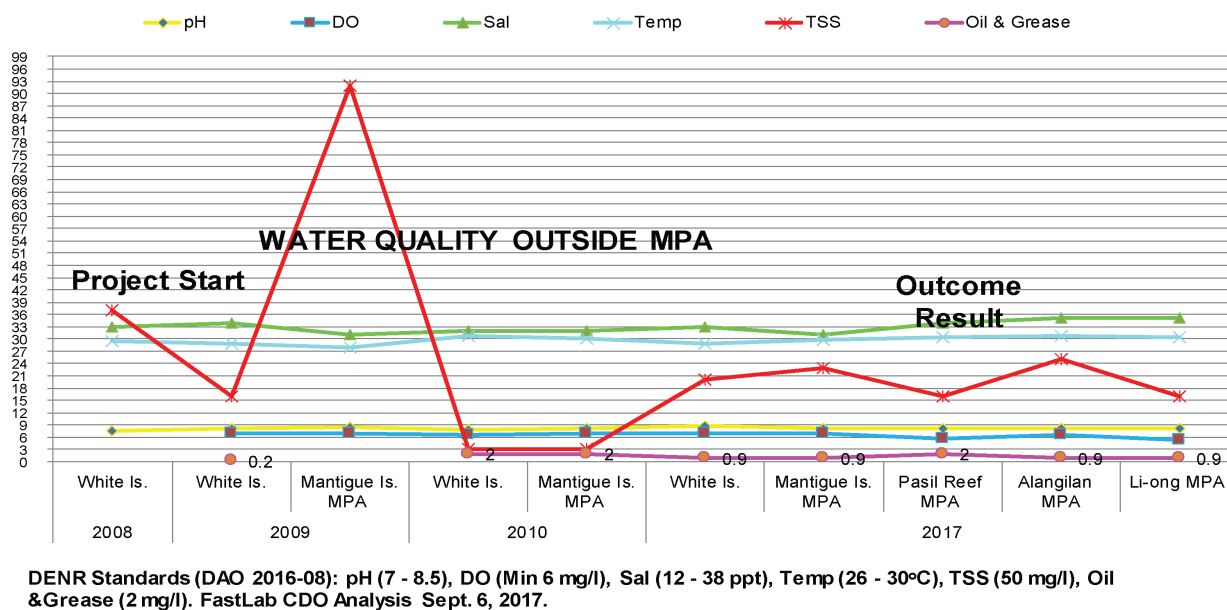
Healthy branching staghorn coral *Acropora* sp. providing shelter to damselfish and other species in Liong MPA, Guinsiliban, Camiguin



**Figure 15.** Water quality inside the MPAs in Camiguin in terms of pH, dissolved oxygen (DO), salinity, temperature, total suspended solids (TSS), and oil and grease, 2004 to 2017

Values for all water parameters outside the MPAs also showed a pattern similar to those inside the MPAs. The latest assessment reveals that all values are within the standard limit set by the DENR. TSS in the 2008 baseline for Mantigue Island recorded 92mg/l, way beyond the 50mg/l limit, which is

probably attributed to the disturbance from docking and swimming activities of residents in the island. As the LGU started to regulate the number of people living in the island, TSS dropped to 3mg/l in 2010 and has not increased since then. For oil and grease, all sites were within the 0.9mg/l values beyond



**Figure 16.** Water quality outside the MPAs in Camiguin in terms of pH, dissolved oxygen (DO), salinity, temperature, total suspended solids (TSS), and oil and grease, 2004 to 2017

the 2mg/l limit, except for Pasil Reef which registered exactly 2mg/l. Oil and grease contaminants which may be contributed by boat oil spillage and from non-point sources in the mainland. It would be prudent to craft policies regarding boat maintenance, either for tourism or fishing purposes, to mitigate future contamination.

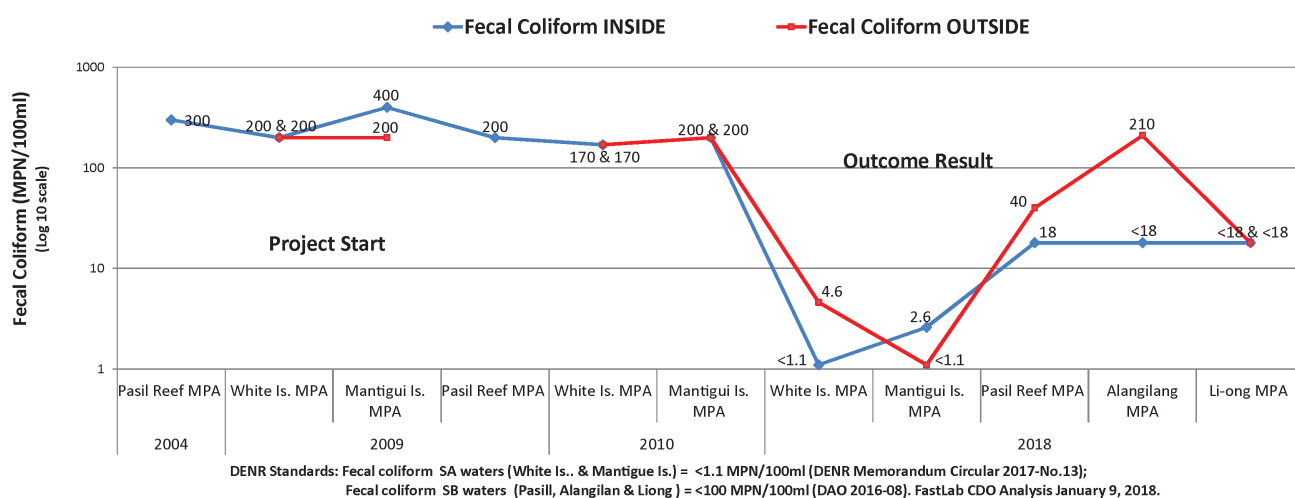
Fecal coliform information is crucial in maintaining the viability of an area whether for recreational or for mariculture purposes since this is an indicator of sanitation in general. Fecal coliform pertains to fecal matter sourced from different animals and especially human-sourced fecal matter. A survey was conducted in January 2018 and presented together with secondary information from 2004 onwards (Figure 17).

On the historical trends of fecal coliform inside the MPAs, Pasil reef in 2004 recorded the highest level at 300 MPN (most probable number) /100ml, 50 percent higher than the 200 MPN limit set by DENR. This figure could be due to the local sanitation situation wherein sub-standard septic tank design

can lead to seepage of septic effluents to the marine environment or it could be from local flooding at that time, carrying contaminated waters to the surrounding area. In 2009, however, there was an improvement in reading to 200 MPN/100ml level (inside and outside) in Pasil reef.

In 2009, Mantigue Island registered a fecal coliform level of 400 MPN/100ml or 100 percent higher than the prevailing DENR standards at that time. This may probably be because of the high density population in the island and toilet facilities in the area could have caused seepage of septic effluent to the marine environment because of the porous property of the sandy substrate around the island. In the 2010 monitoring, there was an improvement to 200 MPN/ml; this was probably the outcome of a relocation program of the local settlers from Mantigue Island to the mainland of Camiguin.

In 2016, DENR passed the Department Administrative Order (DAO) No. 2016-08 or the Water Quality Guidelines and General Effluent Standards of 2016 which states that fecal coliform level for



**Figure 17.** Fecal coliform assessment inside and outside the MPAs in Camiguin, 2004 to 2018

marine SB water should only be at 100 MPN/100ml level, a stricter limit from 200 MPN/100ml. In 2017, DENR passed a memorandum circular 2017 No. 13 reclassifying both White Island and Mantigue Island as SA waters or Protected Waters which only allow fecal coliform levels of <1.1 MPN/100ml.

In January 2018, a follow-up water quality monitoring was conducted and analyzed based on the latest DAO No. 2016-08 and new water classification for White Island and Mantigue Island. It was drizzling at the time of collection and the tide was low for all sites.

The latest assessment shows that all values inside the MPA boundaries are within the standard limit set by the DENR. All the MPAs were able to hurdle the requirements for SB rating requirements (Figure 17). However, following the DAO No. 2016-08 and new water classification for White Island and Mantigue Island MPAs, only the waters within the White Island MPA pass the SA standards, but both are well within the SB standards, which is what is needed for the recreational or tourism activities in these areas.

Starting with White Island, fecal coliform values inside the MPA is <1.1 MPN/100ml while outside the MPA and near the bathing area, the reading is 4.6 MPN. Inside the Mantigue Island MPA, the value is 2.6 MPN while outside the MPA, and near the docking area, the value is <1.1 MPN. The location matters here: White island had higher values near the bathing area while the Mantigue Island MPA is much nearer to local residents. These two sites were recently reclassified from SB marine waters to SA marine waters due to their DENR protected

status, and under this new category, not all locations sampled was able to satisfy the the new reclassification allowable limit of <1.1 MPN/100ml.

However, taking into consideration the MPA's original SB classification during the implementation of the CCRMP, both sites were successful in bringing down their fecal coliform levels from the originally high values to below 100 MPN necessary for the SB classification.

Pasil reef, Alangilan and Liong sites were also all successful in bringing down their fecal coliform levels from 200 MPN/100ml in 2010 to less than 50 MPN in 2018, inside and outside the MPAs with the exception of samples from outside Alangilan which registered 210 MPN, exceeding the 100 MPN/100ml standard for SB waters. A probable explanation could be that the collection area (outside station) was near a discharge culvert where domestic waste, informal piggeries and irrigation canals could converge

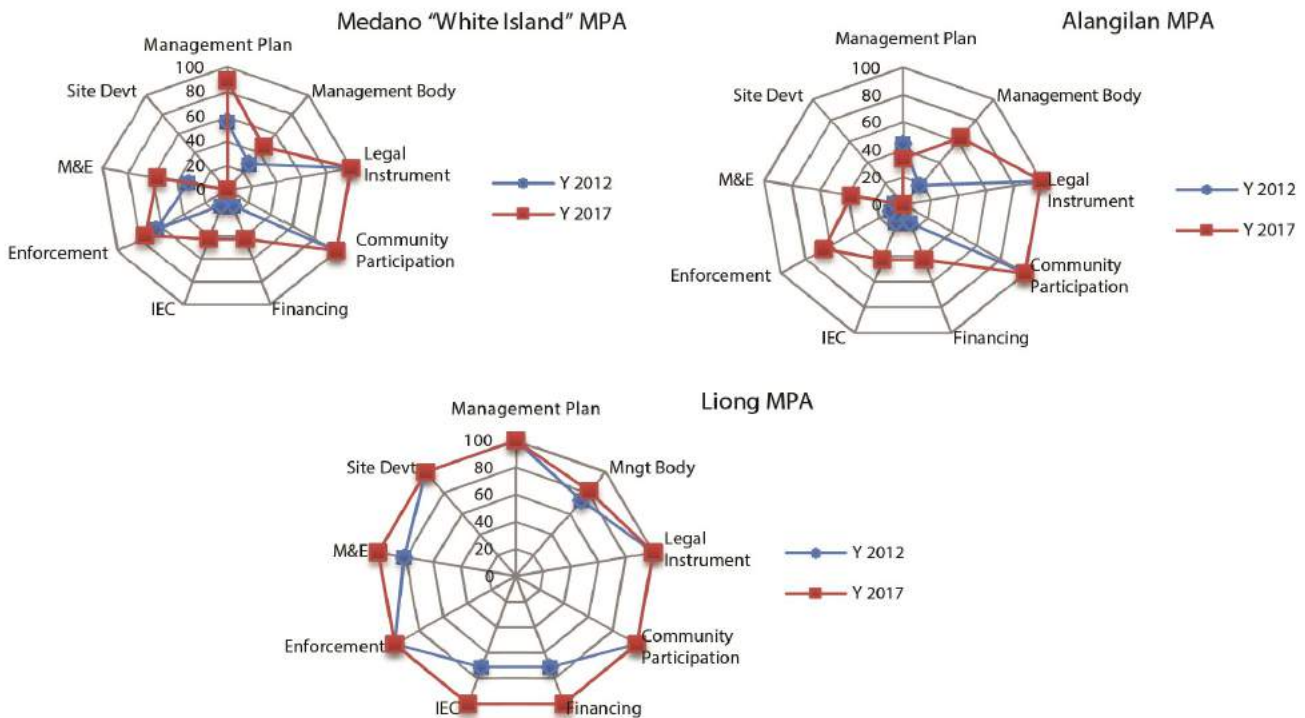
## Management effectiveness

Using the MPA Management Effectiveness Assessment Tool (MPA MEAT), this impact study assessed how well the MPAs are being managed. The tool helps evaluate the extent to which management systems and processes are being implemented and determines the MPAs' compliance to certain threshold governance processes. The 48-item rating scale is divided into nine management focus indicators, namely: (1) management plan, (2) management body, (3) legal instrument, (4) community participation, (5) financing, (6) IEC, (7) enforcement, (8) monitoring and evaluation, and (9) site



**Table 7.** Management Effectiveness Assessment Tool (MEAT) scores

MPA	MPA MEAT 2012					MPA MEAT 2017					Net increase	
	Level 1	Level 2	Level 3	Level 4	Total	Level 1	Level 2	Level 3	Level 4	Total		%
1. Medano "White Island" MPA	24	14	21	16	75 Level 3	27	15	19	21	82 Level 3	7	7 (8.5%)
2. Alangilan MPA	25	13	0	0	38 Level 1	26	12	12	7	57 Level 2	19	19 (33.3%)
3. Liong MPA	17	0	0	0	17 Level 1	21	15	5	0	41 Level 1	24	24 (58.5%)

**Figure 18.** Results of the 2012 and 2017 MPA MEAT evaluation of the MPAs in Medano White Island, Alangilan, and Liong

development. Based on the scores across these indicators, the MPAs are categorized according to the MEAT's four management levels, namely (1) established, (2) strengthened, (3) sustained, and (4) institutionalized. These four levels describe the progression of the MPAs, moving up the higher management levels as they

are able to satisfy more management and governance indicators over time.

The latest study conducted by DENR PENRO Camiguin reported an increase in management levels in the three MPAs, at least one level higher than the previous management evaluation in 2012 (Table 7). The increase in management level corresponded to an increase in



scores of the different management focus (Figure 18).

With only three of the five selected MPAs having baseline data from a 2012 MPA-MEAT evaluation, these are also the only MPAs evaluated in 2017 to check if any progress has been made. Given that only three of the 31 MPAs (about 10%) covered by the CCRMP is evaluated, the results of the MPA-MEAT does not provide adequate representation of the current management status of all the MPAs in general.

**Management Plan.** Clear and appropriate objectives supported by a management plan and adequate resources are characteristics of an effective MPA management. A management plan usually details the goals, targets, and indicators of the MPA within a prescribed period.

The CCRMP helped facilitate the drafting of MPA management plans for the five MPAs under study. However, the plans appeared to be “shelf documents”; no one from the LGUs/MPA management committee refer to these in the day-to-day management process of the MPAs. At the minimum, the MPA plans under MEAT’s Level 1 threshold should be adopted and legitimized by the LGU, but no such resolution or ordinance is present among those turned over for review; no one was even aware of it as a requirement.

The ordinances for the establishment and management of MPAs provided for the creation of a MPA management committee, the sole policy-making and permit-granting body of the MPA. Among the members of the committee are officials, representatives, and staff of the LGU/CRMO/MAO, national line

agencies (e.g., DA-BFAR), barangay officials/council/BFARMC, POs, and sector representatives.

**Legal Instrument.** Municipal ordinances declaring the establishment of the MPAs have been approved in each of the municipalities, except for Alangilan MPA which is covered by a Barangay Ordinance (Table 8). Alangilan MPA in Guinsiliban and Liong MPA in Sagay were among the 15 MPAs established under the CCRMP Phase II. The MPAs were primarily established in support of tourism and conservation. The primary consideration for the design of future MPAs, especially in the context of communities struggling with food security, should reflect a balance between the needs of conservation, and the realities of sustainable exploitation and socio-economic requirements.

Several newly established MPAs under the CCRMP were small (less than ten hectares), limited to coral reefs, and by design did not consider the movement and home range of migrating or highly mobile species. Literatures on coral reef fishes define home range as the area or space that fishes utilize as their territory during certain periods and over particular life stages. For example, the school of *Caranx sexfasciatus* or the big-eye trevally found in the eight-hectare Mantigue Island MPA are known species that usually aggregate in their adult stage at the foreshore edges of the reefs, but spend their juvenile stage in estuaries or areas where rivers meet the seas. This ontogenetic shift has a linear distance of three kilometers, while other long-term movements of the fish can reach up to 200 kilometers. The recommended ideal protected size in terms of linear distance for protecting or

**Table 8.** Legal instruments declaring the establishment of each of the five MPAs covered, including location and total area covered

MPA	Location	Legal instrument	Area (hectares)
Magsaysay "Mantigue Island"	Brgy. San Roque, Mahinog	<b>Municipal Ordinance No. 54, s. 2000</b> "AN ORDINANCE DECLARING AND IDENTIFYING PORTIONS OF MUNICIPAL WATERS AT MAGSAYSAY ISLAND AND SAN ROQUE, MAHINOG, CAMIGUIN AS MARINE SANCTUARIES AND FOR OTHER PURPOSES."	3.65
Medano "White Island"	Brgy. Agoho, Mambajao	<b>Municipal Ordinance No. 3, s. 2000</b> "AN ORDINANCE ESTABLISHING THE MEDANO WHITE ISLAND FISH SANTUARY IN AGOHO, MAMBAJAO, CAMIGUIN PROVIDING FOR ITS REGULATION AND/OR CONSERVATION/ PROTECTION MEASURES AND FOR OTHER RELATED PURPOSES."	19.67
Pasil Reef "Sunken Cemetery"	Brgy. Bonbon, Catarman	<b>Municipal Ordinance No. 3, s. 2004</b> "AN ORDINANCE DECLARING PASIL REEF OF THE DAANG LUNGSOD, BONBON, CATARMAN, CAMIGUIN, AS A RESERVED MARINE SANCTUARY AND REGULATING ITS USE."	16.88
Alangilan	Brgy. Alangilan, Sagay	<b>Municipal Ordinance No. 73-10, s. 2010</b> "MUNICIPAL ORDINANCE ESTABLISHING BARANGAY ALANGILAN FISH SANCTUARY/ MARINE PROTECTED AREA OF 3.38 HECTARES LOCATED IN SITIO PANGPANG"	3.38
Liong	Brgy. Liong, Guinsiliban	<b>Municipal Ordinance No. 63, s. 2010</b> "AN ORDINANCE ESTABLISHING THE LIONG MARINE PROTECTED AREA AT BARANGAY LIONG, GUINSILIBAN, CAMIGUIN."	6.86

conserving this fish is six kilometers (Green et al., 2013).

In establishing new MPAs, a new focus should be on quality and towards a network of MPAs. The design principle will be to develop networks of MPAs, a collection of individual MPAs that cover a variety of habitat types ecologically connected through home range movement of larvae, juveniles, and adult key species. This means that MPAs should be established to protect not just coral reefs but also sea grass beds, mangroves, or other habitats, as these are interconnected and interdependent, providing benefits to each other. The

connection ensures that MPAs can facilitate species recovery and replenishment after disturbance of the species sanctuary.

**Financing and Site Development.** Funds appropriated for the MPA management provided by the LGU are under the CRM budget. In general, the funds are inadequate to support management operations. There seems to be a disconnect, where plans were not being supported by any financial mechanism to cover the cost of their implementation. Under the decentralization scheme, the municipal government predominates, with the budget allocated for MPA management

depending on what the LGU can prioritize and manage to pay for. With the Environmental User Fee System installed in several MPAs, LGUs have been able to secure an additional income source to support management of the MPAs.

Under the CCRMP, resource enhancement was initiated and limited to mangrove rehabilitation. The mangrove area in Benoni, Mahinog has been declared protected as “Katungan Park”, and at the same time, is promoted by the LGU as an ecotourism site.

**Enforcement.** The CCRMP has assisted LGUs in implementing coastal law enforcement mechanisms across the barangay, municipal, and provincial levels. The capability training for *Bantay Dagat* personnel has strengthened knowledge on fisheries laws and regulations and apprehension of illegal fishing, involving infractions of MPA regulations and other municipal fishery laws and ordinances. However, following the site assessment and validation of the evaluator, intensified efforts are necessary in terms of implementing the Fisheries Code and other laws related to coastal resources management, effective patrolling and protection of the MPAs including the municipal waters (fishing grounds), coral reefs, seagrass, and mangrove areas, and aggressive apprehension and prosecution of violators of the Fisheries Code and other laws related to coastal resources management and environmental laws. Enforcement activities have been claimed to be irregular and systems not fully operational in the last five years,

with the exception in areas such as White Island MPA, Mantigue MPA, and Pasil Reef MPA which have many tourism activities. The Municipal *Bantay Dagat* monitors the Pasil Reef and, at the same time, serves as tourist guides where they receive an honorarium. Meanwhile, the Municipal Philippine National Police and barangay *tanods* conduct round the clock patrolling in Mantigue MPA. In White Island, the CRM Office still conducts surveillance and patrolling with a ten-member task force and assigned lifeguards. Although there appear to have been intrusions into these MPAs, no actual violations or apprehension were reported because the absence of demarcation buoys for the MPAs made it difficult to ascertain infractions. This is a problem, for example, in the Liong and Alangilan MPAs that are currently being managed and patrolled by the barangay.

#### **Monitoring and Evaluation (M&E).**

The M&E for the MPAs was reasonably extensive, with sufficient activities conducted and designed to capture the indicator targets included in the CCRMP logical framework. Participatory coastal resource assessment and the MPA biophysical monitoring undertaken by contract firms/the academe provided the MPAs with baseline data, and reports were available as reference. LGU personnel were trained to do the biophysical monitoring of habitats, including open water SCUBA training; however, none of those trained conducted any monitoring activities after the CCRMP ended.

## National Evaluation Policy Framework (Relevance, Effectiveness, Efficiency, Sustainability) in terms of Outcome 1 - Increased Productivity and Enhanced Integrity of the Coastal and Marine Resources

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### Relevance

In general the CCRMP has made significant contributions to biodiversity conservation in the island-province of Camiguin by helping LGUs improve the development and management approaches of MPAs, and institutionalizing the support systems. The most important lesson gained by this evaluation is that institutional changes and broader policies introduced by the CCRMP are translated into better biodiversity conservation outcomes.

All the five MPAs registered “fair” to “good” coral cover with a mean cover of 45.26 percent inside the MPA. Remarkably, the area outside the MPAs registered around the same coral cover, with a mean “fair” condition at 37 percent.

Historical trend before and after the project signifies that, overall, health and productivity of the reef’s fish population in terms of diversity, density, and biomass have significantly improved, especially in the MPAs established during the program, specifically in Alangilan and Liong (Table 4).

Overall observations showed no major changes in the sea grass communities which have remained intact over time.

Good sea grass condition remained intact in Mantigue Island as well as in Guinsiliban (North Poblacion). Since 2008, no major development occurred in known seagrass areas in the province.

Accounts from locals revealed mangrove cover has remained intact in the province, with no significant disturbance.

The establishment of the MPAs and strengthening of management had been the preferred management measure under the CCRMP in meeting coastal and fisheries management objectives. The evidence on the effectiveness of the MPAs in addressing depleted marine resources is mixed, although more positive results are reported in the latest evaluation. The recent results show significant increase in trends of species abundance and population trends for both corals and fishes, particularly inside the MPAs. Only White Island MPA shows a down trend since the selected location of the MPA is not the most productive site, the area being mostly sandy and covered with dead corals with algae.

The CCRMP has assisted the LGUs in implementing coastal law enforcement mechanisms across the barangay, municipal, and provincial levels. The capability training for *Bantay Dagat* personnel has strengthened knowledge on fisheries laws and regulations and the apprehension of illegal fishing involving infractions on established laws governing MPAs. However, more significant efforts are found to be necessary in several areas of implementation. These include stricter implementation and enforcement of laws, policies, and plans; strengthening judicial and prosecution process; and pursuing maintenance support structures

during patrolling and enforcement activities.

The human element or the community and its actions are very important for the MPAs to succeed (White and Green, 2003). There is a link between the state of natural resource and existing socio-economic systems because the activities of the latter impose pressure on natural resources through various extraction and contamination processes (Ablan et al., 2004). As protection is afforded inside the MPA that prohibit all human extractive activity within its boundaries, it provides greater conservation benefits compared to the areas outside the MPAs that allowed fishing and other uses.

In general, there is a positive perception on the establishment of the MPAs in Camiguin – a departure from the negative reactions to the establishment of the MPAs during the initial stages of implementation. At first, fisherfolk saw the MPAs as “taking away their rights to fish” since they were used to fishing anywhere without restrictions. With the MPAs, some of their traditional fishing grounds were now off-limits to fishing activities. With the intensive information, education, and communication (IEC) campaign, fisherfolk are able to understand the goals of the project and come to realize the MPAs’ benefits.

The stakeholders noted that communities were aware of the MPAs. Fisherfolk now know why there are limitations in the extraction of marine products inside the MPAs. This awareness resulted in vigilance in guarding the MPAs to protect their source of income and livelihood. They realized that the benefits are not only for this generation but for generations to come. Although they have not felt the full impact of the

MPAs, it was perceived that in the long run, an abundant volume of fish will result from these conservation efforts. However, the gains of the project will not be sustained if enforcement of the coastal laws is lenient and constant IEC will not be maintained.

The stakeholders regarded the development of CRM plans as highly relevant to institutionalizing CRM towards increasing natural productivity and enhancing the integrity of the coastal and marine resources of Camiguin. They mentioned that the delineation of waters, including the demarcation of the MPAs, was relevant in terms of reducing the incidence of illegal fishing. They added that deputized fish wardens are well-versed in fishing laws because of the project’s capacity-building activities. However, the stakeholders also reported that in areas which lack markers (buoy), there were negative effects in the protection of the marine resources of the province.

### **Effectiveness**

Overall, the reef, fish, sea grass, and mangrove health have improved, as indicated by the significant increase in live coral cover, increase in fish density and fish size inside MPAs, and increased basal area of mangroves. Among the CCRMP’s goals was to improve the overall water quality within the MPAs and its surrounding waters; this has been maintained, as evidenced by the increase in water clarity and the improvement in selected water parameters over baseline.

Responses from interviews with the *Bantay Dagat* and CRM officer revealed that the CCRMP-sponsored training courses and workshops on the establishment of the MPAs have been



widely supported and implemented. The CCRMP provided extensive technical and material assistance and facilitated the proposed site assessment and preparation of technical maps.

The stakeholders identified the presence of legal instruments in the form of ordinances to establish the MPAs as effective in institutionalizing the CRM. They likewise mentioned that organizing management councils was an effective strategy. Another effective law enforcement strategy was the presence of deputized fish wardens. The stakeholders said that the daily surveillance of municipal waters by Bantay Dagat was effective in guarding their MPAs and preventing illegal fishing. The presence of markers (buoy) helps protect the MPAs. Finally, the stakeholders recognized that the conduct of biophysical assessments was effective in the overall management of the MPAs.

Stakeholders reported that inadequate law enforcement is counter-productive to increasing natural productivity and enhancing the integrity of the coastal and marine resources of Camiguin. Certain areas, they said, did not have enough deputized fish wardens (DFW), partly because the honorarium was considered too small and irregular. Marker buoys primarily serve as demarcation points of marine areas being protected. Lost markers (buoys) may lead to violations because their absence allows intrusion and fishing activities within the protected area.

### Efficiency

If knowledge gaps are addressed, this will create a much better understanding of how the CCRMP contributed to bringing about biodiversity impacts. This include understanding drivers that facilitated participation and engagement of local communities in the program,

**Table 9.** Estimated economic value of Camiguin's coral reef area, 2017+10 years and 2017+20 years (in PHP)

<b>31 MPAs only (1.128 sq.km.)</b>	
Annual Economic Value	931,461.58
Total 10-year Economic Value	16,316,206.20
Net Present Value (NPV)	9,582,205.88
Total 20-year Economic Value	34,382,810.00
NPV 20 years	13,862,178.20
<b>Near Shore Coastal Habitats (11.28 sq.km.)</b>	
Annual Economic Value	7,051,601.76
Total 10-year Economic Value	70,516,017.60
NPV 10 years	43,329,040.22
Total 20-year Economic Value	141,032,035.20
NPV 20 years	60,034,260.91

Nearshore refers to the larger coastal area covering MPAs and the areas outside the MPAs where fisherfolk can fish and where other economic activities can be conducted

and how participatory management and governance systems were mainstreamed (i.e., how control systems were put in place, including how enforcement was carried out to protect the value and increased productivity of coastal and marine resources in Camiguin Island).

In terms of financial efficiency, the benefits vis-à-vis the cost of the CCRMP were reviewed. Following the valuation of reefs in the Philippines by Samonte-Tan and Armedilla (UNEP, 2004), the estimated economic value of Camiguin's coral reef area is computed (Table 9). Based on the reef valuation, every 1 square kilometer (km<sup>2</sup>) of coral reef can generate PHP625,142 of direct and indirect-use values. Using this factor, the estimated economic value of Camiguin's MPAs as well as its near-shore coastal habitat was computed

The CCRMP Phase 1 Completion Report estimated the cost of the five-year project at PHP116,000,000. Based on the 20-year estimated economic value of the entire Camiguin near-shore coastal habitat, the CCRMP's return on investment (ROI) is 22 percent.

### **Sustainability**

The CCRMP has made important contributions to biodiversity conservation in the island-province of Camiguin by helping the LGUs improve the development of their MPAs. The CCRMP offers extensive experience to

the government to improve its approaches to managing protected areas and to institutionalize its support systems. The most important lesson gained by this impact evaluation is that institutional changes and broader policies introduced by the CCRMP translated into better biodiversity conservation outcomes. Eventually, the MPAs will directly and indirectly affect people. These socio-economic impacts include effects on income, livelihood opportunities, migration, and cultural habits, as well as on ecosystem services. Well-designed MPAs can offer important benefits, both to the environment and to the people concerned.

Also, the stakeholders reported continuous support from the LGU even beyond the term of the CCRMP. It is also pointed out that the community united to protect the MPAs; a higher stake was involved because of the income derived from diving or snorkeling.

However, the stakeholders also expressed concerns over sustainability because of the absence of a regular budget for the maintenance of the MPAs. Hence, the stakeholders saw that funding is not sustainable. Community participation is also reported as inconsistent and the use of the CCRMP-provided equipment, not sustained, especially after the project was completed.



## Results of CCRMP in terms of Outcome 2 - Increased Income of the Fisherfolk

### Perception of enrolled and not-enrolled fisherfolk respondents on income in terms of fish catch

The impact evaluation showed there is a perceived positive impact on conservation efforts with the establishment of the MPAs. This is a departure from the negative perception during the Project's initial stage. At present, fisherfolk are aware of the importance of the MPAs and the benefits to their sources of income. However, the perceived benefits in terms of increase in fish catch were not felt due to irregular "spillover" of fish from the MPAs; this is understandable since it takes 10 to 15 years to fully experience the benefits of MPAs, from date of institutionalization.

Table 10 presents the perception of respondents on income and their view on changes in income. Fifty-six

(39.72%) of the 141 enrolled fisherfolk responded that income was better, 48 (34.04%) said it was the same, while 36 (25.53%) said it was worse. Compared to ten years ago, more of the enrolled respondents said that their income was better.

Of the 111 not-enrolled fisherfolk, 37 of the respondents (33.33%) said that income was better, 55 (49.55%) said it was the same, and 19 (17.12%) noted it was worse.

Table 11 shows that majority or 58.87 percent and 72.07 percent, respectively, of respondents who are enrolled and not-enrolled observed that fish catch was decreasing. This opinion may be attributed to the increase in the number of fisherfolk and the expansion of commercial fishing, but some also attributed this to the establishment of the MPAs which have stricter laws and ordinances against unwanted fishing. Those who perceived that fish catch was increasing attributed this mainly to the establishment of the MPAs; there was awareness of the importance of the MPAs.

**Table 10.** Perception of respondents from the five MPAs on income, 2017

Enrolled Fisherfolk	Frequency	Percentage
Better	56	39.72
Same	48	34.04
Worse	36	25.53
No answer	1	.071
Not-enrolled Fisherfolk	Frequency	Percentage
Better	37	33.33
Same	55	49.55
Worse	19	17.12

**Table 11.** Perception of respondents on fish catch trends, 2017

Enrolled Fisherfolk	Frequency	Percentage
Decreasing	83	58.87
Increasing	32	22.70
Same	18	12.77
No answer	8	5.67

Not-enrolled Fisherfolk	Frequency	Percentage
Decreasing	80	72.07
Increasing	11	9.91
Same	15	13.51
No answer	4	4.50

### Women's perceptions on changes in income

The involvement of women in the livelihood of the fishing communities is usually limited to selling fish caught by their husband, and gathering shells. With the implementation of the CCRMP, women were involved in the processing of coastal and marine products like bottled sardines, fish drying, seaweed farming, among others. More than half (51%) of the women surveyed said that their income level at present is better compared to ten years ago, as shown in

Table 12. On the other hand, 33.33 percent expressed it was just the same, while 14.81 percent mentioned it was worse. The latter were typically women who were more inclined to selling fish catch than selling processed products.

Table 13 shows that 35.71 percent of the respondents said they perceived a decreasing trend in fish catch. Some reasons given for the decrease were the increased number of fisherfolk, commercial fishing, and effects of climate change.

**Table 12.** Perception of respondents from the five MPAs on fish catch trends, 2017

Enrolled Fisherfolk	Frequency	Percentage
Better	14	51.85
Just the Same	9	33.33
Worse	4	14.81

**Table 13.** Perception of women respondents on fish catch trends, 2017

Enrolled Fisherfolk	Frequency	Percentage
Decreasing	10	35.71
Increasing	9	32.14
Same	3	10.71
No answer	6	21.43

However, 32.14 percent believed that fishcatch was increasing, mainly because of the establishment of the MPAs.

### **Established CRM-based income-generating livelihood projects**

The impact evaluation study found that sustainable mechanisms were in place for the management of the 31 MPAs established in Camiguin, and that CRM awareness increased through the different activities conducted by project implementers. During Phase II implementation, eight alternative and conservation-based enterprises were established, which surpassed the target of one enterprise per municipality, namely: 1) Bottled Sardines Production in the municipality of Mambajao, 2) Coco Sugar Production and Cabuan Coastal and Village Tour in the municipality of Guinsiliban, 3) Taguines Lagoon Aqua Sport and Recreation Facility in the Municipality of Mahinog, 4) Dried Squid Production – Product Enhancement and Marketing Support of Fishery Product in the Municipality of Sagay, and 5) Pasil Reef Eco-Tourism

Support Services Enterprise, Punta Dive, Snorkeling, and Paddling Tour Package, and Blue Lagoon Fun Dive, Snorkeling, and Paddling Tour Package in the Municipality of Catarman. Of the ten people who were trained for the Mambajao Bottled Sardines Production, only four are still active since production is irregular due to seasonality of fish catch. Those who are active usually worked as casual employees in the Municipal Hall in Mambajao when sardines are off-season.

For the Guinsiliban Coco Sugar Production, only one of the 21 individual-beneficiaries is still active and is being supported by fisherfolk family members. The inactive individual-beneficiaries went back to fishing as their main source of income, stating they were more interested in fishing than in working on the alternative livelihood project they were introduced to during the CCRMP.

For the Mahinog Taguines Lagoon Aqua Sport and Recreation Facility, the ten fisherfolk trained to provide boating and guiding services were unfortunately not located by the impact evaluation study team. This facility was previously owned by the Mahinog LGU with a private company partner. According to the recollection of the LGUs, the individual-beneficiaries were employed in the facility but later returned to fishing; others migrated outside the community. These would explain why the beneficiaries stopped rendering services at the facility.

For the Sagay Dried Squid Production, 21 KASAMMA (*Kahugpungan sa Masilakong Mananagat*) members were still actively engaged in the project. Their income has been increasing, and their only apprehension was the lack of robust sales of their products – because they were not trained in marketing.

For the Catarman Pasil Reef Eco-Tourism Support Services Enterprise, 15 snorkeling guides were trained, but only ten were found to be still active.

Respondents explained that most of the inactive individual-beneficiaries had no passion or interest in the identified alternative livelihood projects. Most of them returned to fishing and justified this by saying they had been trained only in fishing since childhood, and this was the

livelihood passed on to them by their parents. If the alternative livelihood projects were identified based on what the beneficiaries were passionate about, then perhaps a more entrepreneurial mindset would have been developed and honed.

## **National Evaluation Policy Framework (Relevance, Effectiveness, Efficiency, Sustainability) for Outcome 2**

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Outcome 2 looks into the impact of the CCRMP project in terms of increased income of fisherfolk. A more extensive REES evaluation of Outcome 2 is presented in this section. The first covers the specific analysis of the established alternative livelihood projects and the second covers the overall impact of the CCRMP to income, which takes into account both the MPA and alternative livelihood interventions.

### **REES evaluating the established CRM-based income generating livelihood projects**

#### **Relevance**

The establishment of alternative livelihoods as a strategy to reduce reliance on fishing and to enable coastal resources to regenerate is deemed positive by the stakeholders. Two types of alternative livelihoods were introduced: fishery/agriculture-based and ecotourism-based livelihoods. The CCRMP was able to establish support systems for these alternative livelihoods by working together with other government agencies in product development, skills trainings, and other needs of the enterprises. Market linkages through

display centers and promotions have been set-up to assist the enterprises.

It is observed that fisherfolk who were enrolled in ecotourism livelihood activities have an alternative source of income during the lean months of fishing. However, the fishery- and agriculture-based livelihood projects were stalled due to seasonality and availability of resources; this was the case for bottled sardines, coco-sugar production, and dried squid. Some of those enrolled in these livelihoods were inactive.

#### **Effectiveness**

At the onset of the establishment of the alternative livelihoods, the presence of the different stakeholders and their support to the established enterprises are found effective. These support mechanisms enabled the enterprises to gain headway during the implementation of the CCRMP. Differences are noted in the effectiveness of the fishery or agriculture-based and ecotourism-based livelihoods. The former generally experienced more difficulties, while the latter was observed to have provide better alternative sources of income.

This study noted the limited involvement of fisherfolk in these enterprises. Only a small number of fisherfolk were enrolled in the pilot alternative livelihoods and enterprises introduced and supported by the CCRMP. However, fisherfolk engaged in the provision of ecotourism-related services had significantly reduced their reliance on fishing. This was true for the snorkeling guides in Catarman and the pump boat operators in Mahinog. Six snorkeling guides who previously engaged in fishing as their

main source of income were currently earning from tourism-related services.

Although the development of alternative livelihoods was focused on the eight enterprises in Phase II of CCRMP, various alternative livelihoods were introduced in Camiguin, such as seaweed farming, fruits and vegetable production, mussel production, butterfly garden, bamboo handicraft, and LGU income generating tourism-based livelihoods in Phase I. Alternative livelihoods based on production have not progressed into full-scale enterprises, as reflected in the livelihood and enterprise monitoring. Most of these livelihoods were also limited to family-based activities. Marine-based value-added income generating projects were also initiated and further developed in Phase II. However, for tourism-based livelihoods, the LGUs generated revenues from entrance fees, diving and snorkeling fees, and other fees, and so did the

fisherfolk who provided tourism-related services like sea transport, snorkel rentals, guides, etc. These services provided alternative sources of income to fisherfolk during the lean months of fishing, as shown in Figure 19.

## Efficiency

The livelihood interventions provided by the CCRMP were aimed at opening opportunities for alternative livelihoods. Ecotourism-based and processing livelihoods were introduced to reduce the fisherfolk's reliance on fishing. While the ecotourism-based services had some positive effect on fisherfolk's livelihood, fishery/agriculture-based processing livelihoods faced many operational challenges. Ecotourism-based livelihoods offered an alternative income for fisherfolk during fishing lean months. However, with just a few marine tourist areas, there was limited participation of fisherfolk in providing services.

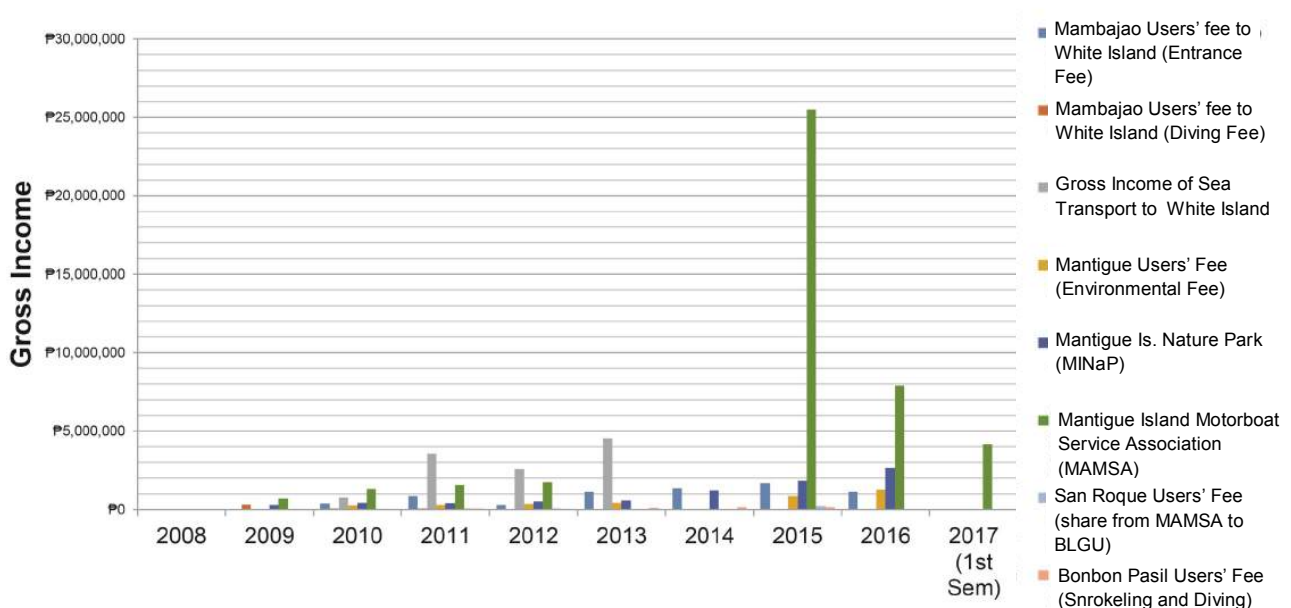


Figure 19. Gross income of tourism-based enterprises, 2017

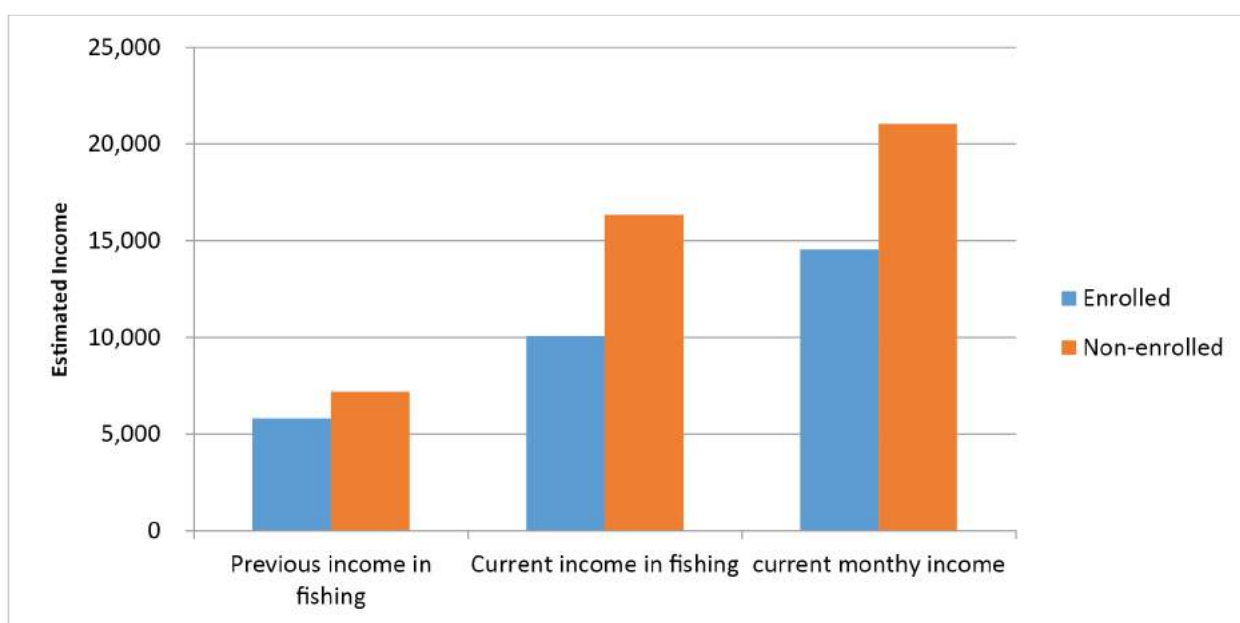
For the processing projects, vulnerability to shocks, trends, and seasonality was not anticipated. This resulted in the irregular production of processed products like bottled sardines, coco-sugar, and dried squid, which rely on the seasonality of marine products. With the effects of climate change, weather conditions were no longer predictable. A sudden change of weather could affect the production process, for example, in coco-sugar production which requires coconut wine to be extracted at certain times and should not be mixed with rainwater. These concerns should have been identified in the early implementation of these alternative livelihoods to strategize how to minimize losses in production and sustain the projects.

## Sustainability

Two basic types of enterprises were established during the CCRMP: products and services. Bottled sardines, coco-sugar, and squid processing were production-based enterprises which relied

on marine resources and agriculture products for the raw materials. These enterprises were susceptible to irregular produce due to seasonality and availability of raw materials. Ecotourism-based livelihoods provided services to tourists, such as snorkeling, boat services, food services, and tour guiding.

With support from the LGUs, other government agencies, NGOs, and the private sector, sustainability of these enterprises will be maintained. Vulnerability of the raw materials that rely on extraction of natural resources could be addressed through livelihood strategies. The ecotourism project will depend on the influx of tourists to Camiguin. But this impact study also noted the inactivity of previously enrolled beneficiaries of the CCRMP. To remedy this concern, expansion of involvement of other fisherfolk in the enterprises should be taken into consideration so that the gains of the CCRMP will not be wasted.



**Figure 20.** Estimated 2007 and 2017 income of enrolled and not-enrolled respondents



. mean Proj_IncomeF if Enroll ==2				
Mean estimation		Number of obs		= 141
	Mean	Std. Err.	[95% Conf. Interval]	
Proj_IncomeF	7508.431	664.0635	6195.542	8821.32
. mean Proj_Income if Enroll ==2				
Mean estimation		Number of obs		= 141
	Mean	Std. Err.	[95% Conf. Interval]	
Proj_Income	8286.799	661.7583	6978.467	9595.131

**Figure 21.** Projected income of enrolled fisherfolks based on inflation rate, 2017

. mean Proj_IncomeF if Enroll == 1				
Mean estimation		Number of obs		= 111
	Mean	Std. Err.	[95% Conf. Interval]	
Proj_IncomeF	8822.424	787.6071	7261.572	10383.28
. mean Proj_Income if Enroll ==1				
Mean estimation		Number of obs		= 111
	Mean	Std. Err.	[95% Conf. Interval]	
Proj_Income	8826.325	848.39683	7143.869	10508.78

**Figure 22.** Projected income of not-enrolled fisherfolks based on inflation rate, 2017

## REES evaluating results of the CCRMP in terms of increased income of fisherfolk

### Relevance

Reliance on fishing as the main source of income was validated in the survey. Seventy-eight percent of the respondents considered fishing as the primary source of income, in contrast to about 22 percent who did not. This showed that there was minimal income diversification in the livelihood of the fisherfolk. Other sources of income came from manual labor or construction work, fishing-related

activities, farming, employment for government workers, livestock raising, and sari-sari stores. With these findings, there is a need to further intensify the idea of income diversification for fisherfolk to enable the conservation effort to be sustainable. Otherwise, conflict among them may occur with the limited fishing grounds, and this could affect the MPAs.

The income level of enrolled and not-enrolled fisherfolk from fishing has increased since the implementation of the CCRMP, as shown in Figure 20. The effect of the CCRMP on the lives of the fisherfolk, whether enrolled or not-



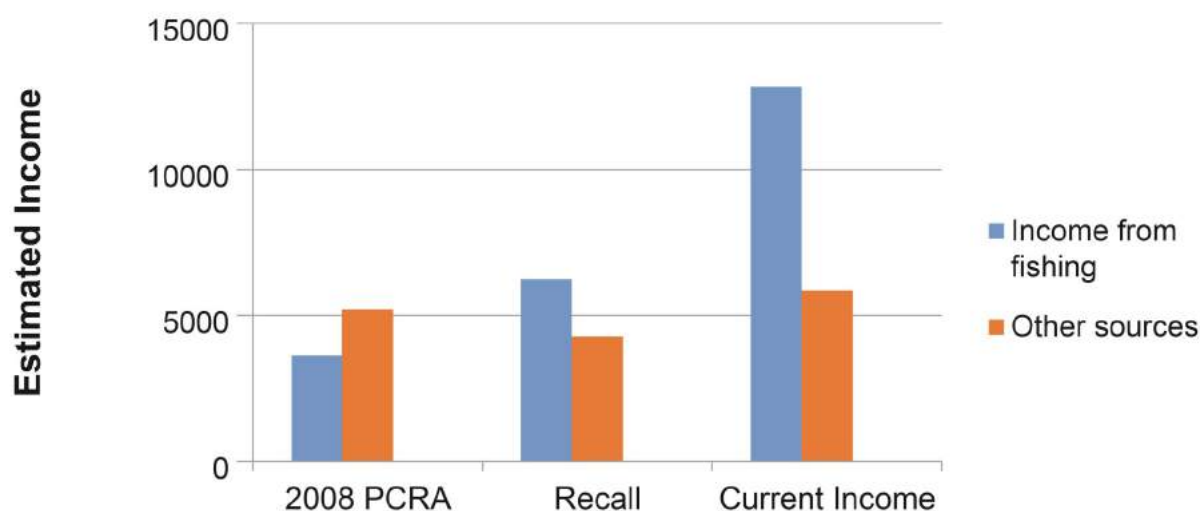
enrolled, is the same since both use the same fishing grounds. Meanwhile, the effect of conservation efforts will be beneficial to all fisherfolk. Not-enrolled fisherfolk in Camiguin also indirectly benefited from the implementation of the CCRMP, as shown by the income results. Eighteen not-enrolled fisherfolk are working as snorkeling guides, *Bantay Dagat*, seaweed farmers, and pump boat operators. Although the number may be small, it just shows that the CCRMP implementation directly and indirectly affected the lives of the coastal communities. The long-term impact of the CCRMP on the conservation effort has yet to be determined, however, it is already evident that the CCRMP benefited both enrolled and not-enrolled fisherfolk.

Factoring in the inflation rate, the current monthly income of enrolled fisherfolk from fishing which was PHP10,066.67, stands at PHP7,508.43 in inflation-adjusted real income. For their current monthly income of PHP14,566.02, the inflation adjusted

income is PHP8,286.79. For the not-enrolled fisherfolk, current monthly income in fishing was PHP16,346.40, and its inflation-adjusted real income PHP8,822.42. The current monthly income of PHP21,060.37 is estimated at PHP8,826.32, with inflation. With the positive computed monthly income of fisherfolk, they were considered as belonging above the annual per capita poverty line threshold of PHP 21,678.00. This indicates an improved quality of life of fisherfolk after the institutionalization of MPAs and the implementation of the alternative livelihoods.

### Effectiveness

The location of the MPAs were traditionally considered rich fishing areas, which resulted in overfishing and degradation. With the establishment of the MPAs, access to these traditional fishing grounds was restricted to enable recovery, which reduced the fishing areas of the fisherfolk.



**Figure 23.** Comparative estimates of income from fishing and other sources\*, 2007 and 2017

\* **ENROLLED:** 4P's member, Baker, BHW, Boat maker, Butcher, Buwad and vegetables seller, Buy and Sell, Casual Employee, Coconut Climber, Coconut Copras, Coconut Vendor, Construction Worker, Copras, Diver, Electrician, Farmer, Financial support from abroad, Firewood, Fish vendor, Fish warden, Government Employee, etc.; **NOT ENROLLED:** Bamboo Furniture employee, Business, Coal Seller, Coconut Climber, Coconut Copras, Construction Worker, Copras, Cutting for Firewood, Driver (tricycle, habal-habal), Farmer (coconut, banana, lansones, root crop, etc), Financial Support from relatives, Pumpboat Operator, Sari-sari Store Owner, Sawing of Wood, Seaweed Production, etc.

**Table 14.** Distribution of estimated income: 2007 vs. 2017

Range (Php)	Previous Income (10 years ago)		Current Income (2017)	
	Frequency	Percentage	Frequency	Percentage
0	28	11.11	8	3.17
5000-below	106	42.06	32	12.70
5001-10000	77	30.56	90	35.71
10001-15000	25	9.92	59	23.41
15001-20000	8	3.17	29	11.51
20001-25000	2	0.79	10	3.97
25001-30000	4	1.59	16	6.35
30001-35000	1	0.40	5	1.98
35001-35000	1	0.40	3	1.19

The establishment of the MPAs has been the focus of discussion of many respondents. Majority of the respondents perceive the establishment of the MPAs to be beneficial in the long run, since they observed an increase in fish volume in the waters outside the MPAs. However, the impact of this increase has not been felt at the time of the evaluation.

Respondents noted that while the fish volume may have increased, there was a decreasing trend in fish catch in the past five years. One of the factors cited for this decrease is the increase in the number of fisherfolk. Some viewed the establishment of the MPAs as another reason.

For those who perceived an increase in fish catch, the establishment of the MPAs was identified as the reason.

### **Efficiency**

There is a general perception of increase in income from fishing. Figure 23 shows that respondents income from fishing have significantly increased during the survey compared to ten years

ago before the CCRMP was implemented.

Table 14 shows the comparison of income bracket 10 years ago and 2017. There is an upward movement across all income brackets. Of the 252 respondents, 106 (42.06%) belonged to the 5000 and below income bracket in 2008. During the evaluation this number decreased to 32 respondents (12.70%).

However, other factors came into play that counter-balanced the positive effects of the establishment of the MPAs. Productivity of the coastal marine resources, at this point, has not yet translated into a net increase in fish catch that in turn should have increased income. The perceived increase in volume of fish in the MPAs could not be associated to increase in fish catch since “spillover” of fishes is still irregular.

Some fisherfolk and stakeholders observed that fishes tend to stay inside the MPAs, which limits their fish catch. This resulted in fisherfolk having to venture far from the coastline to fish, where they compete with the

**Table 15.** Enterprise and livelihood income from 2007 to 2017, First Quarter (in PHP)

Income from various usersfees	11,812,627
Income from other enterprises and livelihoods	62,780,767
Income from the eight alternative livelihoods	2,014,155
<b>TOTAL</b>	<b>76,607,549</b>

commercial fishers. This perception is corroborated by the result of Outcome 1, which showed that the fish densities outside the MPAs are poor compared to the condition inside the MPAs. The number of variety and density of target species are also poor outside the MPAs, which explain the decrease in fish catch. This is aggravated by the observed increase in the number of fisherfolk in the community.

On the other hand, the provision of alternative livelihoods was limited to direct beneficiaries, some of whom are no longer active in the projects. The limited number of enrolled fisherfolk in the alternative livelihoods translated into a very low coverage and distribution of benefits from the eight alternative livelihood projects. Moreover, with the decline in the fisherfolk who continued to implement the alternative livelihood activities, the potential benefits coming from the said livelihoods further decreased.

With respect to benefit and cost analysis, the Livelihood and Enterprise Monitoring Matrix of the CCRMP was evaluated. This was continued by the local stakeholders, even after the Project ended in September 2014. Based on the enterprise and livelihood monitoring, from the start of the

CCRMP in 2007 up to the first quarter of 2017, the total revenue and user fees generated amounted to PHP76,607,549.

Viewed against the CCRMP Phase II project cost of PHP14,839,832, the total revenue and user fees generated in the past ten years shows a 416 percent\* return on investment. However, looking at the user fees and the eight alternative livelihoods, the return on investment over the ten-year period is negative 7 percent. Based on a 20-year projection, the possible return on investment will be potentially 86 percent, assuming status quo.

### **Sustainability**

The increased productivity and enhanced integrity of coastal and marine resources affect the sources of income of fisherfolk who rely on fishing as their main source of livelihood. Fisherfolk were aware that enforcement of coastal laws was needed to protect and regenerate marine resources. To sustain the protection of the MPAs, fisherfolk were aware that community participation was vital in the conservation efforts. Conservation efforts are foreseen to eventually benefit the fisherfolk community and improve their income.

\* *Return on Investment Percentage* = [(Gain from Investment - Cost of Investment)/Cost of Investment] x 100

## Other gains, and innovative and effective strategies in the implementation of the project

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### Institutionalization

**Coastal law enforcement.** The enforcement of coastal laws and ordinances to protect the MPAs would not be possible without the deputized fish wardens who are in the forefront of the conservation effort. This was recognized by the fisherfolk who were aware that any illegal fishing method will be reported, resulting in apprehension by the authorities. Awareness that the government is serious in implementing the coastal and marine laws, changed the fishing habits of fisherfolk.

**Registration of fisherfolk from other areas.** To address encroachment, the LGU required the fisherfolk from outside the municipality to register first to be able to fish within the LGU's municipal waters. This policy has been instituted to regulate fisherfolk coming from other areas who would compete with the local fisherfolk in the five municipalities of Camiguin. The registration also controls the use of illegal fishing gears that may be used by these fisherfolk.

Through the IEC campaign on the rich but delicate resources of the island, the Project helped to strike a balance between conservation and utilization, especially when Mantigue Island residents were re-settled to the

mainland. The purpose of this was to manage the small island and position it as a top tourism destination for marine biodiversity conservation, as well as to showcase the seaweed farming practices and how the seaweed farmers manage their fishery resources for sustainable harvest in the future.

### Community-based projects

Protecting the MPA is like a family enterprise in Barangay Cantaan, Guinsiliban. According to the barangay chairperson, "Even the children in the community are the ones reminding others to stay away from the sanctuaries." Encouraging the adoption of this mindset in other barangays could benefit those that would otherwise suffer the consequences of the depletion of coastal and marine resources. This, coupled with continuous IEC, would strengthen the fisherfolk's awareness on the importance of the MPAs.

### Resource mobilization

The implementation of the CCRMP has brought about the convergence of the different development interventions for the fisherfolk in the coastal communities. Various government agencies, NGOs, and private sectors provided interventions in the different aspects of the project implementation. The merging of assistance provided the support mechanism needed by the Project and the beneficiaries. Skills training, product development, and provision of fishing gears were some of these interventions. For future implementation of a similar project, this component will have an impact on the sustainability of the project.

# Conclusion and Policy Recommendations

## **The CCRMP in terms of Outcome 1 made significant contributions to biodiversity conservation**

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Outcome 1 of the CCRMP has made significant contributions to biodiversity conservation in Camiguin. By laying down the foundation for longer-term initiatives in collaboration with the LGUs, and other stakeholders, marked improvement in the MPAs covered was realized. The value of stakeholder involvement is further underscored by the most relevant lesson gained from the evaluation: institutional changes and broader policies introduced by the CCRMP translated to better biodiversity conservation outcomes.

Overall reef, fish, sea grass, and mangrove health improved, as indicated by the improvement of live coral cover, increase in fish density and fish size inside the MPAs, as well as higher basal area of mangroves. The goal of the CCRMP to improve the overall water quality was achieved, as evidenced by the improvement of water clarity and other selected water parameters. Using as context, the original SB water classification of the MPAs evaluated, all were able to hurdle the necessary scores for the SB category.

The stakeholders regarded the development of coastal resource management plans as highly relevant in

institutionalizing Coastal Resource Management towards increasing natural productivity and enhancing the integrity of the coastal and marine resources of Camiguin. Following the economic valuation of Philippine coral reefs by Samonte-Tan and Armedilla (UNEP, 2004), a 20-year estimated economic value of the entire Camiguin near shore coastal habitat was considered. The return on investment of the CCRMP Phase 1 is at 22 percent.

The MPAs in Camiguin have demonstrated biological and ecological effects both inside and outside their boundaries. Inside the MPAs are indications of more and bigger animals of some species, more reproductive output (potentially sustaining fish populations), preservation of genetic diversity, protection of habitats, increase in biodiversity, and reduction of bycatch and discards. Outside the MPAs, the potential positive effects observed include spillover and dispersal of fish eggs and larvae from within the MPAs. The MPAs contribute to higher fishery production by making this spillover available to catch and by an increase in reproductive output, contributing to recruitment to the fishery.

Majority of the fisherfolk perceived the establishment of the MPAs to be beneficial in the long run since they observed an increase in fish volume, consistent with the results of the natural resource assessment.

Ordinances and the presence of the fish wardens cannot ensure the sustainability of the MPAs. Strict implementation of laws and community participation are necessary. The community-based coastal resource management committees that were formed during the project implementation should be reactivated to become functional.

While the MPAs were able to contribute to the enhancement of Camiguin's coastal resources, there is a need to consider broader ecosystem-based management; expand the conventional fisheries management framework to explicitly consider a wider view of fishery and its ecosystem, including its human dimension.

Long term management of water resources (fresh and marine) is a primary goal of the LGUs not only to sustain health and economic benefits, but more importantly, to maintain the ecological function of these resources that support the overall community needs. This is especially significant for Camiguin because majority of its residents rely on natural resources for food and commercial needs. Thus, effective waste water and solid waste management are imperatives for Camiguin in order to meet its water body classification standards.

As a small island ecosystem, the management of waste is crucial in conserving the ecosystem's services. Moreover, regular water quality monitoring (WQM) is an essential tool for sustainable development that the local government units and other concerned agencies can maximize. While most water bodies of Camiguin passed their water body classification

standards based on DAO No. 2016-08, there are water bodies that failed to meet the standards. The LGUs can use the results of this impact evaluation study to re-examine their waste management policies and programs. Appropriate interventions by the LGUs to meet their water body standards can be guided by the results of the study, as well as other existing body of knowledge related to the water quality standards and management.

### **The CCRMP in terms of Outcome 2 was only partially successful in providing sustainable sources of alternative income**

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Outcome 2 of the CCRMP, which centers on the introduction of the alternative livelihoods in every municipality, while generally received positively by the stakeholders was only partially successful in providing alternative sources of income to its beneficiaries. Specifically, only those involved in ecotourism-based livelihoods are able to report sustained benefits. Those who were part of the food processing projects, mostly dropped out of the CCRMP.

Among the 252 respondents, there is a trend of moving up to a higher income bracket, as shown in Table 14 (Page 45). The number of individuals earning PHP5,000 and below, dropped from 106 in 2008 to 32 in 2017. However, this could not be attributed exclusively to the project interventions since there were some negative perceptions about the



alternative programs from the municipalities of Sagay, and Guinsiliban. The provision of alternative livelihoods was limited to direct beneficiaries, many of which were not sustained. The livelihood projects were also not able to benefit the larger fisherfolk population because of limited coverage.

Productivity of the coastal marine resources at this point did not translate into an increase in fish catch outside the MPA boundaries that will eventually increase income.

The increase in the volume of fish inside the MPAs could not be associated with increase in fish catch since “spillover” of fishes might be irregular and some fisherfolk target pelagic species and demersal reef species. Some respondents observed that fishes tend to stay inside the MPAs, which limits their fish catch. This

resulted in fisherfolk venturing farther from the coastline to fish, where they compete with commercial fishers. This perception is corroborated by the result of the Outcome 1 which showed that the fish densities outside the MPAs are very poor. Target species are also poor outside the MPAs, which explains the decrease in fish catch.

The provision of alternative livelihood has been a challenge to the fisherfolk who have known only fishing as their means of earning a living. Livelihood projects that rely on marine and coastal resource will always encounter issues of availability and seasonality. Livelihood assessment and in-depth beneficiary buy-in discussions could be conducted to determine the issues in the operation of the Project and to strategize towards sustainability. Land-based projects could be an alternative livelihood, but these have to be assessed to ensure sustainability.



Hawksbill sea turtle *Eretmochelys imbricata* foraging the reef ledge inside Mantigue Island MPA, Mahinog, Camiguin



## Overall Recommendations

After careful examination and consultation on the impact of the CCRMP, the following measures are recommended in order to further enhance and strengthen the management and sustainable use of Camiguin's coastal resources.

- i. To become effective for biodiversity conservation and to meet the desired fisheries management objectives, the MPAs should be complemented, where applicable, with several other fishery management tools and options. These include harvest control measures such as catch limits, fishing effort limits or restriction on number of fishing trips per gears or boats, restriction or limiting the size of fish to catch, gear restrictions; access controls such issuances of licenses, territorial use rights in fisheries, wherein those holding the user rights allocate resource use sharing or impose restrictions on who can do what within a designated area. All these tools can complement the effective management of the MPAs and can be balanced with relevant management framework and policies.
- ii. In establishing new MPAs, focus should be on quality and toward networking of the existing 31 MPAs in Camiguin.

The concept of networking MPAs will be to a collection of individual MPAs that cover a variety of habitat types ecologically connected

through home ranges movement of larvae, juveniles, and adult key species. This means that the MPAs should be established to protect not just coral reefs but also sea grass beds, mangroves, and other habitats, as these are interconnected and interdependent, providing benefits to each other. The connection ensures the MPAs facilitate species recovery and replenishment after disturbance.

Focusing on quality will ensure that the best locations are chosen to be the MPAs. As an example, the White Island MPA, is located in an area dominated by sandy substrate, dead corals with algae (DCA), and a few rubble fields. Transferring the location of the MPA to the southern portion of White Island is recommended. The coral reef in this new location is much more intact. Therefore, enhanced productivity or improvement will be achieved faster as compared to the current location. The other alternative is to deploy artificial reefs in the present location to enhance the reef complexity and thereby augment productivity.

- iii. Intensify research in key aspects in monitoring the productivity of coastal and marine resources, including vulnerability to natural hazards and climate change and fisheries, and both broad and specific topics on biology and ecology – spawning areas, technology, environmental science, and economics. Data should be available, accessible, and applicable as basis for setting coastal and marine resources fisheries management objectives.

Intensified effort is necessary in several areas of MPA management.

This includes stricter implementation and enforcement of laws, policies, and plans; strengthening judicial and prosecution process; and to pursue maintenance support structures during patrolling and enforcement activities. In addition, MPA demarcation in Liong MPA, in Guinsiliban, and Alangilan MPA in Sagay should be in place in order to differentiate it from the regular fishing areas, otherwise fisherfolk can fish inside the sanctuary and just make excuses if apprehended.

- iv. Vital to the long-term sustainability of the MPA is the social “buy-in” and compliance of stakeholders, individually or as a group. Active participation in the entire decision-making process should be encouraged, and stakeholders’ inputs should be taken into consideration in finalizing the MPA implementation plans.
- v. On the aspect of water quality, all information derived from the monitoring activities on water quality should be communicated to all Local Chief Executives and to concerned departments to have cohesive and unified sanitation strategy or program to improve sanitation.

While all the MPAs were able to meet the requirements for SB rating, the presence of immediate areas outside the MPAs where water quality did not meet the DENR standards must be evaluated further and potential sources of contaminants taken into account to mitigate potential risk to the adjacent MPAs. Once identified, a comprehensive sanitation program

to mitigate the coliform level, not just in affected sites but the whole province in general, should be carried out. One particular direct intervention would be to improve existing septic tank designs in order to meet allowable septic effluent standards (DAO 016-08). This can include retrofitting of existing septic tanks to improve efficiency or distribution of toilet materials to households without this facility. Secondary to this would be to establish a centralized septic treatment facility that would treat collected effluents from individual houses and commercial establishments, and be managed as a private or public facility. Alternatively, existing low-cost home-based water treatment facilities that are nature-friendly should be explored by the LGUs.

The waters in all five sites are considered safe for recreational use based on SB water classification (100 MPN/100ml). The SA reclassification for White Island and Mantigue Island elevates these locations to DENR protected status and is expected to be maintained against stricter standards. The Alangilan outside station failed the fecal coliform level with readings at 210 MPN/100ml. The site should be revisited to identify steps to improve water quality scores. This should serve as a sample for other areas with the same situation (domestic waste, informal piggeries, irrigation run-off). As mentioned above, potential sanitation interventions can be introduced in this type of area to mitigate the effects of pollutants.

- vi. Part of the design of future coastal resource management projects should be the development and implementation of alternative or supplementary livelihood activities before establishing new MPAs. This has been suggested by locals as an important incentive for participation, especially for stakeholders who will be directly affected and economically disrupted from their fishing grounds. Appropriate actions must be developed to address the issue of operational sustainability of these alternative livelihood activities based on the learnings from the CCRMP.
- vii. Explore opportunities in aquaculture, mariculture and agriculture. With plateauing production from captured fisheries, mariculture can contribute substantially to national and local fish production and nutrition. Smallholder farming has the potential to contribute to household food security and poverty alleviation. To support this, Camiguin should promote pro-smallholder value chains, increase smallholder-friendly financing and investment, and consider risk-mitigation and adaptation strategies. On the other hand, alternative income other than those identified such as fish caging or fish farming can be recommended (e.g., contract growing of Pompano fish), especially for the municipalities of Guinsiliban and Sagay where the sites are ideal for mariculture.

## Specific Recommendations

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### At the regional and provincial level

- a. Support the development of small and medium enterprises, including investment support services such as access to credit financing, and access to resources that will teach best practices in the management of enterprises including sound financial management.
- b. Provide or facilitate the provision of appropriate infrastructures such as roads, and septage treatment facility, capacity-building, and organizational development and systems to support the small-scale fisheries

### At the municipal level

- a. Strengthen the role and functions of the Fisheries and Aquatic Resources Management Councils (FARMC) in the barangays and in the municipality, as defined in the Local Government Code, in planning and implementing policies and programs for the management, conservation, development, and protection of fisheries resources
- b. Enforce complete delineation, delimitation, and zoning of municipal waters; include the mapping and zoning of foreshore areas for protection and production areas to ensure sustainable fisheries
- c. Create a specialized office or department in the municipality dedicated to oversee the implementation of fisheries

management programs and to look after the welfare services of the fishers

- d. Municipal LGU-funded personnel should serve as *Bantay Dagat* and/or incentives should be provided to volunteers (e.g., allowance/honorarium); training in scuba diving and provision of equipment (underwater camera, etc.) should also be evaluated as recommended by the stakeholders.
- e. Issue fishing permits and licenses according to the approved municipal zoning plan
- f. Implement and update municipal fishers and gear registration and color coding scheme for fishing boats
- g. Carry out IEC and social marketing activities on fisheries management
- h. Implement a solid waste disposal system or environmental management system and services or facilities related to general hygiene and sanitation
- i. Introduce sanitation program to improve liquid waste (septic, agricultural) management, as mentioned above (provincial level)
- j. Conduct regular law enforcement operations; maintenance and acquisition of law enforcement operations and assets
- k. Create an adjudication body organized and trained for fisheries management
- l. Organize a monitoring and evaluation team to routinely conduct biophysical, socio-economic, and fish catch monitoring activities for

adaptive fisheries management

- m. Put in place a data management system for fisheries, where data is retrieved and integrated into the management programs
- n. Lead the development of resilient and biodiversity-friendly livelihood and enterprises for municipal fishers
- o. Introduce a “contract growing” scheme for fishers where in mariculture investors will tap the fishers’ labor force to run the facility and earn a standard salary as well as performance bonus. However, this should be managed through a cooperative or association model in order to protect their rights and gain better negotiation power to prevent inequality. It is high time for our fishers to evolve from a “hunting or gathering” profession to a “sea farmer” occupation where they become active participants in fishery production (mariculture) and minimize dependence on fishing efforts (traditional fishing).
- p. Local Chief Executives shall appoint a municipal focal person who will facilitate the processing and application of the legal personality of the enterprises and another focal person to facilitate registration requirements of the Food and Drug Administration (FDA) for food products like bottled sardines.

### At the community level

- a. Participate in citizens’ watch to help guard against the MPA or fisheries management violators

- b. Take part and contribute to the maintenance of the MPAs through activities that will lessen fishing efforts, which will result to lowered fishing pressure on the MPAs, thus allowing natural fishery production to increase.
- c. Set-up fences to demarcate the MPAs to ensure protection and maintain its integrity; the use of bamboo instead of synthetic buoys is also suggested
- d. Use corporate sectors and private social responsibility funds to encourage actions such as “Adopt an MPA” program.
- e. Take an active role in cultivating resilient and biodiversity-friendly livelihood and enterprises in the marine, freshwater, and terrestrial ecosystem. Future projects should ensure buy-in of all target beneficiaries by engaging them in all project stages starting from the identification and design of livelihood projects, project management and implementation, to M&E.

## Alternative Livelihood Strategies

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The establishment of alternative livelihoods in Camiguin has brought about concerted efforts of different government agencies from identification of appropriate livelihood projects, skills training, product development, packaging, and marketing. These support mechanisms in the livelihood development of fishers

in the island have resulted to some positive gains during the initial implementation. However, the effectiveness of the alternative livelihoods could be further developed through a thorough livelihood assessment.

For the sustainability of the alternative livelihood projects introduced by the CCRMP, the following action points and strategies could be adopted by the proponents:

### a. Bottled Sardines Production

- Scheduling of production of the bottled sardines based on when the raw materials are abundant.
- Facilitate the registration of the enterprise
- Facilitate registration in the FDA

### b. Taguines Lagoon Aquasports and Recreation Facility (TLASRF)

- Intensify marketing promotion of the facility
- Continuous capacity-building for service providers
- Link facility to province-wide ecotourism package
- Review the profit sharing scheme of the LGU, fishers organization, and eco-paddlers
- Benchmark with similar facilities outside Camiguin

### c. Squid Processing

- Financial management training for the organization
- Set up a financial management system



- Procure appropriate fishing gears for squid capture
- Research and development of new squid value-added by-product
- Continuous product development and marketing

**d. Coco-sugar Production**

- Source raw materials from other areas
- Review the enterprise plan
- Open membership to other interested coconut farmers
- Set up a financial management system

**e. Cabuan Community Village and Coastal Tour**

- Address the tenure of the project site
- Identify an alternative site for the project

**f. Pasil Reef Eco-tourism Support Services Enterprise**

- Intensify promotions campaign
- Link the enterprise to other tourist spots through province-wide ecotourism package
- Set up a financial management system

**g. Punta and Blue Lagoon Fun Dive, Snorkeling and Paddling Tour**

- Review the MOA on activities between the LGU and the operator
- Conduct monitoring of the enterprise
- Link the enterprise to other tourist spots through a province-wide ecotourism package.



*Bantay dagat* enforcement guide performing his role inside the Mantigue Island MPA, Mahinog, Camiguin



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# Impact Evaluation of the **Camiguin Coastal Resource Management Project (CCRMP)**

## Final Report

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# Acronyms and Abbreviations

<b>AEV</b>	Annual Economic Value
<b>ALS A&amp;E</b>	Alternative Learning System Accreditation and Equivalency Exam
<b>ASEAN</b>	Association of Southeast Asian Nations
<b>AVP</b>	Audio-Visual Presentation
<b>BFARMCs</b>	Barangay Fisheries and Aquatic Resources Management Councils
<b>CCRMP</b>	Camiguin Coastal Resource Management Project
<b>Coop</b>	Cooperative
<b>CPSC</b>	Camiguin Polytechnic State College
<b>CRM</b>	Coastal Resource Management
<b>CTL</b>	Core Trainees/Learners
<b>DA-BFAR</b>	Department of Agriculture – Bureau of Fisheries and Aquatic Resources
<b>DENR</b>	Department of Environment and Natural Resources
<b>DBM</b>	Department of Budget and Management
<b>DID</b>	Difference in Differences
<b>Ed</b>	Education
<b>FARMCs</b>	Fisheries and Aquatic Resources Management Councils
<b>FGD</b>	Focus Group Discussions
<b>FVC</b>	Fish Visual Census
<b>GPS</b>	Global Positioning System
<b>HH</b>	Household
<b>HS</b>	High School
<b>ICI Asia</b>	Integrative Competitive Intelligence Asia
<b>IE</b>	Impact Evaluation
<b>IEC</b>	Information Education Campaign
<b>Kg</b>	Kilogram
<b>KII</b>	Key Informant Interview
<b>LGU</b>	Local Government Unit
<b>LHC</b>	Live Hard Coral
<b>LIT</b>	Line Intercept Transect
<b>MAO</b>	Municipal Agriculture Office

<b>MEAT</b>	Management Effectiveness Assessment Tool
<b>MFAT</b>	New Zealand Ministry of Foreign Affairs and Trade
<b>MLGU</b>	Municipal Local Government Unit
<b>MOVs</b>	Means of Verification
<b>MPAs</b>	Marine Protected Areas
<b>MSN</b>	MPA Support Network
<b>Mun.</b>	Municipality
<b>NEDA</b>	National Economic and Development Authority
<b>NIPAS</b>	National Integrated Protected Areas System
<b>NGO</b>	Non-government Organization
<b>NPV</b>	Net Present Value
<b>PENRO</b>	Provincial Environment and Natural Resources Office
<b>PIT</b>	Point Intercept Transect
<b>OMC</b>	Orient Management Consultants
<b>OTL</b>	Other NEDA RX Trainees/Learners
<b>POs</b>	People's Organizations
<b>TSS</b>	Total Suspended Solid

# Definition of Select Technical Terms

<b>Benthic Life Form Cover</b>	<p>The Benthic Community is made up of organisms that live in and on the bottom of the ocean floor. These organisms are known as benthos. Benthos includes worms, clams, crabs, lobsters, sponges, and other tiny organisms that live in the bottom sediments. Benthos is divided into two groups: the filter feeders and the deposit feeders. Filter feeders, such as clams and quahogs, filter their food by siphoning particles out of the water. Deposit feeders, such as snails and shrimp, ingest or sift through the sediment and consume organic matter within it.<sup>1</sup></p> <p>The term benthic refers to anything associated with or occurring on the bottom of a body of water. The animals and plants that live in or on the bottom are known as the benthos. Benthic habitats can best be defined as bottom environments with distinct physical, geochemical, and biological characteristics. Benthic habitats vary widely depending on their location and depth, and they are often characterized by dominant structural features and biological communities.<sup>2</sup></p>
<b>Biomass</b>	<p>The amount of living matter in a given habitat, expressed either as the weight of organisms per unit area or as the volume of organisms per unit volume of habitat.<sup>3</sup></p> <p>When all of an ecosystem's mass is added up, it is called the biomass of that ecosystem. Biomass refers to the overall mass of an ecosystem. Biomass may be quantified as the total amount of mass in an ecosystem or as an average amount of mass in a given area.<sup>4</sup></p>
<b>Biophysical</b>	<p>The biophysical environment is the biotic and abiotic surrounding of an organism or population, and consequently includes the factors that have an influence on their survival, development, and evolution. The biophysical environment can vary in scale from microscopic to global in extent.<sup>5</sup></p> <p>Understanding how a biophysical environment functions is essential to understanding how human activities may impact that environment. The living and non-living features of an environment in which an organism lives is called the biophysical environment. This is the complex of biotic, climatic, and abiotic factors that act upon an organism and determine its form, survival, and how it adapts over time in the process. Ecosystems are parts of the biosphere and, as a whole, they make up the biosphere. Ecosystems are made up of habitats in which organisms live. Natural ecosystems have seen minimal effects of human activity, while built environments are at the other end of this scale in which there is little biotic activity. Studies of the biophysical environments include atmospheric, marine, or terrestrial and range from microscopic to global.<sup>6</sup></p>

<sup>1</sup> Estuarine Science. (n.d.). Retrieved from <http://omp.gso.uri.edu/ompweb/doe/science/biology/benth2.htm>

<sup>2</sup> Invasive Species Compendium. (2017, September 26). Retrieved from <http://www.cabi.org/isc/datasheet/107788>

<sup>3</sup> Biomass. Dictionary.com Unabridged. Retrieved from <http://www.dictionary.com/browse/biomass>

<sup>4</sup> What Is Biomass? - Definition & Explanation. (n.d.). Retrieved from <http://study.com/academy/lesson/what-is-biomass-definition-lesson-quiz.html>

<sup>5</sup> Biophysical environment. (n.d.). In Wikipedia. Retrieved August 7, 2017, from [https://en.wikipedia.org/wiki/Biophysical\\_environment\\_\(biophysical\)](https://en.wikipedia.org/wiki/Biophysical_environment_(biophysical))

<sup>6</sup> Biophysical Impacts. (n.d.). Retrieved from <http://www.yukonenvirothon.com/biophysical-environments.html>

## **Dissolved Oxygen**

Dissolved oxygen (DO) refers to the concentration of oxygen gas incorporated in water. Oxygen enters water by direct absorption from the atmosphere, which is enhanced by turbulence. Water also absorbs oxygen released by aquatic plants during photosynthesis. Sufficient DO is essential to growth and reproduction of aerobic aquatic life.<sup>7</sup>

Dissolved oxygen is necessary to many forms of life including fish, invertebrates, bacteria, and plants. These organisms use oxygen in respiration, similar to organisms on land. Fish and crustaceans obtain oxygen for respiration through their gills, while plant life and phytoplankton require dissolved oxygen for respiration when there is no light for photosynthesis. The amount of dissolved oxygen needed varies from creature to creature.<sup>8</sup>

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## **Fish Catch or Fisheries Catch Data**

‘Fisheries catch data’ refers to information detailing how much fish is caught per country on a global basis. ‘Catch’ refers to the total amount of whole fish captured. It has a fundamental impact on fish populations and food webs because it represents removal of biomass and individuals from an ecosystem.<sup>9</sup>

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## **Fish Landings**

Fish landings are defined as the catches of marine fish landed in foreign or domestic ports. Marine capture fisheries landings are subject to changes in market demand and prices, as well as the need to rebuild stocks to maximum sustainable yield levels in order to achieve long-term sustainable use of marine resources.<sup>10</sup>

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## **Habitat Monitoring Team**

The habitat monitoring team is the group of people assembled for developing a habitat inventory or monitoring the program at a local planning unit.<sup>11</sup>

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## **Live Coral Cover**

Coral cover is a measure of the proportion of reef surface covered by live stony coral instead of sponges, algae, or other organisms. Stony, reef-building corals are the main contributors to a reef’s three-dimensional framework—the structure that provides critical habitat for many organisms.<sup>12</sup>

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<sup>7</sup> Dissolved Oxygen. (n.d.). Retrieved from [https://www3.epa.gov/caddis/ssr\\_do\\_int.html](https://www3.epa.gov/caddis/ssr_do_int.html)

<sup>8</sup> Fondriest Environmental, Inc. "Dissolved Oxygen." Fundamentals of Environmental Measurements. (2013, November 19). Retrieved from <http://www.fondriest.com/environmental-measurements/parameters/water-quality/dissolved-oxygen/>

<sup>9</sup> Ocean Health Index. (n.d.). Retrieved from <http://www.oceanhealthindex.org/methodology/components/fisheries-catch>

<sup>10</sup> OECD, Fish landings (indicator). (2017). Retrieved from <https://data.oecd.org/fish/fish-landings.htm>

<sup>11</sup> Rowland, M.M.; Vojta, C.D.; tech. eds. 2013. A technical guide for monitoring wildlife habitat. Gen. Tech. Rep. WO-89.

Washington, DC: U.S. Department of Agriculture, Forest Service: 400 p. Retrieved from [https://www.fs.fed.us/research/publications/gtr/gtr\\_wo89/gtr\\_wo89.pdf](https://www.fs.fed.us/research/publications/gtr/gtr_wo89/gtr_wo89.pdf)

<sup>12</sup> Coral Cover. (n.d.). Retrieved from <http://www.healthyreefs.org/cms/coral-cover/>

<b>Macro invertebrates</b>	Benthic (meaning “bottom-dwelling”) macro invertebrates are small aquatic animals and the aquatic larval stages of insects. They include dragonfly and stonefly larvae, snails, worms, and beetles. They lack a backbone, are visible without the aid of a microscope, and are found in and around water bodies during some period of their lives. Benthic macro invertebrates are often found attached to rocks, vegetation, logs, and sticks or burrowed into the bottom sand and sediments. Benthic macro invertebrates are commonly used as indicators of the biological condition of water bodies. <sup>13</sup>
<b>Mangrove Tree’s Basal Area</b>	<p>Basal area is the area of a given section of land that is occupied by the cross-section of tree trunks and stems at the base. The term is used in forest management and forest ecology. In most countries, this is usually a measurement taken at the diameter at breast height (1.3m or 4.5 ft) of a tree above the ground, and includes the complete diameter of every tree, including the bark. Measurements are usually made for a plot, and this is then scaled up for one hectare of land for comparison purposes to examine a forest's productivity and growth rate.<sup>14</sup></p> <p>Basal area is the cross-sectional area of a tree 4.5 feet above ground. The basal area of all trees in a given land area describes the degree to which an area is occupied by trees, and is generally expressed in square feet per acre (ft<sup>2</sup>/acre).<sup>15</sup></p>
<b>Species Composition</b>	Species composition is the identity of all the different organisms that make up a community. This is important when studying how an ecosystem works, and how important different organisms are to an environment. <sup>17</sup>
<b>Transect</b>	<p>A transect is a path along which one counts and records occurrences of the species of study (e.g., plants). It requires an observer to move along a fixed path and to count occurrences along the path and, at the same time (in some procedures), obtain the distance of the object from the path.<sup>18</sup></p> <p>This method of sampling involves only a small section of a large natural area, yet produces an accurate representative sampling of the biotic and abiotic parts of that community.<sup>19</sup></p>

<sup>13</sup> Indicators: Benthic Macroinvertebrates. (n.d.). Retrieved from <https://www.epa.gov/national-aquatic-resource-surveys/indicators-benthic-macroinvertebrates>

<sup>14</sup> Basal Area. In Wikipedia. Retrieved August 7, 2017, from [https://en.wikipedia.org/wiki/Basal\\_area](https://en.wikipedia.org/wiki/Basal_area)

<sup>15</sup> Making and using measurement tools - basal area. (2013). Retrieved from <http://www.extension.umn.edu/environment/trees-woodlands/forest-management-practices-fact-sheet-managing-water-series/making-and-using-measurement-tools-basal-area/>

<sup>17</sup> Species Composition: Definition & Explanation. (n.d.). Retrieved from <https://study.com/academy/lesson/species-composition-definition-lesson-quiz.html>

<sup>18</sup> Transect. In Wikipedia. Retrieved August 7, 2017, from <https://en.wikipedia.org/wiki/Transect>

<sup>19</sup> Retrieved from <http://gen.uga.edu/documents/biodiversity/activities/A%20Line%20Transect.pdf>



**Trophic Level**

In ecology, the trophic level is the position that an organism occupies in a food chain — what it eats, and what eats it.<sup>20</sup>

Any class of organisms that occupy the same position in a food chain, as primary consumers, secondary consumers, and tertiary consumers. Any of the sequential stages in a food chain, occupied by producers at the bottom and in turn by primary, secondary, and tertiary consumers. Decomposers (detritivores) are sometimes considered to occupy their own trophic level.<sup>21</sup>

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**Quadrat Method**

Quadrat sampling is a classic tool for the study of ecology, especially biodiversity. In general, a series of squares (quadrats) of a set size are placed in a habitat of interest, and the species within those quadrats are identified and recorded. Passive quadrat sampling (done without removing the organisms found within the quadrat) can be done either by hand, with researchers carefully sorting through each individual quadrat or, more efficiently, can be done by taking a photograph of the quadrat for future analysis. Abundances of organisms found at the study site can be calculated using the number found per quadrat and the size of the quadrat area. Quadrat methods are time-tested sampling techniques that are best suited for coastal areas where access to a habitat is relatively easy.<sup>22</sup>

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<sup>20</sup> Trophic Level. In Wikipedia. Retrieved August 7, 2017, from [https://en.wikipedia.org/wiki/Trophic\\_level](https://en.wikipedia.org/wiki/Trophic_level)

<sup>21</sup> Trophic Level. (n.d.). Dictionary.com Unabridged. Retrieved December 5, 2017 from Dictionary.com website <http://www.dictionary.com/browse/trophic-level>

<sup>22</sup> Quadrat Sampling. (n.d.). Retrieved from [http://www.coml.org/investigating/observing/quadrat\\_sampling](http://www.coml.org/investigating/observing/quadrat_sampling)

# Executive Summary

This study endeavored to determine the impact of the Camiguin Coastal Resource Management Project (CCRMP) three years since its conclusion in September 2014. The impact evaluation determined whether there has been an increase in productivity and any enhancement in the integrity of the coastal and marine resources, and whether there has been an increase in the income of fisherfolk brought about by the project.

To determine the impact and effects of the CCRMP, the evaluation focused on three interrelated aspects, namely: 1) Outcome 1 on coastal resource management assessment aspect, 2) Outcome 2 on alternative livelihood assessment aspect, and 3) the management aspects. The impact evaluation examined the changes that occurred over time in these three main aspects. The period of interest spans from November 2007, when the project started, and the present, which is about three years after the project conclusion. Furthermore, ICI Asia and OMC applied the National Evaluation Policy Framework (NEDA-DBM Joint Memorandum Circular No. 2015-01): (a) Relevance (i.e., alignment and consistency with national priorities and policies, responsiveness to stakeholder needs, complementation with other programs/projects, and programmatic alternatives); (b) Effectiveness (i.e., achievement of objectives, intended results, and timeliness); (c) Efficiency (i.e., delivery of outputs vis-à-vis inputs and operational alternatives); and (d) Sustainability (i.e., continued profitability of ecotourism livelihood projects and complementary services in the declared Marine Protected Areas).

Based on available resources, time, and documents, the impact study was able to evaluate sample areas and select enrolled and not-enrolled sample respondents who are representative of the project sites. The enrolled respondents were fishers and stakeholders directly involved in the implementation of the CCRMP.

Of the challenges encountered during the evaluation, two were quite considerable: 1) availability of baseline information, and 2) information recall challenge. Another constraint was that the study had limited available information and could not fully capture the environmental variation in the years before and after the establishment of the Marine Protected Areas (MPA), and this may obscure the trends resulting from protection.

The CCRMP has made important contributions to biodiversity conservation in the island-province of Camiguin by helping local government units (LGUs) improve the development of their MPAs. The most important lesson gained by this evaluation is that the institutional changes and broader policies introduced by the CCRMP were translated

into better biodiversity conservation outcomes. Overall reef, fish, sea grass, and mangrove health has improved, as indicated by the significant increase in live coral cover, increase in fish density and fish size inside MPAs, and increased basal area of mangroves over baseline. The goal of the CCRMP to improve the overall water quality was achieved, as evidenced by the increase in water clarity and improvement in selected water parameters over baseline. The stakeholders regarded the development of coastal resource management plans as highly relevant in institutionalizing Coastal Resource Management towards increasing natural productivity and enhancing the integrity of the coastal and marine resources of Camiguin. Following the economic valuation of Philippine coral reefs by Samonte-Tan and Armedilla (UNEP, 2004), ICI Asia x OMC considered a 20-year estimated economic value of the entire Camiguin near shore coastal habitat. The return on investment of the CCRMP Phase 1 is at 22 percent.

Reliance on fishing as the main source of income is still evident in Camiguin; 77.69 percent of respondents considered fishing as their primary source of income. The “spillover” effect of the MPAs on the target and contiguous municipalities benefitted the fishers of Camiguin, whose main source of income is fishing. The current monthly income of fishers from fish catch increased by at least Php 4,000, which is equivalent to about Php1,500 increase in inflation-adjusted real income.

On the other hand, the establishment of alternative livelihoods as a strategy to reduce reliance on fish catch and enable the coastal resources to regenerate was deemed positive by the stakeholders. The effectiveness of established enterprises differed from the fishery/agriculture-based and ecotourism-based livelihoods. For the processing projects, vulnerability to shocks, trends, and seasonality was not anticipated; difficulty in sourcing raw materials was a major challenge, coupled with the low entrepreneurial mindset-readiness of some fishers who seemed to return to fishing after taking a step to product processing livelihood projects. On the other hand, ecotourism-based enterprises were observed to provide alternative sources of income. Fishers engaged in the provision of tourism-related services had significantly reduced their reliance on fish catch, as in the case of snorkeling guides in Catarman and pump boat operators in Mahinog. The sustainability of these enterprises will be maintained with the support from the LGUs, other government agencies, non-government organizations (NGOs), and the private sector. Considering the total revenue and users’ fees generated in past ten years vis-à-vis the CCRMP Phase 2 project cost, the return on investment was considerably high.

MPAs have biological and ecological effects both inside and outside their boundaries. Inside MPAs, there were indications of more and bigger animals of some species, more reproductive output (potentially sustaining fish populations), preservation of genetic diversity, protection of habitats, increases in biodiversity, and reduction of bycatch and discards. Outside MPAs, the potential positive effects observed include spillover and dispersal of fish eggs and larvae from within MPAs. MPAs contribute to higher fishery production by making this spillover available to catch and by an increase in reproductive output, contributing to recruitment to the fishery.

MPAs are a popular management measure for biodiversity conservation and fisheries management objectives. Majority of the respondents perceived the establishment of the MPAs to be beneficial in the long run since they observed an increase in the volume of fish.

MPAs should be complemented with other management options to produce better effects. There is a need to consider broader ecosystem-based management and expand the conventional fisheries management framework to explicitly consider a wider range of aspects of the fishery and its ecosystem, including its human dimensions.

Key lessons and recommendations include, among others:

To become effective for conservation and to meet desired fisheries objectives, MPAs should be complemented by the LGUs, DA-BFAR, and DENR, where applicable, with several other fishery management tools and options such as but not limited to coastal zoning, coastal law enforcement, coastal and marine pollution management, closed season, reduction in the number of fishers, and rotational or periodically harvested area closures. In establishing new MPAs, the new focus of the LGUs, DA-BFAR, and DENR should be on quality and towards a network of MPAs.

Vital to the long-term sustainability of the MPA is the social buy-in and compliance of stakeholders, individually and/or as a group. They should take part in the entire decision-making processes, be able to actively participate, and be allowed to influence the process.

Development of alternative or supplementary livelihood activities, as suggested by locals, should be undertaken ahead of the design process and timeline in the establishment of MPAs. In the short-run, these will be an important incentive for participation, especially for stakeholders who will be directly affected and economically disrupted from fishing grounds that they had traditionally been using.

Strengthen implementation of existing policies of the LGUs, DA-BFAR, and DENR through the introduction and implementation of real-time monitoring and evaluation activities using technology.

# Introduction

## Establishment of the Camiguin Coastal Resource Management Project (CCRMP)

The impetus of the CCRMP was the immediate need to utilize natural resources in a sustainable manner and to hasten social and economic equity in the process. Residents in the island-province of Camiguin were heavily reliant on fishing and farming, but the island was threatened by worsening social, economic, and environmental conditions. Decline in the overall economic well-being of the residents was evident due to low fish catch, increase in prices of prime commodities, emerging impact of appliances, and the lack of livelihood opportunities.

Two core coastal resource management (CRM) problems were identified in Camiguin: 1) the declining integrity of coastal and marine ecosystems and natural productivity, and 2) the acute poverty and widening social inequity. The immediate causes of the underlying core problems included: 1) the weak institutional capability for CRM, 2) the destruction and degradation of limited near-shore and coastal habitats, 3) the presence of natural hazards, 4) the absence of conscious resource enhancement and conservation strategies, 5) the unharmonized or conflicting development activities, 6) the population pressures, and 7) the inequitable access to and control of productive resources among residents, especially women and youth. Since CRM is a dynamic field, additional training, ongoing education, and internship were necessary. These problems also became the additional driving force to create the CCRMP and to address the complex issues of sustainable management of coastal resources and provision of sustainable economic activities in Camiguin Province.

## CCRMP Intervention

The CCRMP began in 2007 with the aim of institutionalizing CRM as a basic service of the LGUs, thereby increasing natural productivity and enhancing the integrity of the coastal and marine resources in the island-province. The project was funded by the New Zealand Agency for International Development (NZAID), which commissioned the CCRMP Phase I management services to Tetra Tech EM Inc. The CCRMP interventions were implemented in coordination with the LGUs of the province and spearheaded by the Department of Environment and Natural Resources (DENR), NZAID, and other national government agencies.

The CCRMP envisioned the increased productivity and enhanced integrity of coastal and marine resources, while providing sustainable economic activities towards an improved quality of life among the fisherfolk communities in Camiguin Island. The Project reported that sustainable mechanisms were in place for the management of the 31

MPAs established in Camiguin, and CRM awareness increased through different approaches conducted by the implementers. In the enterprise development component, alternative and conservation-based enterprises were implemented, including marine-based value-adding livelihood activities such as seaweed farming and ecotourism, to name a few.

The objective of Phase I was the institutionalization of an integrated coastal resource management system at the barangay, municipal, and provincial levels in five years. Another objective was to strengthen the capacities of Camiguin coastal communities, LGUs, and other institutions involved to protect and manage the municipal waters and the limited productive near-shore ecosystems and their resources.

Republic Act 8550 or the Philippine Fisheries Code of 1998 and the municipal ordinances support the implementation of MPAs in target coastal marine zones in Camiguin Province. Moreover, other coastal law enforcement had complementary fishery-related laws which include illegal quarrying, municipal ordinance on the establishment of a marine sanctuary, barangay ordinance on fish sanctuary, coastal clean-up activities, barangay ordinance on illegal fishing activities and illegal quarrying, and waste segregation and disposal.

Since the establishment of the MPAs, most barangays have been very receptive to the Project. There has been cooperation between the project implementers and the local stakeholders, particularly the people's organizations (POs) and the municipal and barangay governments. Regulations have been set to protect the MPAs, and patrolling and monitoring activities were regularly conducted. Community acceptance has been documented through public consultations and the passing of barangay resolutions.

On the other hand, the objective of Phase II was the development of the business/private sector, LGUs, and the entrepreneurial capacities of local communities in sustainable and marine resource-based economic enterprises.

In recent years, the coastal regions also became the focus of tourism development, as the beauty of seascapes, the diversity of various habitats in the marine environment, as well as diverse and colorful marine life prompted tourists to make Camiguin a priority destination. The need to protect and sustain the integrity and productivity of these resources was therefore one of the important strategies for ensuring food production, livelihood, and improvements in rural income.

Establishment of MPAs had proven beneficial to fisherfolks and had a direct impact on their income. At the end of Phase I, a total of 26% of the appropriate near shore coastal habitats were established as MPAs. Taken as a whole, there was increase, on average, of 10.89 percent in the densities of target species inside the MPAs, but this was offset by a 13.70 percent decrease in the areas surveyed immediately outside these. Interventions provided by the Camiguin LGUs for the fisherfolk included but were not limited to livelihood projects such as livestock production,



seaweed farming, artificial coral reef, banana chip making, fish shelter, mangrove reforestation, clam nursery, marine sanctuary, fish sanctuary, and fishing boat.

Economic benefits listed include alternative livelihood from fish catch and increased income of beneficiaries. These respond to some of the major goals of the management plan.

Although not highlighted in the management plan, the participation of women in CRM was observed. Fisherfolk organizations had both male and female members. The existence of women's organizations might have had an effect on women's direct/indirect participation in CRM.

# Background on the Evaluation Strategy

## Objectives of the Study

The impact evaluation study of the CCRMP is intended to:

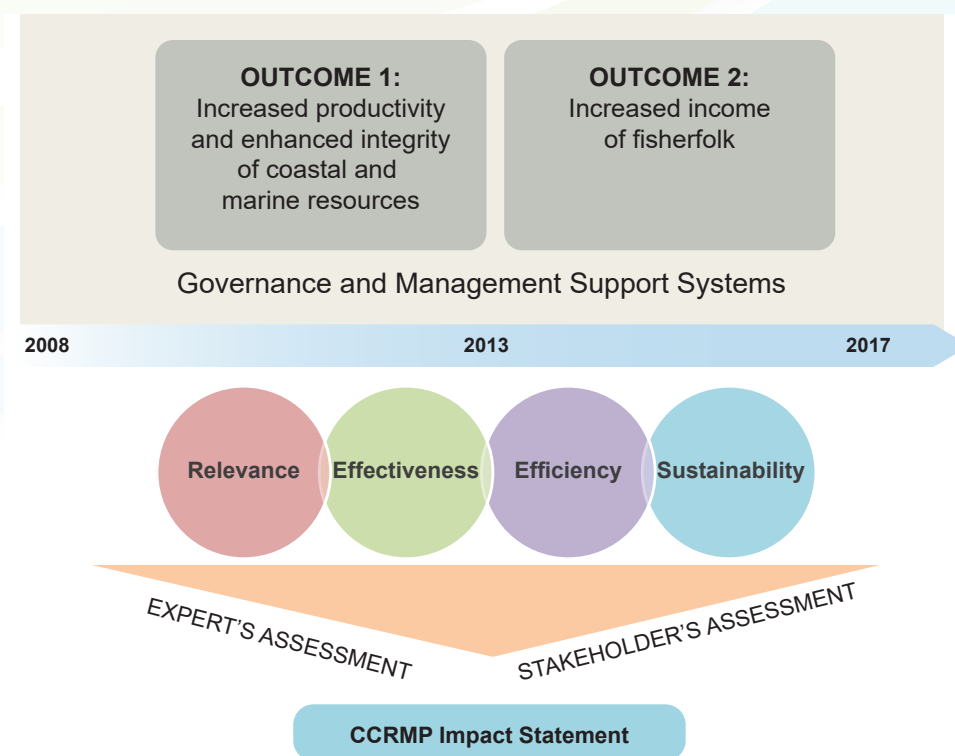
- a. Evaluate achievements of the development objectives of the project
- b. Evaluate the benefits and gains (both planned and unplanned) and impact (intended and unintended) of the project to the beneficiaries
- c. Evaluate the effectiveness of the sustainability mechanism that was put in place
- d. Identify and validate innovative and effective approaches and strategies, including lessons learned in the implementation of the project that could be adopted in the design or implementation of similar or related interventions in the future

## Evaluation Framework

To determine the impact and effects of the CCRMP, the evaluation focused on three interrelated aspects, namely: 1) Outcome 1 on coastal resource management assessment aspect, 2) Outcome 2 on alternative livelihood assessment aspect, and 3) the management aspects. As provided in the Terms of Reference, the evaluation will examine Outcome 1, to determine increased productivity and enhanced integrity of coastal and marine resources, and Outcome 2, to determine increased income of fisherfolk brought about by the CCRMP. The result of these examinations will provide us with the extent of the CCRMP's impact and effect on the coastal ecosystem and on the economic condition of the fishers reached by the project.

Furthermore, the impact evaluation will examine the changes that happened over time in the three main aspects. The period of interest spans from 2008, when the project started, and the present, which is about three years after the conclusion of the project.

ICI Asia and OMC will apply the National Evaluation Policy Framework (*NEDA-DBM Joint Memorandum Circular No. 2015-01*): (a) **Relevance** (i.e., alignment and consistency with national priorities and policies, responsiveness to stakeholder needs, complementation with other programs/projects, and programmatic alternatives); (b) **Effectiveness** (i.e., achievement of objectives, intended results, and timeliness); (c) **Efficiency** (i.e., delivery of outputs vis-à-vis inputs and operational alternatives); and (d) **Sustainability** (i.e., continued profitability of ecotourism livelihood projects and complementary services in the declared MPAs).



## Key Evaluation Questions

In seeking to determine the impact of the CCRMP, ICI Asia and OMC will focus on the following key evaluation questions:

1. Has the project addressed the emerging issues and concerns of the artisanal fishers in Camiguin—poverty, depleted marine resources, etc.— and to what extent? (*Relevance*)
2. Has the project contributed to increasing the incomes of the artisanal fishers in Camiguin and to improving its coastal ecosystem/marine resources? How and to what extent? To what extent can changes be attributed to the CCRMP? (*Effectiveness*)
3. Have resources (including human, logistical, and funds) been optimally used in the conduct of the project activities and in the delivery of the expected outcomes? (*Efficiency*)
4. How will the gains and benefits brought about by the project be sustained on a longer term? What mechanisms for sustaining them have been installed? Were the stakeholders' capacities built towards greater sustainability? (*Sustainability*)
5. What lessons have been learned from the project in terms of:
  - a. The enabling and disabling factors that facilitated or prevented the CCRMP from addressing the needs of the artisanal fishers and the need to improve the condition of the coastal ecosystem/marine resources. (*Relevance*)
  - b. The unintended outcomes (positive and negative) that the CCRMP produced. (*Effectiveness*)
  - c. The factors that contributed to or hindered the attainment of the intended outcomes. (*Efficiency*)
  - d. The effectivity of the project modality/strategy in the attainment of intended outcomes. (*Effectiveness*)

- e. The things that will be done differently and the things that will be pursued even more. (Efficiency)
- f. The future prospects for broadening and scaling up the project in other areas with a similar situation/context. (Sustainability)

## Scope and Limitation of the Study

Based on available resources, time, and documents to study, the impact study was able to evaluate sample areas and select enrolled and not-enrolled sample respondents who are representative of the project sites. The enrolled respondents were fishers and stakeholders who were directly involved in the implementation of the CCRMP. The enrolled and not-enrolled respondents were identified from the barangays covered by the CCRMP. In addition, the study looked into the management and governance aspects of MPAs, among key result areas of the project. Using the standardized MPA Management Effectiveness Assessment Tool (MPA MEAT), this study was able to evaluate trends and changes in management indicators and processes that helped promote and achieve the MPAs' effectiveness.

Of the challenges encountered during the evaluation, two were quite considerable: 1) availability of baseline information, and 2) information recall challenge. The absence or lack of baseline, monitoring, and end line data limited the extent to which the project was able to determine the impact of the CCRMP in certain components and/or areas. Program details including baseline and monitoring results were culled from information and project documents that were made available to ICI Asia x OMC Team by NEDA ROX, DENR PENRO, CPSC, and the LGUs.

In addition, key informants had difficulty recalling sequences of events and time periods. The CCRMP Phase 1 started in 2008, which is about ten years ago, while Phase 2 ended in 2014, or about three years ago. Some key participants of the project, especially those who worked in the LGU and government institutions, were no longer around, due to transfer to a new assignment or migration. However, the impact study exhausted all possible means to search for the right key informants who could provide information and program implementation details.

Another constraint was that the study had limited available information and could not fully capture the environmental variation in the years before and after the establishment of the MPAs, and this may obscure the trends resulting from protection. For example, variable recruitment in fishery due to change in climatic and oceanic conditions may affect, either positively or negatively, the apparent recovery of a stock after closure of an area.

## Evaluation Methodologies

To implement the CCRMP Impact Evaluation, ICI Asia x OMC designed the evaluation methodology composed of five major components, namely: a) document review, b) participatory impact evaluation on Outcome 1, c) participatory impact evaluation on Outcome 2, d) data analysis and report preparations, and e) presentation of findings to key stakeholders.

### DOCUMENTS REVIEW

Literature review of available baseline and existing project data

Review of the latest reports of LGUs, and/or local organizations, cooperatives, and academic institutions

### PARTICIPATORY IE ON OUTCOME 1

Various qualitative approaches (with some quantitative elements) will be employed to determine the changes in productivity and enhanced integrity of coastal and marine resources—specific to fish catch, seawater quality, live coral cover, fish density and abundance, seagrass cover, and basal area of mangroves.

Participation of local community members, especially fisherfolk, will be employed; active involvement in the assessment activities will be ensured.

### PARTICIPATORY IE ON OUTCOME 2

A mix of quantitative and qualitative research approaches will be used to measure the increase in the fishers' income.

Subjects of the study are the fishermen of Camiguin: a sample each from those enrolled to the CCRMP and those who are not.

A short questionnaire survey will be rolled out; FGDs will be conducted among enrolled fishermen, while non-enrollees will be KII respondents.

### Subjects of the Study

Program beneficiaries: individual and community level

Heads of the organizations/cooperatives within the community

LGU and government agencies' officials

### Geographical Scope

Representative sample areas of the 31 Marine Protected Areas located in five municipalities in the Province of Camiguin

# Data Presentation and Discussion

## Results of CCRMP in terms of Outcome 1 - Increased Productivity and Enhanced Integrity of the Coastal and Marine Resources

### Participatory Impact Evaluation on Outcome 1

#### 1. Sites evaluated (map)



**Figure 1.** Sampling sites: MPAs/sea grass/mangrove/water quality<sup>25</sup>

(1-mpa) Magsaysay "Mantigue Island", San Roque, Mahinog  
(2-mpa) Medano "White Island", Agoho, Mambajao  
(3-mpa) Pasil Reef Marine Sanctuary  
"Sunken Cemetery", Bonbon, Catarman  
(4-mpa) Alangilan MPA, Alangilan, Sagay  
(5-mpa) Liong MPA, Liong, Guinsiliban  
(6-sg) Mantigue Island, Mahinog  
(7-sg) Brgy. San Roque, Mahinog

(8-sg) Brgy. South Poblacion, Guinsiliban  
(9-sg) Brgy. North Poblacion, Guinsiliban  
(10-sg) Brgy. Magting, Mambajao  
(11-sg) White Island, Agoho, Mambajao  
(12-mg) Brgy. Benoni, Mahinog  
(13-mg) Brgy. North Poblacion, Guinsiliban  
(14-mg) Brgy. Magting, Mambajao

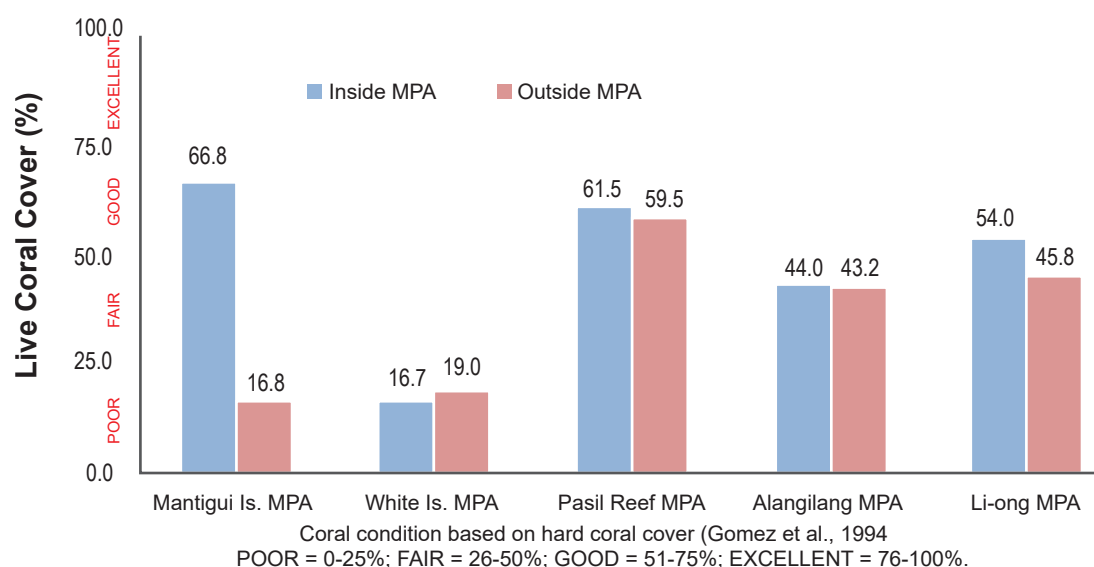
<sup>25</sup> MPA = Marine Protected Area; sg = seagrass; mg = mangrove



## 2. Coral cover status and trends

All five MPAs registered “fair” to “good” coral cover with a mean cover of 45.26 percent inside the MPA. Remarkably, the area outside the MPAs registered around the same coral cover, with a mean “fair” condition at 37 percent (Figure 2). Of the five sites, inside Mantigue Island MPA registered the highest coral cover of 67 percent, far from the poor coral condition outside MPA at 17 percent. Two sample t-tests registered the difference at  $p=0.004$  and confidence level at 95 percent, suggesting the unique benthic profile of the inside reef from outside (Table 1). Inside the MPA, the back reef is composed of extensive sea grass beds that transition to a distinctive contiguous reef wall. Meanwhile, the back reef outside MPA gently slopes towards the wall, generally composed of patches of sea grass beds, sand, pavement, and rubble.

White Island MPA registered poor coral condition both inside and outside MPA, as the area is a naturally sandy flat where corals are patchily distributed. Net difference registered at -2.3, although the difference is not significant at  $p=0.50$ . The remaining MPAs in Pasil Reef, Alangilang, and Li-ong indicated “fair” to “good” coral cover (44-62 percent) both inside and outside MPA, although the difference between stations indicated no significant difference at 0.43, 0.47, and 0.24, respectively.



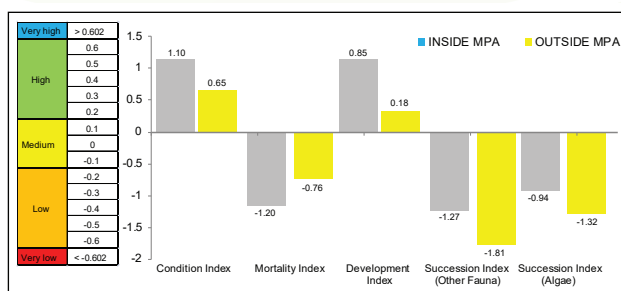
**Figure 2.** Live coral cover status in percentage

**Table 1.** MPAs location, ordinance, areas net difference, and p value inside and outside the MPAs

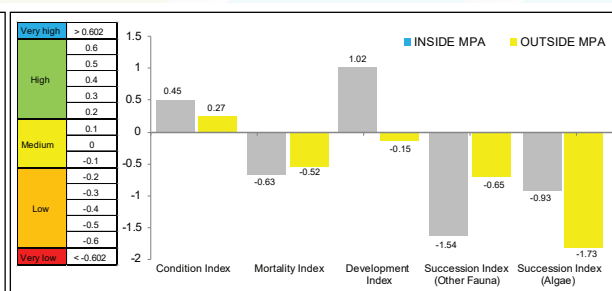
MPA	Inside MPA (%)	Outside MPA (%)	Net difference (%)	p value
<b>1. Magsaysay “Mantigue Island” MPA</b> Location: Brgy. San Roque, Mahinog Legal instrument: M.O. # 054 Series of 2000 Area: 8.81 hectares	66.8	16.8	50	0.004
<b>2. Medano “White Island” MPA</b> Location: Brgy. Agoho, Mambajao Legal instrument: M. O. # 03, s 2000 Area: 19.67 hectares	16.7	19	-2.3	0.50
<b>3. Pasil Reef “Sunken Cemetery” MPA</b> Location: Brgy. Bonbon, Catarman Legal instrument: M. O. # 3 Series of 2004 Area: 27.262 hectares	61.5	59.5	2.0	0.43
<b>4. Alangilan MPA</b> Location: Brgy. Alangilan, Sagay Legal instrument: B.R. # 01 Series of 2010 Area: 6.41 hectares	44.0	43.2	1.2	0.47
<b>5. Liong MPA</b> Location: Brgy. Liong, Guinsiliban Legal instrument: M.O. #63 Series of 2010 Area: 4.21 hectares	54.0	45.8	8.2	0.24

Condition index inside Mantigue, Liong, and Pasil Reef in both inside and outside stations indicated a high proportion of live coral cover relative to the cover of dead corals, algae, and other fauna (Figure 3). This means that even the adjacent reef outside the MPA has a high proportion of live coral cover, perhaps indicative of the MPA having gained from the protection and management afforded within/inside. The high development index inside as well as outside the MPAs also signifies the diversity and abundance of living components present that are highly contributing to the development and improvement of the reef. This means all MPAs still have “space” to expand, improve, and develop. Expanding the protected core zone to include the buffer zone can help increase biodiversity and productive capacity of the MPA. Expansion means providing more “space” for corals to grow and more “room” for depleted fish stocks to bounce back and spill over into fishing grounds. Expanding the MPA will also contribute to the reef resiliency by providing higher buffering capacity of the reef to maintain its rich genetic pool, especially during climate-induced calamities.

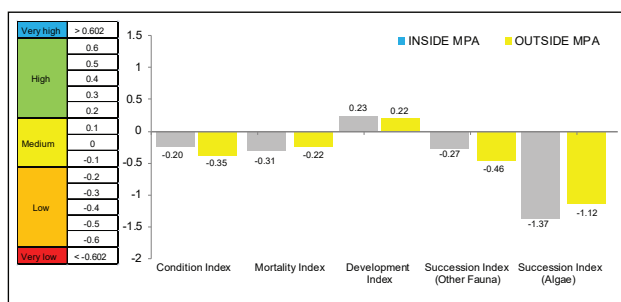
The “very low” mortality index and succession rate for algae and other fauna in all sites also indicate a less likely chance for coral-algal phase shift (McManus et al., 2000) to occur and/or the succession of other fauna to negatively invade the reef.



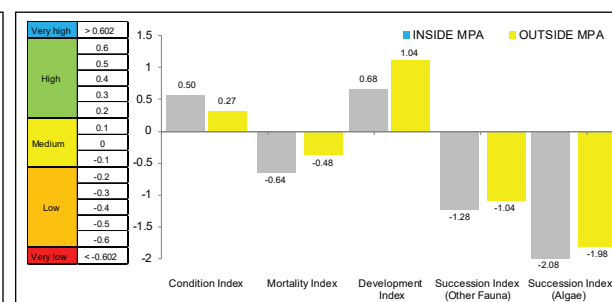
Magsaysay "Mantigue Island" MPA



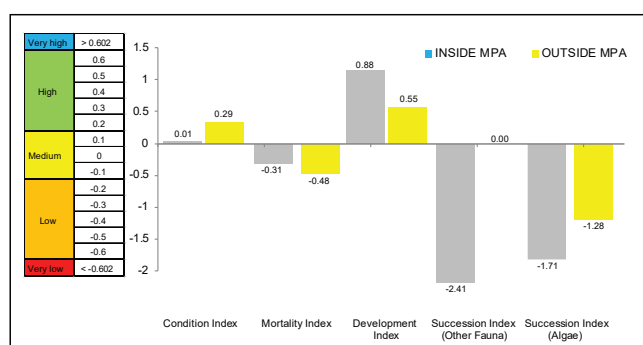
Liong MPA



Medano "White Island" MPA



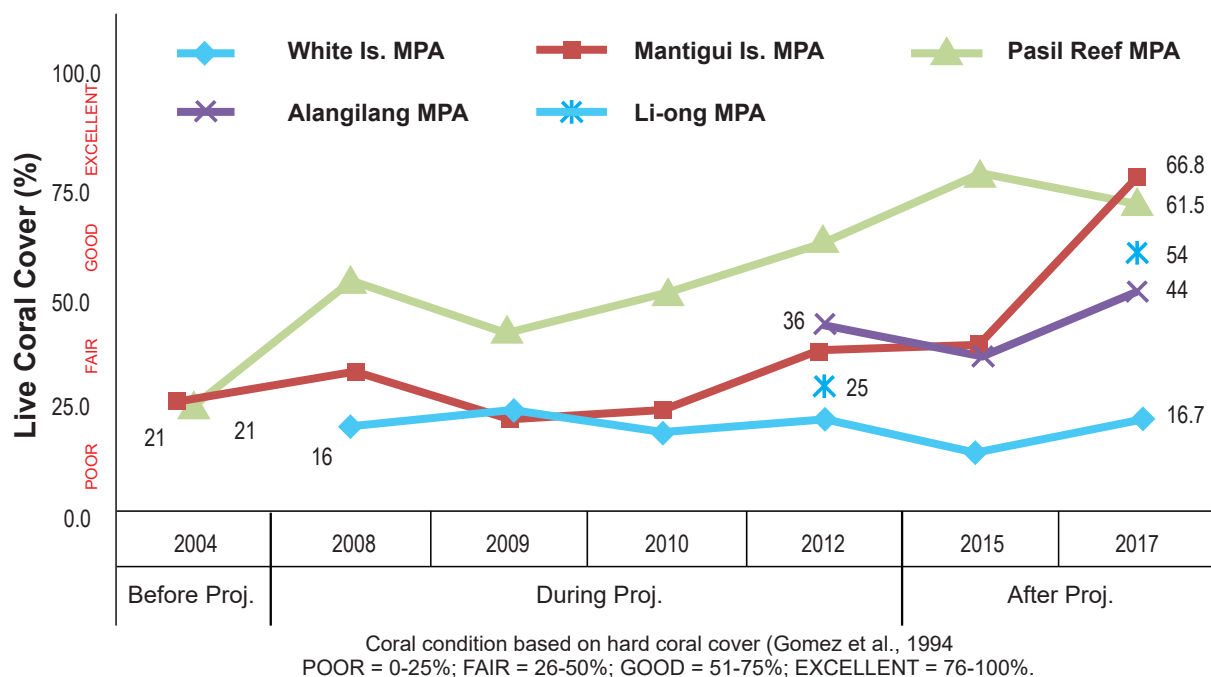
Pasil Reef "Sunken Cemetery" MPA



Alangilan MPA

**Figure 3.** Reef condition index in the five MPA sites

Historical trends in coral cover vary greatly in all of the five MPAs evaluated, although results generally show positive increasing trends. The Mantigue Island MPA, for instance, showed a significant increase of 39 percent from the 2008 baseline against the 2017 data, the highest net change among sites evaluated (Figure 4). Significant increases were also noted at 16 percent ( $p=0.0001$ ) and 8 percent ( $p=0.004$ ) in Pasil Reef and Alangilan MPA, respectively, indicating that protection measures installed have translated into better conservation outcomes for the reef (Table 2).



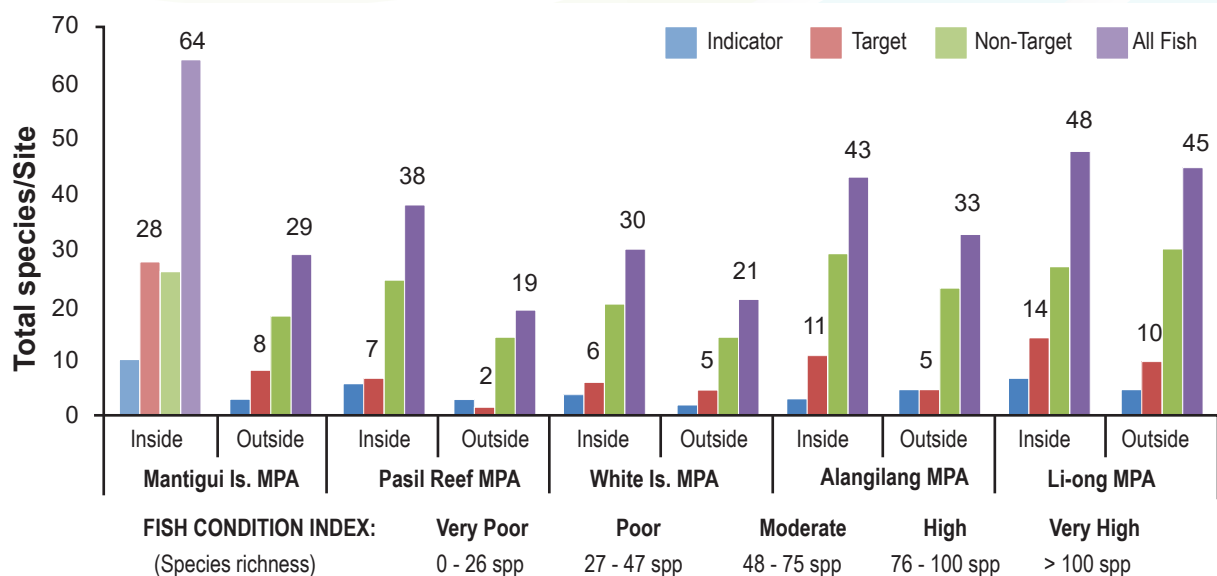
**Figure 4.** Live coral trends in the five MPAs from 2004 to 2017

**Table 2.** MPAs location, ordinance, areas net difference, and p value before and after the CCRMP

MPA	Timeline	Before coral cover (%)	After coral cover (%)	Net change (%)	p value
1. Magsaysay "Mantigue Island" MPA	2004-2017	28	67	39	.001
2. Medano "White Island" MPA	2008-2017	16	17	1	0.14
3. Pasil Reef "Sunken Cemetery" MPA	2004-2017	46	62	16	0.0001
4. Alangilan MPA	2012-2017	36	44	8	.004
5. Liong MPA	2012, 2017	25	53	28	0.11

### 3. Fish diversity (species richness), density, and biomass status and trends

A mean of 45 reef fish species were recorded during the latest evaluation, compared to only 29 species outside the MPA. However, only very few of these were target species considered commercially important and favored targets of local fishermen, with a mean of 13 target species inside the MPA, compared to only five species outside (Figure 5). The low record means fish populations have dwindled and/or high fishing pressure existed within the areas. Of the five sites, Mantigue Island MPA registered the highest species diversity, with 64 species inside and 29 species outside, followed by Liong MPA with 49 species inside and 45 outside, and Alangilan MPA with 43 species inside and 33 outside.



**Figure 5.** Species richness inside and outside the five MPAs evaluated

In terms of species density, Mantigue Island MPA showed the highest density with  $1178 \pm 197$  fish/1,000m<sup>2</sup> inside and  $661 \pm 124$  fish/1,000m<sup>2</sup> outside the MPA. Liong MPA tallied next, with  $872 \pm 132$  fish/1,000m<sup>2</sup> inside and  $615 \pm 56$  fish/1,000m<sup>2</sup> outside the MPA, contributed mainly by damselfish (Pomacentridae) and fairy basslets (Anthiinae). Significant difference, however, was recorded, especially in Mantigue Island MPA and Alangilan MPA, at  $p=0.07$  and  $p=0.01$  respectively (Table 3). These two MPAs actually exhibited more complex and diverse coral life forms over the first three MPAs. As it is, many reef fish can confine, shoal, and school themselves in the reef crevices formed from the complex coral life form systems. The “moderate” density count inside Mantigue Island MPA was contributed by the target species of school of jacks (*Caranx sexfasciatus*) and rudderfish (*Kyphosus* sp.). Meanwhile, fish biomass registered highest in Mantigui Island MPA, with 401 mt/km<sup>2</sup> contributed mostly by the large-sized body of jacks (*Caranx sexfasciatus*) and rudderfish (*Kyphosus* sp.), where each species measured approximately 40-50cm in length.

**Table 3.** Species richness, density, and biomass inside and outside the five MPAs

MPA	Diversity (Species richness/Site)				Density (Ave. count/1,000m <sup>2</sup> )			Biomass (Ave. MT/Km <sup>2</sup> )		
	In	Out	Net difference	p value	In	Out	p value	In	Out	p value
1. Magsaysay "Mantigue Island" MPA	64	29	35	0.02	1178±197	661±124	0.07	401±202	10±2.3	0.09
2. Medano "White Island" MPA	30	21	9	0.02	585±50	450±103	0.15	6.1±2	3±1.3	0.02
3. Pasil Reef "Sunken Cemetery" MPA	38	19	19	0.11	865±96	479±16	0.10	12±3.2	5.3±1.2	0.05
4. Alangilan MPA	43	33	10	0.08	288±43	333±20	0.01	11±2	4±1	0.04
5. Liong MPA	48	45	3	0.90	872±132	615±56	0.11	16±6	8.3±2	0.02

However, MPAs can contribute to higher fishery production only by their effect on the amount of fishery resources available to fishers outside the MPA. Outside MPAs, however, showed an inconsistent trend with very poor turnout of target fish species and declining results. This means that high extraction outside the MPAs gets in the way for recruitment and spillover to fully take effect and for stock to bounce back and recover. The increasing number of fishers competing for fish beyond MPA boundaries was among the primary reasons cited for the decline.

Historical trend before and after the project signifies that, overall, the reef's fish health and productivity in terms of diversity, density, and biomass have significantly improved, especially in MPAs established during the program, specifically in Alangilan and Liong (Table 4). Medano White Island MPA, meanwhile, registered a negative net difference owing to its location in a natural sand bar. The reef is patchily distributed within fine coarse sandy bottomed with coral rubble that limits corals from growing, hence the difficulty for fishes to thrive and establish a home base and nursing ground here.



**Table 4.** Species richness, density, and biomass of the five MPAs before and after the CCRMP

MPA	Diversity (Species richness/Site)				Density (Ave. count/1,000m <sup>2</sup> )			Biomass (Ave. MT/Km <sup>2</sup> )		
	Before	After	Net difference	P value	Before	After	P value	Before	After	P value
1. Magsaysay "Mantigue Island" MPA	46	64	18	0.0001	787	1178±197	0.01	21	401±202	0.03
2. Medano "White Island" MPA	49	30	-19	0.003	799	585±50	0.01	6	6.1±2	0.006
3. Pasil Reef "Sunken Cemetery" MPA	41	38	-3	0.0001	666	865±96	0.01	2	12±3.2	0.003
4. Alangilan MPA	11	43	32	0.04	60	288±43	0.07	1	11±2	0.16
5. Liong MPA	14	48	24	ID	88	872±132	ID	ND	16±6	ID

Note: ID – insufficient data, ND- No data

#### 4. Sea grass cover status and trends

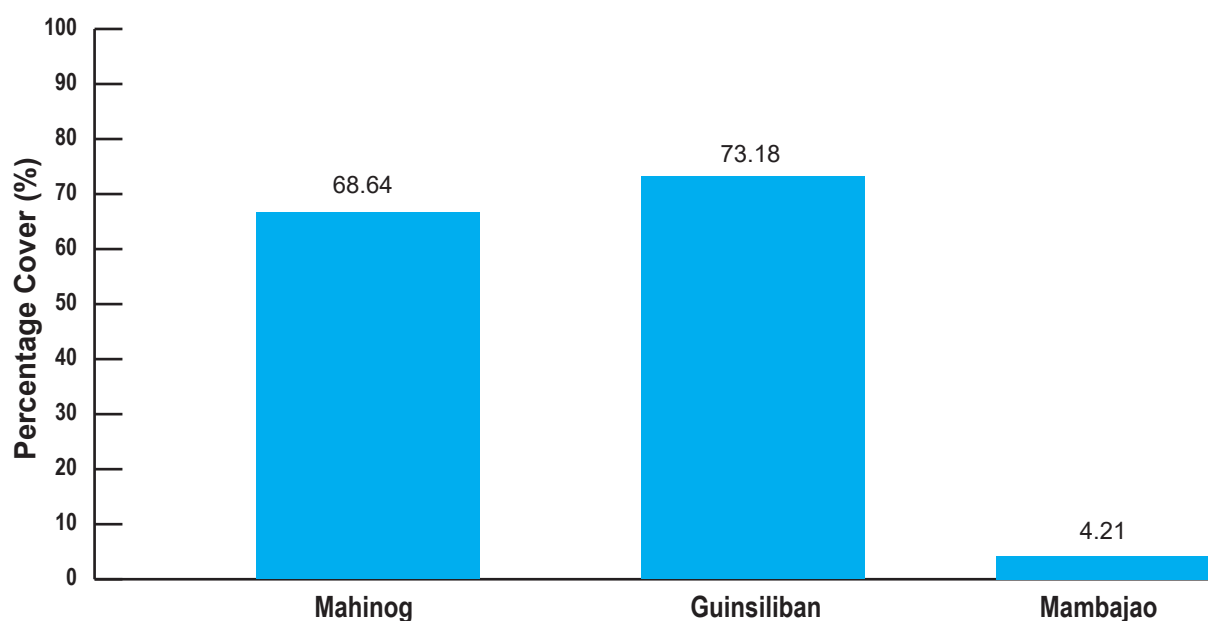
Sea grass beds are often disregarded and are the least conserved, as most rehabilitation and restoration projects focus on mangroves and the coral reefs. With the growing human population and the need for coastal developments, sea grass communities are also heavily exploited.

Three of five municipalities were surveyed for the sea grass community structure, namely: Mahinog, Guinsiliban, and Mambajao.

**Table 5.** Sea grass density, canopy height, and percentage cover of algae and epiphytes in Mahinog, Guinsiliban, and Mambajao

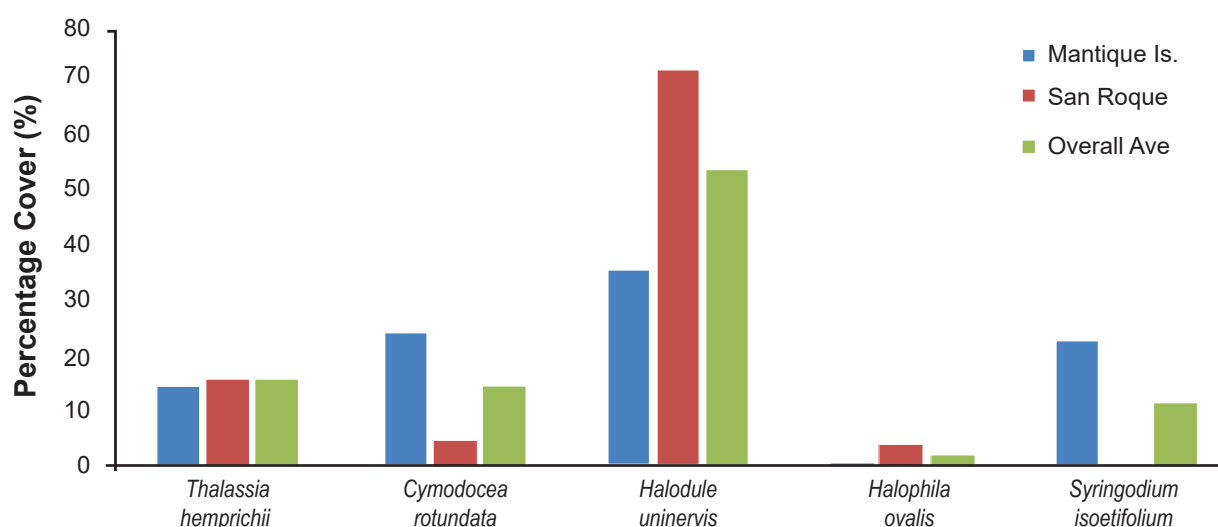
Site	Density Shoots/m <sup>2</sup>	Canopy Height (cm)	% Algae Cover	% Epiphyte Cover	Sea grass Species
Mahinog	4,659	8.63	13.61	51.50	Thalassia hemprichii Cymodocea rotundata Halodule uninervis Halophila ovalis Halophila decipiens Syringodium isoetifolium Enhalus acoroides (2008)
Guinsiliban	6,564	9.36	0.91	18.18	Thalassia hemprichii Cymodocea rotundata Halodule pinifolia Enhalus acoroides (2008)
Mambajao	nd	nd	nd	nd	Halodule uninervis Halophila ovalis

Table 5 also shows the percentage cover of macro-algae and epiphytes, which appears highest in Mahinog. About 80 percent cover of epiphytes was observed in Brgy. San Roque. Epiphytes have ecological advantages in shallower areas as these promote better growth rate for seagrasses, even as they prevent these from desiccating (Aho and Beck, 2011). They also contribute to the high productivity of the sea grass habitat (Meñez et al., 1983). However, the presence of massive cover of epiphytes in the area can also indicate stress, signifying that the water is highly nutrient-enriched due to human produce and activities, prompting epiphytes to bloom.

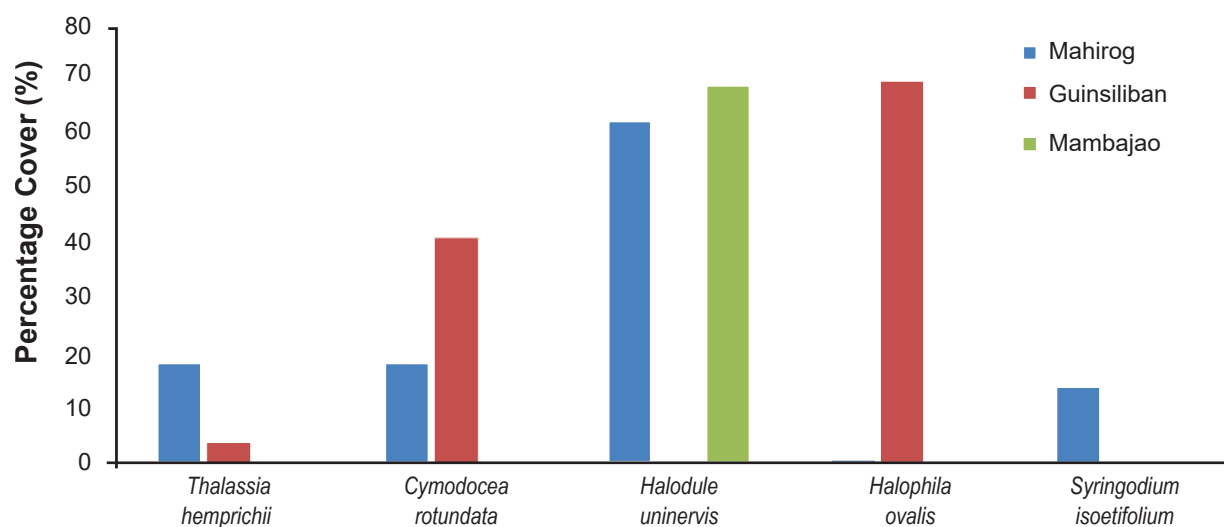


**Figure 6.** Percentage of sea grass cover in Mahinog, Guinsiliban, and Mambajao

Both Mahinog and Guinsiliban areas showed vast and good sea grass cover of 68.64 percent and 73.18 percent, respectively, with a dense population of 4,659 shoots/m<sup>2</sup> and 6,564 shoots/m<sup>2</sup>, respectively (Figure 6). Mambajao, on the other hand, had only 4.21 percent. The most dominant sea grass species found in all areas were from the genus *Halodule*, with an average canopy height of 9cm. *Halodule uninervis* obtained good cover of over 70 percent in Brgy. San Roque in Mahinog and in Brgy. Magting, Mambajao, while *Halodule pinifolia* were abundant in South Poblacion of Guinsiliban with 60.5 percent (Figures 7 and 8). *Thalassia hemprichii* (Sickle or Turtle Grass) and *Cymodocea rotundata* (Smooth Ribbon Grass) were also common in areas in Mahinog and Guinsiliban.

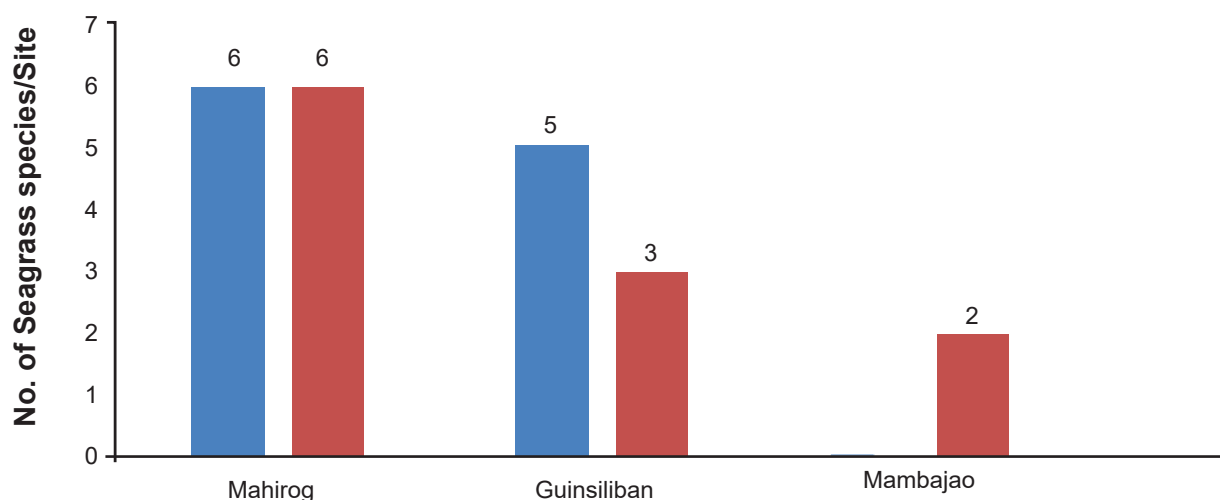


**Figure 7.** Sea grass composition of the two sites assessed in Mahinog



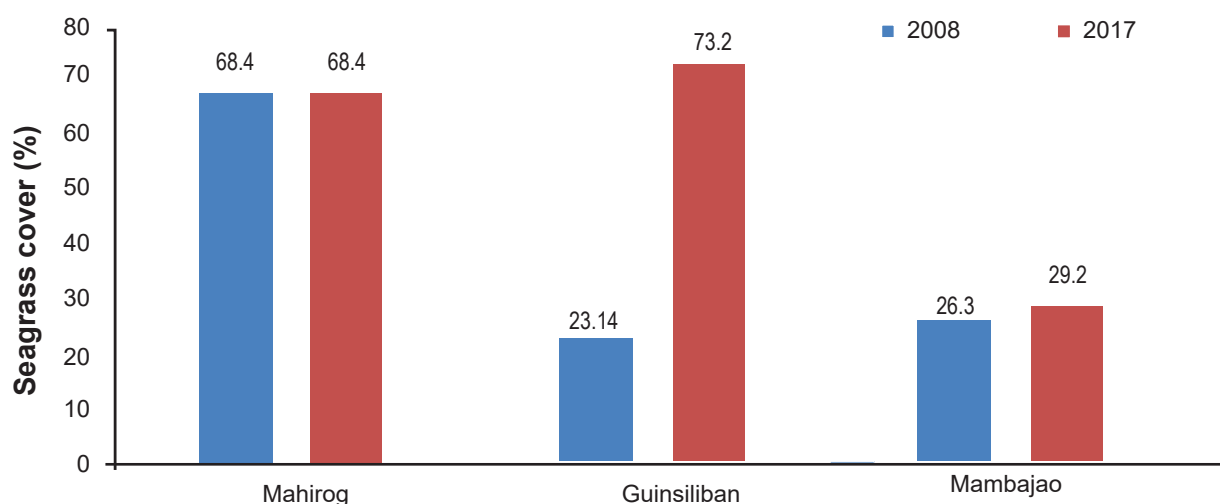
**Figure 8.** Sea grass composition in Mahinog, Guinsiliban, and Mambajao

Comparison of data between the 2008 baseline and the latest assessment showed the same number of sea grass species in Mahinog, specifically in Mantigui Island (Figure 9). The latest survey also noted a rare flowering seagrass, *Syringodium isoetifolium*, in the area. The robust sea grass species of *Enhalus acoroides* was recorded in the 2008 survey conducted by the CCRMP; however, this was not seen in the recent survey. Of the five species recorded in Guinsiliban (North Poblacion) in 2008, only three species were recorded in the latest assessment. On the other hand, in Magting, Mambajao, the team was able to record two species of sea grass in the latest assessment, over none in the baseline. These were the minute and fine species of *Halophila ovalis* and *Halodule spp*, not the *Thalassiaspp* and *Enhaus acoroides* initially accounted by locals during the survey scoping. The difference in results may be attributed to the limited information the team was working on, as to location of sampling sites, coverage of baseline assessment, and technical reports turned over.



**Figure 9.** Sea grass species richness in the five selected MPAs, showing 2008 and 2017 data

In terms of sea grass cover, Mantigui Island had a similar percentage cover of 68 percent under good condition between the two periods of evaluation. This was the most diverse sea grass community recorded, with “Narrow leaf sea grass” *Halodule uninervis* as the most dominant species. A rare flowering “Noodle sea grass” *Syringodium isotifolium* was also observed, making the site unique for scientific studies. The sea grass community also transitions slowly with the coral reef area, making the site a productive biological “ecotones” where two ecosystems meet. Guinsiliban (North Poblacion) recorded an increase, from 23 percent cover in 2008 to 73 percent cover in 2017. Finally, Magting in Mambajao had a 26 percent cover in 2008, with a similar amount of cover in 2017, at 29 percent (Figure 10). The “Narrow leaf sea grass” *Halodule uninervis* was the most dominant species, interspersed with “Spoon grass” *Halophila ovalis* in the latest assessment, which is a staple of Dugong. Green sea turtle *Chelonia mydas* was also observed during the survey.



**Figure 10.** Sea grass cover in the five selected MPAs, showing 2008 and 2017 data

Overall observations showed no major changes in the sea grass communities which have remained intact over time. Good sea grass condition remained intact in Mantigui Island as well as in Guinsiliban (North Poblacion). Since 2008, no major developments occurred in known seagrass areas in the province.

## 5. Mangrove community structure status and trends

Mangroves are important habitats that serve as breeding and nursery ground to various organisms. They also protect the coast from strong waves and surges. In fact, mangrove protection and rehabilitation are key components in mitigating climate change. They absorb up to five times more carbon than the tropical forest. From the 1970s to 1990s, a decline of mangrove forest cover was recorded, due to conversion to fish ponds and coastal developments.

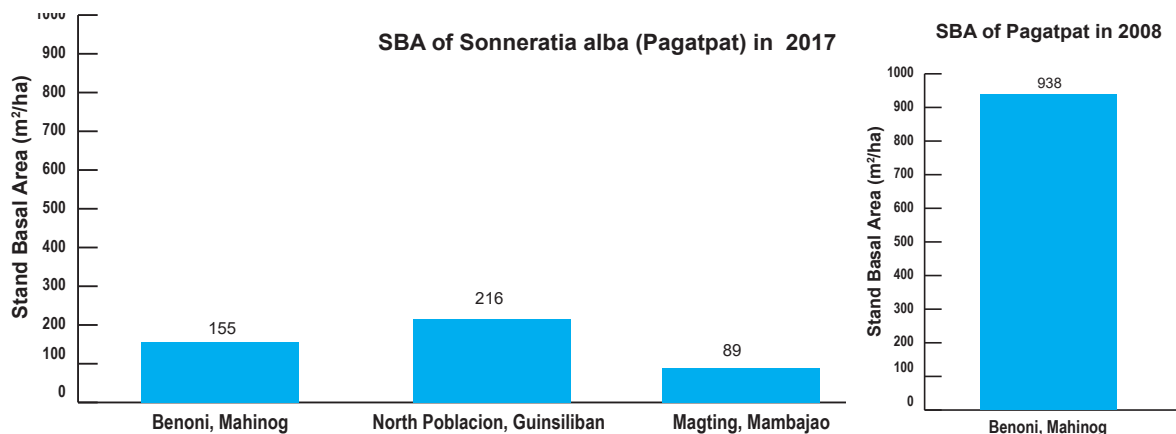
Of the 35 mangrove species in the Philippines, nine species were observed in the province of Camiguin, as enumerated in Table 6. Both Mahinog and Guinsiliban recorded six mangroves species, Mambajao two, and Sagay the single *Nypa fruticans*. Based on the recent survey, the island-province is surrounded by the most resilient mangrove species

*Sonneratia alba*, locally called “pagatpat”. In Benoni, Mahinog, century-old and large trunk diameter *Sonneratia* spp. dominated the area. The site is actually a “Katungan” Park, declared protected but at the same time promoted by the LGU as an ecotourism site. In Guinsiliban, aside from pagatpat dominating North Poblacion, sampling plots also recorded species of *Rhizophora mucronata* seedlings and saplings of *Bruguiera* species. A few stands of pagatpat were also recorded in Mahinog, Mambajao.

**Table 6.** Mangrove species in the Province of Camiguin

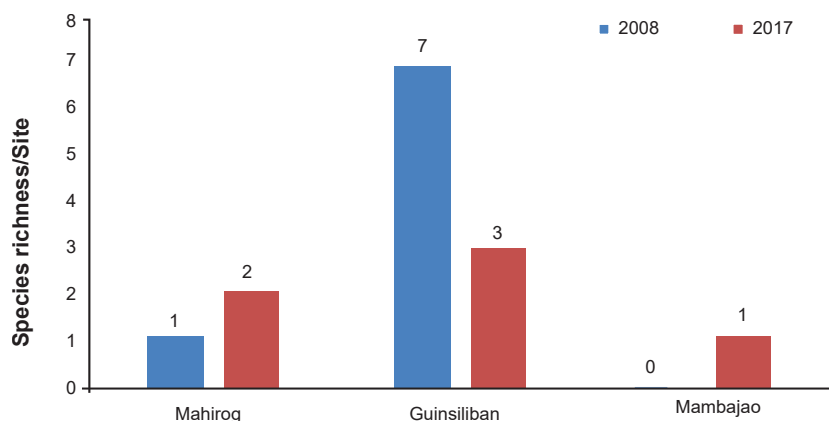
Mangrove species	Local name	Mahinog	Sagay	Guinsiliban	Catarman	Mambajao
<i>Nypa fruticans</i>	Nipa		a		no data	ab
<i>Avicennia</i> sp.	Bungalon; Piapi	a		ab		
<i>Excoecaria agallocha</i>	Lipata; Buta-buta	ab				
<i>Pemphis acidula</i>	Bantigi			ab		
<i>Xylocarpus</i> sp.	Tabigi	ab				
<i>Bruguiera</i> sp.	Pototan			a		
<i>Rhizophora apiculata</i>	Bakhaw-laki	ab		ab		
<i>Rhizophora mucronata</i>	Bakhaw-bayi	ab		a		
<i>Sonneratia alba</i>	Pagatpat	a		a		a

Figures 11a and 11b show the Stand Basal Area (SBA) of *Sonneratia alba* or pagatpat, which was the only mature tree species recorded in the three different sampling sites. SBA value appeared high in all three sites, which means all mangrove trees accounted were the large and old growth ones. The maximum girth recorded was 470cm or 4.7m. In Figure 12, higher SBA was recorded by the CCRMP team, with 938m<sup>2</sup>/ha SBA of pagatpat in Benoni, Mahinog in 2008. About 54 plots were deployed accounting 92 *Sonneratia alba* trees at the time of the baseline assessment. Figure 12 also compares the mangrove species richness in Mahinog, Guinsiliban, and Mambajao before and after CCRMP. The difference between baseline and the recent assessment in terms of survey design, extent of sampling sites, and coverage prevents the impact evaluation from determining if there is a decreasing or increasing trend of mangrove trees population since 2008. Nevertheless, accounts from locals revealed mangrove cover has remained intact in the province, with no significant disturbance except for a few mangrove patches in Benoni that were affected by the on-going land expansion and reclamation. In fact, LGUs have availed of support from the DENR’s National Greening Program for mangrove reforestation and rehabilitation in their areas. However, the drawback is that one mangrove species, *Rhizophora* spp., was favored over local species that grow naturally and are more suitable to the area. In South Poblacion, Guinsiliban, the species *Rhizophora* spp. was planted in inappropriate areas such as sea grass beds, despite poor survival. In North Poblacion, the species was planted along old growth *Sonneratia alba* as foreground beyond the lower intertidal region.



**Figure 11a.** SBA of Sonneratia alba (pagatpat) in 2017

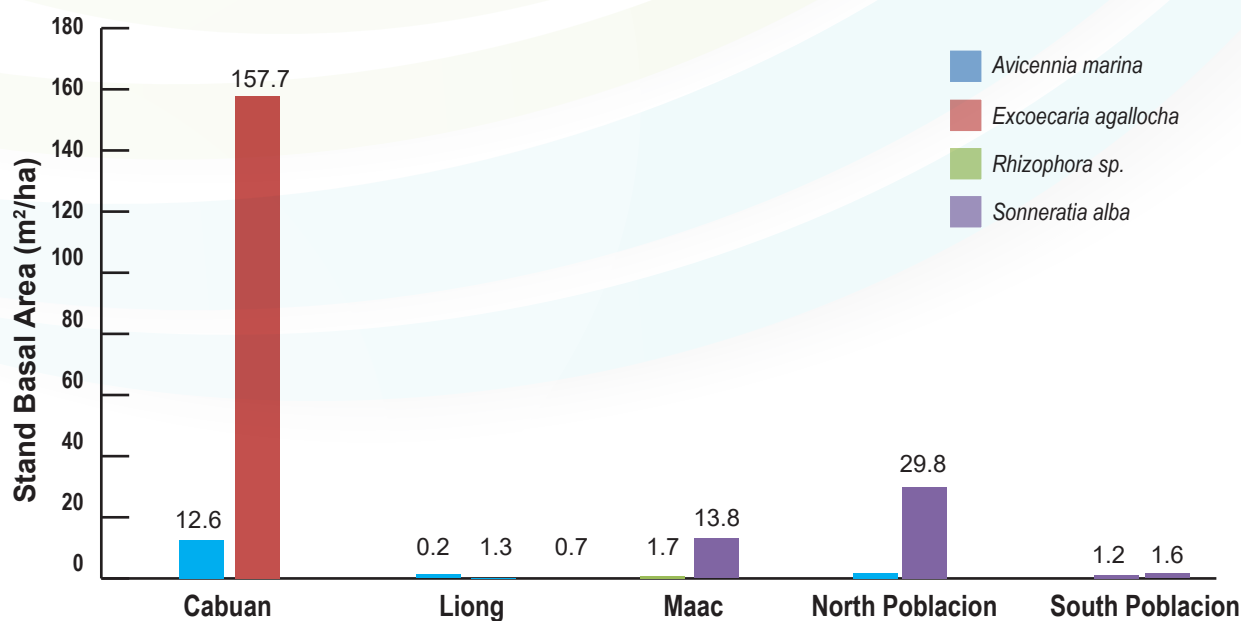
**Figure 11b.** SBA of Sonneratia alba (pagatpat) in 2008



**Figure 12.** Mangrove species richness in Mahinog, Guinsiliban, and Mambajao

Figure 13 shows the 2008 assessment results of the five barangays in Guinsiliban. Remarkably, higher SBA of *Excoecaria agallocha* or *lipata*/butabuta was observed, which garnered 157.7m²/ha in Brgy. Cabuan. Of the five barangays, only Brgy. Cabuan has the *Avicennia marina* species, with an SBA of 12.6m²/ha. Meanwhile, North Poblacion claimed higher *Sonneratia alba*, with 29.8m²/ha. In the recent survey, the team's rapid assessment focused primarily on a denser population of pagatpat at the coast of North Poblacion. The rest of the barangays in Guinsiliban have sparse cover of mangroves at the coast.





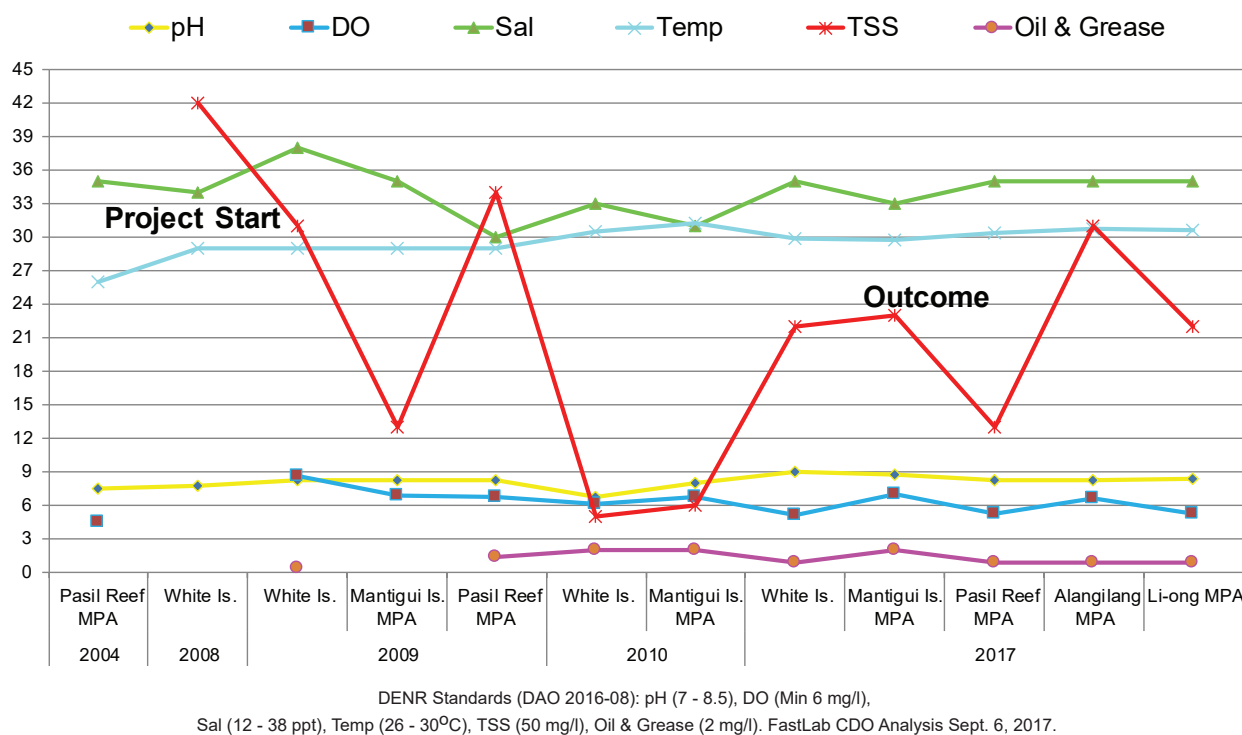
**Figure 13.** Four mangrove species in Guinsiliban: *Avicennia marina* (piapi/bungalon), *Excoecaria agallocha* (lipata/butabuta), *Rhizophora sp.* (bakhaw), and *Sonneratia alba* (pagatpat)

## 6. Water quality

Water quality was measured by collecting water samples in-situ in the same sampling stations established by DENR-Camiguin representing inside and outside MPA. Using portable probes, physico-chemical parameters such as temperature, dissolved oxygen (DO), acidity (pH), and salinity were measured, while water samples for grease/oil, total suspended solid (TSS), and fecal coliform were brought to Fast Lab Cagayan de Oro for laboratory analysis on September 6, 2017.

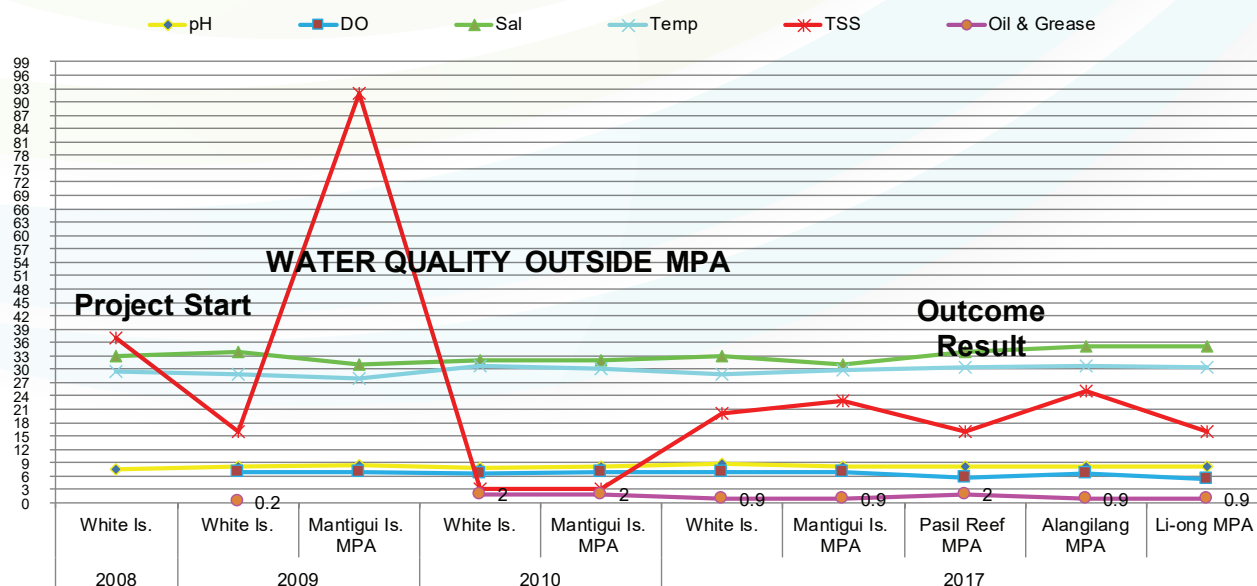
Data collected were then compared to a range of guidelines that DENR sets for SB waters (for recreation and aquaculture) and water quality monitoring. Recent conditions were also compared to previous results and established patterns over time.

Water quality tests of the sample inside MPA revealed that TSS has dramatically decreased since 2009, especially in Mantigui Island, White Island, and Pasil Reef, owing to guidelines and regulations on waste and sewage. High concentrations of suspended solids can cause many problems for stream health and aquatic life. The remarkable decrease of the population in Mantigui Island due to re-settlement to the mainland as regulated by the LGU, coincides with the decreasing TSS trend. The decrease in 2010 values in White Island Reef at 5mg/l from the 42mg/l in 2004 is also notable, including Pasil Reef which also showed a drop from 34mg/l in 2009 to 13mg/l in 2017. Overall, TSS is now way below the maximum limit of 50mg/l set by DENR standards in all sites. Meanwhile, oil and grease for all sites and time periods have been within the limits of 2mg/l. This is also true for other physico-chemical parameters like pH, DO, salinity, and temperature (Figure 14).



**Figure 14.** Water quality inside MPA for pH, DO, salinity, temperature, TSS, and oil and grease

Values for all water parameters outside the MPAs also showed a pattern similar to those inside the MPAs. The latest assessment revealed all values were within the standard limit set by DENR. TSS in the 2008 baseline for Mantigui Island recorded 92mg/l, way beyond the 50mg/l limit, probably attributed to the disturbance from docking and swimming activities of residents in the island. As the LGU started to regulate the number of people living in the island, TSS dropped to 3mg/l in 2010 and has not increased since then. For oil and grease, all sites were within the 0.9mg/l values beyond the 2mg/l limit, except for Pasil Reef which registered exactly 2mg/l. Oil and grease contaminants may be contributed by boat oil spillage and from non-point sources in the mainland. It would be prudent to craft policies regarding boat maintenance, either for tourism or fishing purposes, to mitigate future contamination (Figure 15).



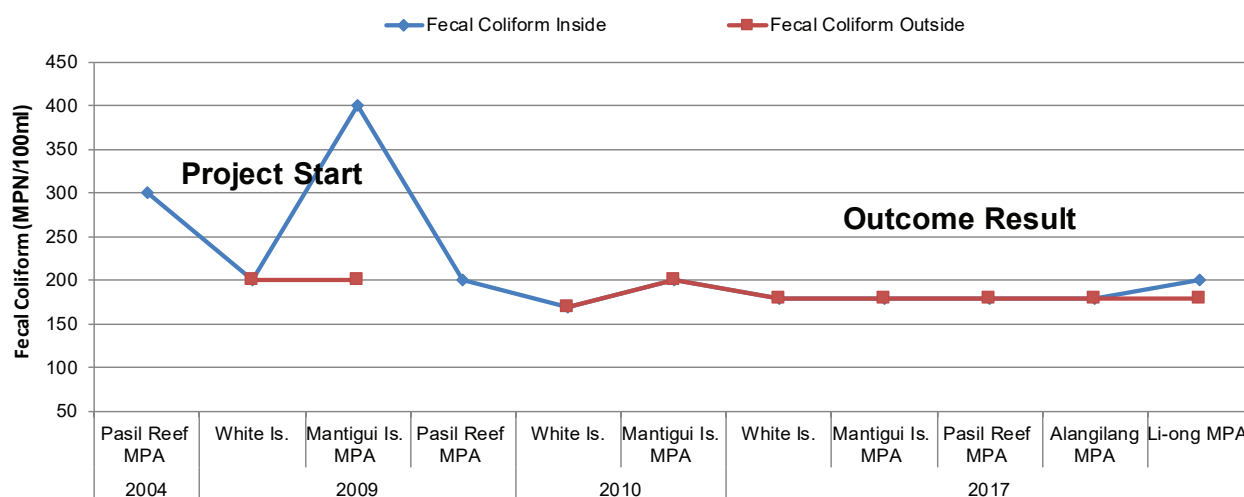
DENR Standards (DAO 2016-08): pH (7 - 8.5), DO (Min 6 mg/l), Sal (12 - 38 ppt), Temp (26 - 30°C), TSS (50 mg/l), Oil & Grease (2 mg/l). FastLab CDO Analysis Sept. 6, 2017.

**Figure 15.** Water quality outside MPA for pH, DO, salinity, temperature, TSS, and oil and grease

Historical trends of fecal coliform inside the MPA indicated that Pasil Reef in 2004 had the highest level of 300 MPN/100ml, way beyond the 200 MPN/100ml allowable limits set by DENR (Figure 16). This could be due to sub-standard septic tank design among residents in the coastal area, leading to seepage of effluents to the marine environment. It could also be that some local flooding at the time of the monitoring carried a lot of contaminated water. In 2009, however, there was a decrease to 200 MPN/100ml level (inside and outside) in Pasil Reef, but Mantigui Island had an increase of fecal coliform at 400 MPN/100ml, or double the DENR limits. This was probably due to the high-density population living in the island and the absence of or sub-standard toilet facilities in the area that caused seepage of fecal matter to the marine environment because of the porous property of sandy substrate. In 2010, this changed drastically to 200 MPN/ml or within the DENR standards. This coincided with the start of relocation of island residents to the mainland, hence the decrease in fecal coliform level. In 2017, majority of fecal coliform values were below 200 MPN/100ml (< 180 MPN). The exception is Li-ong MPA with 200; the site is near a residential area that could have contributed to the present fecal coliform value.

Meantime, the recent DENR Administrative Order (DAO) 2016-08 (Water Quality Guidelines and General Effluent Standards of 2016) changed the allowable fecal coliform limits from the previous 200 MPN/100ml to a more stringent 100 MPN/100ml. This makes it more challenging for stakeholders to maintain or bring down their current level, as shown in the recent water quality monitoring in the five sites. However, as a caveat on the September 6, 2017 data for fecal coliform, the Fast Laboratories CDO (sample analyzer) made an error on dilution factor for the samples, thus rendering it above the allowable 100 MPN/100ml limits for SB waters. Fast Lab CDO acknowledged its error (see its official statement in Annex N) and made a recalculation, this time rendering all samples as “passed” for SB waters fit for recreational

waters. Nevertheless, Camiguin Province and its five municipalities will have to implement more active interventions in their sanitation program to further mitigate future fecal coliform values at much lower levels, especially since the island-province is positioning itself as the top tourism destination in Northern Mindanao.



DENR Standards: Fecal coliform = 100MPN/100ml (DAO 2016-08). FastLab CDO Analysis Sept. 6, 2017.

Figure 16. Fecal coliform assessment inside and outside the MPA

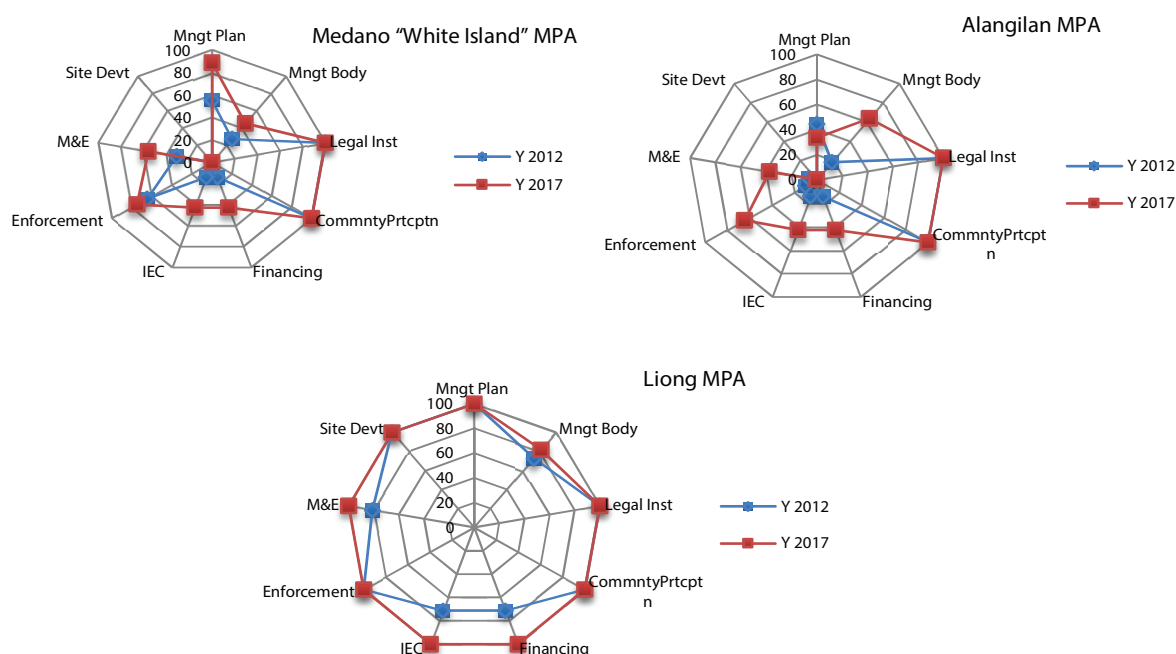
## 7. Management effectiveness

Using the MPA Management Effectiveness Assessment Tool (MPA MEAT), this impact study assessed how well MPAs were being managed. The tool primarily helped evaluate the extent to which management systems and processes were being implemented and determine MPAs' compliance to certain threshold governance processes. The 42-item rating scale is divided according to nine management focus indicators, namely: management plan, management body, legal instrument, community participation, financing, IEC, enforcement, monitoring and evaluation, and site development. The latest study conducted by DENR-X Camiguin reported an increase in management levels in the three MPAs, at least one level higher than the previous management evaluation in 2012 (Table 7). The increase in management level corresponded to an increase in scores of the different management focus (Figure 17). However, the evaluator believes the results of the latest evaluation do not provide adequate representation of the MPAs' current management status.

**Table 7.** MPA MEAT scores

MPA	MPA MEAT 2012		MPA MEAT 2017		Net increase							
	Level 1	Level 2	Level 3	Level 4	Total		Level 1	Level 2	Level 3	Level 4	Total	%
1. Medano "White Island" MPA	24	14	21	16	75 Level 3		27	15	19	21	82 Level 3	7 (8.5%)
2. Alangilan MPA	25	13	0	0	38 Level 1		26	12	12	7	57 Level 2	19 (33.3%)
3. Liong MPA	17	0	0	0	17 Level 1		21	15	5	0	41 Level 1	24 (58.5%)

(Source: DENR Camiguin, 2017)



**Figure 17.** Results of the 2012 and 2017 MPA MEAT evaluation of the MPAs in Medano White Island, Alangilan, and Liong

**Management Plan.** Clear and appropriate objectives supported by a management plan and adequate resources are characteristics of an effective MPA management. A management plan usually details the goals, targets, and indicators of the MPA within a prescribed period.

The CCRMP helped facilitate the drafting of MPA management plans of the five MPAs under study, although the plans appeared to be a “shelf document” as no one from the LGUs/MPA management committee refer to these in the day-to-day management process of the MPAs. At the minimum, MPA plans under MEAT’s Level 1 threshold should be adopted and legitimized by the LGU, but no such resolution or ordinance was available among those turned over for review; no one was even aware of it as a requirement.

**Management Body.** The ordinances for the establishment and management of MPAs provided for the creation of a MPA management committee, the sole policy-making and permit-granting body of the MPA. Among the members of the committee are officials, representatives, and

staff of the LGU/CRMO/MAO, national line agencies (e.g., DA-BFAR), barangay officials/council/BFARMC, POs, and sector representatives.

**Legal instrument.** Municipal ordinances declaring the establishment of the MPAs have been approved in each of the municipalities, except for Alangilan MPA which is covered by a Barangay Ordinance (Table 8). Alangilan MPA in Guinsiliban and Liong MPA in Sagay were among the 15 MPAs established under the CCRMP Phase II. They were primarily established in support of tourism and conservation. The primary consideration for the design of future MPAs, especially in the context of communities struggling with food security, should reflect a balance between the needs of conservation, and the realities of sustainable exploitation and socio-economic requirements.

**Table 8.** MPAs' location, legal instrument, and area

MPA	Location	Legal instrument	Area (hectares)
1. Magsaysay "Mantigue Island" MPA	Brgy. San Roque, Mahinog	M.O. # 054 Series of 2000	8.81
2. Medano "White Island" MPA	Brgy. Agoho, Mambajao	M. O. # 03, s 2000	19.67
3. Pasil Reef "Sunken Cemetery" MPA	Brgy. Bonbon, Catarman	M.O. # 3 Series of 2004	27.262
4. Alangilan MPA	Brgy. Alangilan, Sagay	B.R. # 01 Series of 2010	6.41
5. Liong MPA	Brgy. Liong, Guinsiliban	M.O. #63 Series of 2010	4.21

Several newly established MPAs under the CCRMP were small (less than 10 hectares), limited to coral reefs, and by design did not consider the movement and home range of migrating or highly mobile species. Literatures on coral reef fishes define home range as the area or space that fishes utilize as their territory during certain periods and over particular life stages. For example, the school of *Caranx sexfasciatus* or the big-eye trevally found in the eight-hectare Mantigue Island MPA are known species that usually aggregate in their adult stage at the foreshore edges of the reefs, but spend their juvenile stage in estuaries or areas where rivers meet the seas. This ontogenetic shift has a linear distance of three kilometers, while other long-term movements of the fish can reach up to 200 kilometers. The recommended ideal protected size in terms of linear distance for protecting or conserving this fish is six kilometers (Green et al., 2013).

In establishing new MPAs, a new focus should be on quality and towards a network of MPAs. The design principle will be to develop networks of MPAs, a collection of individual MPAs that cover a variety of habitat types ecologically connected through home range movement of larvae, juveniles, and adult key species. This means MPAs should be established to protect not just coral reefs but also sea grass beds, mangroves, or other habitats, as these are interconnected and interdependent, providing benefits to each other. The connection ensures that MPAs can facilitate species recovery and replenishment after disturbance.

**Financing and site development.** Funds appropriated for MPA management provided by the LGU are under the CRM budget. In general, the funds are inadequate to support management operations. There



seems to be a disconnect, where plans were not being supported by any financial mechanism to cover the cost of their implementation. Under the decentralization scheme, the municipal local government predominates, with the budget allocated for MPA management depending on what the LGU can prioritize and manage to pay for. With the Environmental User Fee System installed in several MPAs, LGUs have been able to secure an additional income source to support management of MPAs.

Under the CCRMP, resource enhancement was initiated and limited to mangrove rehabilitation. The mangrove area in Benoni, Mahinoghas been declared protected as “Katungan Park” and at the same time is promoted by the LGU as an ecotourism site.

**Enforcement.** The CCRMP has assisted LGUs in implementing coastal law enforcement mechanisms across the barangay, municipal, and provincial levels. The capability for training Bantay Dagat personnel has strengthened knowledge on fisheries laws and regulations and apprehension of illegal fishing involving infractions of MPA regulations and other municipal fishery laws and ordinances. However, following the site assessment and validation of the evaluator, more significant efforts are deemed necessary. Enforcement activities have been claimed to be irregular and systems not fully operational in the last five years, although with exception in areas such as White Island MPA, Mantigue MPA, and Pasil Reef MPA which have many tourism activities. The Municipal Bantay Dagat monitors the Pasil Reef and, at the same time, serves as tourist guides where they receive an honorarium. Meanwhile, the Municipal PNP and Barangay Tanods conduct patrolling in Mantigue MPA 24/7. In White Island, the CRM Office still conducts surveillance and patrolling with the ten-member Task Force and assigned lifeguards. Although there appear to have been intrusions into these MPAs, no actual violations or apprehension were reported because the absence of demarcation buoys for the MPAs made it difficult to ascertain infractions. This is a problem, for example, in the Liong and Alangilan MPAs that are currently being managed and patrolled by the Barangay.

**Monitoring and Evaluation (M&E).** M&E for MPAs was reasonably extensive, with sufficient activities conducted and designed to capture the indicator targets included in the CCRMP logical framework. Participatory coastal resource assessment and MPA biophysical monitoring undertaken by contract firms/ the academe provided the MPAs with baseline data, and reports were available as reference. LGU personnel were trained to do the biophysical monitoring of habitats, including open water SCUBA training; however, none of those trained conducted any monitoring activities after the Program ended.

## National Evaluation Policy Framework (Relevance, Effectiveness, Efficiency, Sustainability)

### Relevance

The CCRMP has made important contributions to biodiversity conservation in the island-province of Camiguin by helping LGUs improve the development and management approaches of their MPAs, and institutionalize their support systems. The most important lesson gained by this evaluation is that institutional changes and broader policies introduced by the CCRMP were translated into better biodiversity conservation outcomes.

The establishment of MPAs and strengthening of their management had been the preferred management measure under the CCRMP in meeting coastal and fisheries management objectives. The evidence on the effectiveness of MPAs in addressing depleted marine resources was mixed, although more positive results were reported in the latest evaluation. The recent results showed significant increase in trends of species abundance and population trends for both corals and fishes, particularly inside the MPAs. Only White Island MPA had a down trend since the selected location of the MPA was not the most productive site (mostly sand and dead corals with algae) as per observation.

*The stakeholders mentioned that the delineation of waters, including the demarcation of the MPAs, was relevant in terms of reducing the incidence of illegal fishing. They added that deputized fish wardens are well-versed in fishing laws because of the capacity-building activities of the project. The stakeholders also noted that members of the communities are aware of the MPAs. The stakeholders regarded the development of coastal resource management (CRM) plans as highly relevant in institutionalizing CRM towards increasing natural productivity and enhancing the integrity of the coastal and marine resources of Camiguin.*

The CCRMP has assisted LGUs in implementing coastal law enforcement mechanisms across the barangay, municipal, and provincial levels. While the capability for training Bantay Dagat personnel has strengthened knowledge on fisheries laws and regulations and apprehension of illegal fishing involving infractions on MPAs' regulations and other municipal fishery laws and ordinances, more significant efforts were found necessary in several areas of its implementation. These include stricter implementation and enforcement of laws, policies, and plans; strengthening judicial and prosecution process; and pursuing maintenance support structures during patrolling and enforcement activities.

The human element is very important for MPAs to succeed (White and Green, 2003). There is a link between the natural resource and socio-economic systems because the latter impose pressure on natural resources through various extraction and contamination processes (Ablan et al., 2004). As protection is afforded inside MPAs that prohibit

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*Text in italics are narratives from stakeholders.*

all human extractive activity within their boundaries, it provided greater conservation benefits compared to the areas outside MPAs that allowed fishing and other uses.

Positive perception on the establishments of the MPAs. In general, there is a positive perception on the establishment of MPAs in Camiguin – a departure from the negative reactions to the establishment of MPAs in the initial implementation. At first, fishers saw the MPAs as “taking away their rights to fish” since they were used to fishing anywhere without restrictions. With the MPAs, some of their traditional fishing grounds were now off-limits to fishing activities. But with the intensive information, education, and communication (IEC) campaign, fishers were able to understand the goals of the project and now realize the MPAs’ benefits.

Stakeholders noted that communities are aware of the MPAs. Fishers now know why there are limitations in the extraction of marine products inside the MPAs. This awareness resulted into vigilance in guarding the MPAs to protect their source of income and livelihood. They realize the benefits are not only for this generation but for generations to come. Although they have not felt the full impact of the MPAs, they perceive that in the long run, an abundant volume of fish will result from these conservation efforts. However, the gains of the project will not be sustained if enforcement of the coastal laws is lenient and IEC will not be maintained.

The stakeholders regarded the development of CRM plans as highly relevant to institutionalizing CRM towards increasing natural productivity and enhancing the integrity of the coastal and marine resources of Camiguin. They mentioned that the delineation of waters, including the demarcation of the MPAs, was relevant in terms of reducing the incidence of illegal fishing. They added that deputized fish wardens are well-versed in fishing laws because of the project’s capacity-building activities. However, the stakeholders also reported that in areas which lack markers (buoy), there were negative effects in the protection of the marine resources of the province.

## Effectiveness

Overall reef, fish, sea grass, and mangrove health have improved, as indicated by the significant increase in live coral cover, increase in fish density and fish size inside MPAs, and increased basal area of mangroves over baseline. Among the CCRMP’s goals was to improve the overall water quality; this has been maintained, as evidenced by the increase in water clarity and the improvement in selected water parameters over baseline.

Responses from interviews with the Bantay Dagat and CRM officer revealed that the CCRMP-sponsored training courses and workshops on the establishment of MPAs have been widely supported and implemented. The CCRMP provided extensive technical and material assistance and facilitated the proposed site assessment and preparation of technical maps.

The stakeholders identified the presence of legal instruments in the form of ordinances to establish MPAs as effective in institutionalizing CRM. They likewise mentioned that organizing management councils was an effective strategy. Another effective law enforcement strategy was the presence of deputized fish wardens. The stakeholders said that the daily surveillance of municipal waters by Bantay Dagat was effective in guarding their MPAs and preventing the entry of illegal fishing. The presence of markers (buoy) helps protect the MPAs. Finally, the stakeholders recognized that the conduct of biophysical assessments was effective in the overall management of the MPAs.

The stakeholders reported that lax law enforcement is counter-productive to increasing natural productivity and enhancing the integrity of the coastal and marine resources of Camiguin. Certain areas, they said, did not have enough deputized fish wardens (DFW), partly because the honorarium was considered too small and irregular. Lost markers (buoys) lead to violations. Thus, they are weak in guarding the MPAs.

### Efficiency

*The stakeholders said that consultations via barangay assemblies were efficient in making sure that CCRMP target beneficiaries were heard. They added that the CCRMP objectives were explained well to the stakeholders. Some of the avenues that helped ensure efficient governance include weekly and monthly meetings as well as their “re-echo” of these meetings, trainings, and seminars. Finally, the stakeholders said that the Mayor’s endorsement of project development helped ensure efficient implementation of the CCRMP.*

If knowledge gaps are addressed, this will create a much better understanding of how the CCRMP contributed to bringing about biodiversity impacts. This include understanding drivers that facilitated participation and engagement of local communities in the program, and how participatory management and governance systems were mainstreamed (i.e., how control systems were put in place, including how enforcement was carried out to protect the value and increased productivity of coastal and marine resources in Camiguin Island).

*The stakeholders saw some inefficiencies, which include, among others, monitoring not being sustained as this is done on a voluntary basis. They added that there is no regular budget for the MPA; in certain areas, the MPA plan was not endorsed and consequently not approved by barangay council. The stakeholders also mentioned areas where the MPA management council is not active and does not meet regularly.*

In terms of financial efficiency, ICI Asia x OMC looked into the benefits vis-à-vis the cost of the CCRMP. Following the valuation of reefs in the Philippines by Samonte-Tan and Armedilla (UNEP, 2004), the estimated economic value of Camiguin’s coral reef area was computed, as follows:

**MPAs only (1.128 sq.km.)**

Annual Economic Value	₱ 931,461.58
Total 10-yearEconomic Value	₱ 16,316,206.20
Net Present Value (NPV)	₱ 9,582,205.88
Total 20-yearEconomic Value	₱ 34,382,810.00
NPV 20years	₱ 13,862,178.20

**Near Shore Coastal Habitats (11.28 sq.km.)**

Annual Economic Value	₱ 7,051,601.76
Total 10-yearEconomic Value	₱ 70,516,017.60
NPV 10years	₱ 43,329,040.22
Total 20-yearEconomic Value	₱ 141,032,035.20
NPV 20years	₱ 60,034,260.91

Based on the CCRMP Phase 1 Completion Report, the estimated cost of the five-year project was ₱116,000,000. Based on the 20-year estimated economic value of the entire Camiguin near-shore coastal habitat, the CCRMP return on investment is 22%.

**Sustainability**

The CCRMP has made important contributions to biodiversity conservation in the island-province of Camiguin by helping LGUs improve the development of their MPAs. The CCRMP offers extensive experience to the government to improve its approaches to managing protected areas and to institutionalize its support systems. The most important lesson gained by this impact evaluation is that institutional changes and broader policies introduced by the CCRMP translated into better biodiversity conservation outcomes. The MPAs will directly and indirectly affect people. These socio-economic impacts include effects on income, livelihood opportunities, migration, and cultural habits, as well as on ecosystem services. Well-designed MPAs can offer important benefits, both to the environment and to the people concerned.

The stakeholders reported that there is continuous support from the LGU, even beyond the term of the CCRMP. They also pointed out that the community united to protect the MPA. They have a higher stake to protect MPAs due to income derived from diving/snorkeling.

However, the stakeholders also expressed concerns over sustainability because there is no regular budget for the MPAs; hence, the stakeholders saw that funding is not sustainable. They also said that community participation is not consistent and that use of the CCRMP-provided equipment was not sustained, especially after the project was completed.

## Results of CCRMP in terms of Outcome 2 - Increased Income of the Fisherfolk

### Perception of enrolled and not-enrolled on income in terms of fish catch

The impact evaluation showed there is a perceived positive impact on conservation efforts with the establishment of the MPAs. This is a departure from the negative perception during the Project's initial stage. At present, fisherfolk are aware of the importance of the MPAs and the benefits to their sources of income. However, the perceived benefits in terms of increase in fish catch were not felt due to irregular "spillover" of fish from the MPAs; this is understandable since it takes 10 to 15 years to fully experience the benefits of MPAs, from date of institutionalization. Table 9 presents the perception of respondents on income and their view on changes in income. 56 (39.72%) of the 141 enrolled fishers answered that income was better, 48 (34.04%) said it was the same, while 36 (25.53%) said it was worse. Compared to ten years ago, more of the enrolled respondents said that their income was better. Of the 111 not-enrolled fishers, 37 of the respondents (33.33%) said that income was better, 55 (49.55%) said it was the same, and 19 (17.12%) answered it was worse.

**Table 9.** Perception of respondents on income

Enrolled FF	Frequency	Percentage
Better	56	39.72
Same	48	34.04
Worse	36	25.53
No answer	1	.071

Non-enrolled	Frequency	Percentage
Better	37	33.33
Same	55	49.55
Worse	19	17.12

Table 10 shows that majority or 58.87% and 72.07%, respectively, of respondents who are both enrolled and not-enrolled observed that fish catch was decreasing. This opinion may be attributed to the increase in the number of fishers and the expansion of commercial fishing, but some also attributed this to the establishment of MPAs which have stricter laws and ordinances against fishing. Those who perceived that fish catch was increasing attributed this mainly to the establishment of MPAs; they were aware of the importance of MPAs.



**Table 10.** Perception of respondents on trends of fish catch

Enrolled FF	Frequency	Percentage
Decreasing	83	58.87
Increasing	32	22.70
Same	18	12.77
No answer	8	5.67

Non-enrolled	Frequency	Percentage
Decreasing	80	72.07
Increasing	11	9.91
Same	15	13.51
No answer	4	4.50

## Women's perceptions on changes in income

The involvement of women in the livelihood of the fishing communities was usually limited to selling fish caught by their husband and gathering shells. With the implementation of the CCRMP, women were involved in the processing of coastal and marine products like bottled sardines, fish drying, seaweed farming, etc. More than half (51%) of the women surveyed said that their income level today was better compared to ten years ago, as shown in Table 11. On the other hand, 33.33% said it was just the same, while 14.81% said it was worse. The latter were typically women who were more inclined to selling fish catch than selling processed products.

**Table 11.** Income level perception

	Frequency	Percentage
Better	14	51.85
Just the Same	9	33.33
Worse	4	14.81

Table 12 shows that 35.71% of the respondents said they perceived a decreasing trend in fish catch. Some reasons given for the decrease were the increased number of fishers, commercial fishing, and climate change. However, 32.14% answered fish catch was increasing, mainly because of the establishment of the MPAs; they viewed that MPAs as beneficial to the fisherfolk.

**Table 12.** Perception on fish catch trend

Trends	Frequency	Percentage
Decreasing	10	35.71
Increasing	9	32.14
Same	3	10.71
No answer	6	21.43

## Established CRM-based income-generating livelihood projects

The impact evaluation found that sustainable mechanisms were in place for the management of the 31 MPAs established in Camiguin, and that CRM awareness increased through the different activities conducted by project implementers. During Phase II implementation, eight alternative and conservation-based enterprises were established, which surpassed the target of one enterprise per municipality, namely, 1) Bottled Sardines Production in the municipality of Mambajao, 2) Coco Sugar Production and Cabuan Coastal and Village Tour in the municipality of Guinsiliban, 3) Taguines Lagoon Aqua Sport and Recreation Facility in the Municipality of Mahinog, 4) Dried Squid Production – Product Enhancement and Marketing Support of Fishery Product in the Municipality of Sagay, and 5) Pasil Reef Eco-Tourism Support Services Enterprise, Punta Dive, Snorkelling, and Paddling Tour Package, and Blue Lagoon Fun Dive, Snorkelling, and Paddling Tour Package in the municipality of Catarman. Of the ten people who were trained for the Mambajao Bottled Sardines Production, only four were still active, since production is irregular due to seasonality of fish catch. Those who were active usually worked as casual employees in the Municipal Hall in Mambajao when sardines were off-season.

For the Guinsiliban Coco Sugar Production, only one of the 21 individual-beneficiaries was still active and was being supported by the fisherfolk family members. The inactive individual-beneficiaries went back to fishing as their main source of income, stating they were more interested in fishing than in working on the alternative livelihood project they were introduced to during the CCRMP.

For the Mahinog Taguines Lagoon Aqua Sport and Recreation Facility, the ten fishers trained to provide boating and guiding services were unfortunately not located by the impact evaluation. This facility was previously owned by the Mahinog LGU with a private company partner. The individual-beneficiaries were employed in the Facility but later returned to fishing; others migrated outside the community. These explain why the beneficiaries stopped rendering services of the facility.

For the Sagay Dried Squid Production, 21 KASAMMA members were still actively engaged in the project. Their income has been increasing, and their only apprehension was the lack of robust sales of their products – marketing is not something they were not trained in.

For the Catarman Pasil Reef Eco-Tourism Support Services Enterprise, 15 snorkeling guides were trained, but only ten were traced by the impact evaluation and are still active snorkeling guides.

Respondents explained that most of the inactive individual-beneficiaries had no passion or interest in the identified alternative livelihood projects. Most of them returned to fishing and justified this by saying they had been trained only in fishing since childhood, and this was the livelihood passed on by their parents. If the alternative livelihood projects were identified based on what the beneficiaries were passionate about, then

perhaps a more entrepreneurial mindset would have been developed and honed.

## Relevance

The establishment of alternative livelihoods as a strategy to reduce reliance on fishing and to enable coastal resources to regenerate is deemed positive by the stakeholders. Two types of alternative livelihoods were introduced: fishery/agriculture-based and ecotourism-based livelihoods. The CCRMP was able to establish support systems for these alternative livelihoods by working together with other government agencies in product development, skills trainings, and other needs of the enterprises. Market linkages through display centers and promotions have been set-up to assist the enterprises.

It was observed that fishers who were enrolled in ecotourism livelihood activities have an alternative source of income during the lean months of fishing. However, the fishery- and agriculture-based livelihood projects were stalled due to seasonality and availability of resources; this was the case for bottled sardines, coco-sugar production, and dried squid. Some of those enrolled in these livelihoods were inactive.

## Effectiveness

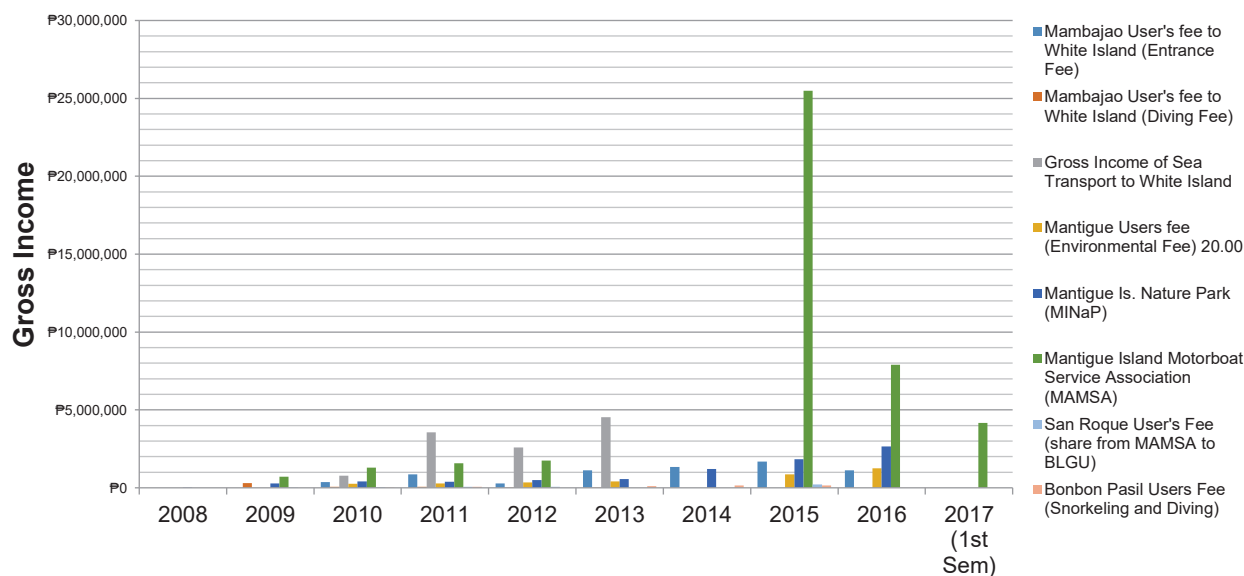
At the onset of the establishment of the alternative livelihoods, the presence of the different stakeholders and their support to the established enterprises were effective. These support mechanisms enabled the enterprises to gain headway during the implementation of the CCRMP.

Differences were noted in the effectiveness of the fishery/agriculture-based and eco-tourism-based livelihoods. The former experienced difficulties in sourcing raw materials, while the latter was observed to provide an alternative source of income.

This study noted the limited involvement of fishers in these enterprises. Only a small number of fishers were enrolled in the pilot alternative livelihoods and enterprises introduced and supported by the CCRMP. However, fishers engaged in the provision of ecotourism-related services had significantly reduced their reliance on fishing. This was true for the snorkeling guides in Catarman and the pump boat operators in Mahinog. Six snorkeling guides who previously engaged in fishing as their main source of income were currently earning from tourism-related services.

Although the development of alternative livelihoods was focused on the eight enterprises in Phase II of CCRMP, various alternative livelihoods were introduced in the Camiguin, such as seaweed farming, fruits and vegetable production, mussel production, butterfly garden, bamboo handicraft, and LGU income generating tourism-based livelihoods in Phase I. Alternative livelihoods based on production have not progressed into full-scale enterprise, as reflected in the livelihood and enterprise monitoring. Most of these livelihoods were also limited to family-based activities. Marine-based value-added income generating projects were also initiated and further developed in Phase II. However, for tourism-

based livelihoods, the LGUs generated revenues from entrance fees, diving and snorkeling fees, and other fees, and so did the fisherfolk who provided tourism-related services like sea transport, snorkel rentals, guides, etc. These services provided alternative sources of income to fisherfolk during the lean months of fishing, as shown in Figure 17.



**Figure 18:** Gross income of tourism-based enterprises

*Certain stakeholders reported inefficiency in the implementation of the livelihood components. As a case in point, they cited a certain Barangay Chairperson who did not approve their list of PO officers, making them unable to gain their share of the income because the process was affected by 'political considerations'.*

## Efficiency

The livelihood interventions provided by the CCRMP were aimed at opening opportunities for alternative livelihoods. Ecotourism-based and processing livelihoods were introduced to reduce the fisherfolk's reliance on fishing. While the ecotourism-based services had some positive effect on fisherfolk's livelihood, fishery/agriculture-based processing livelihoods faced many operational challenges. Ecotourism-based livelihoods offered an alternative income for fisherfolk during fishing lean months. However, with just a few marine tourist areas, there was limited participation of fisherfolk in providing services.

For the processing projects, vulnerability to shocks, trends, and seasonality was not anticipated. This resulted in the irregular production of processed products like bottled sardines, coco-sugar, and dried squid, which rely on seasonal marine products. With the effects of climate change, weather conditions were not no longer predictable. A sudden change of weather could affect the production process, for example, in coco-sugar production which requires coconut wine to be extracted at certain times and should not be mixed with rainwater. These concerns should have been identified in the early implementation of these alternative livelihoods to strategize how to minimize losses in production

and sustain the projects.

*Some inefficiencies were evident in alternative livelihoods, e.g., the legalization as part of the LGU economic enterprise was still not processed, and the Food and Drug Administration (FDA) registration was not yet completed/approved.*

## Sustainability

Two basic types of enterprises were established during the CCRMP: products and services. Bottled sardines, coco-sugar, and squid processing were production-based enterprises which relied on marine resources and agriculture products for the raw materials. These enterprises were susceptible to irregular produce due to seasonality and availability of raw materials. Ecotourism-based livelihoods provided services to tourists, e.g., snorkeling, boat services, food services, and tour guiding.

With support from the LGUs, other government agencies, NGOs, and the private sector, sustainability of these enterprises will be maintained. Vulnerability of the raw materials that rely on extraction of natural resources could be addressed through livelihood strategies. The ecotourism project will depend on the influx of tourists to Camiguin. But this impact study also noted the inactivity of previously enrolled beneficiaries of the CCRMP. To remedy this concern, expansion of involvement of other fishers in the enterprises should be taken into consideration so that the gains of the Project will not be wasted.

*The production of bottled sardines as an alternative livelihood was not sustained.*

## National Evaluation Policy Framework

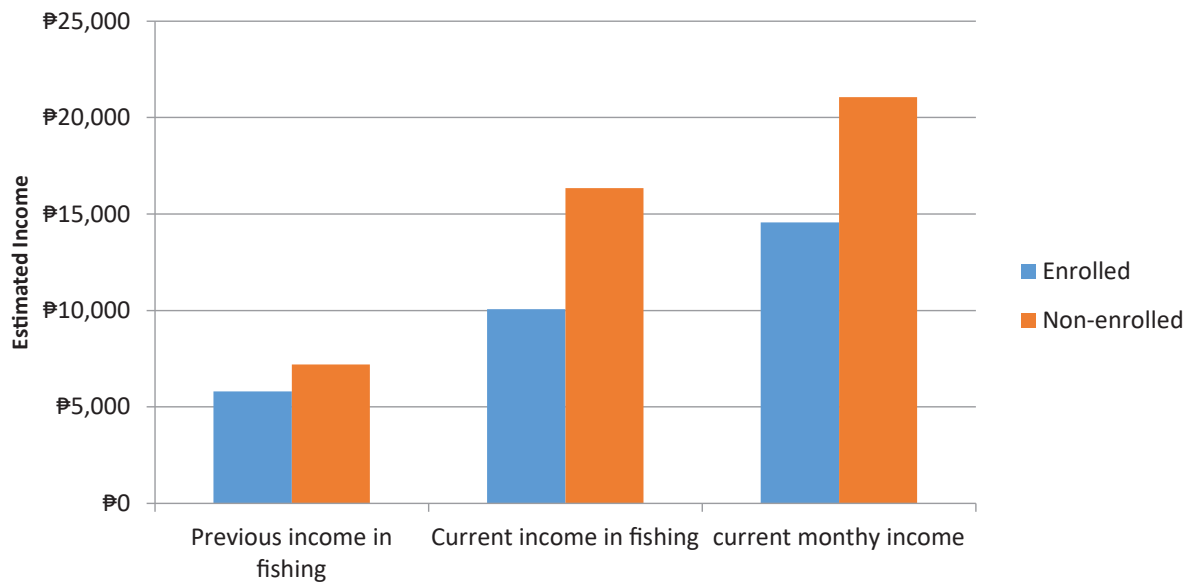
### (Relevance, Effectiveness, Efficiency, Sustainability)

#### Relevance

Reliance on fishing as the main source of income was still validated in the survey. 77.69 percent of the respondents considered fishing as their primary source of income, in contrast to 22.31 percent who did not. This showed that there was minimal income diversification in the livelihood of the fishers. Other sources of income came from manual labor/construction work, fishing-related activities, farming, employment for government workers, livestock raising, and sari-sari stores. With these findings, there is need to further intensify the idea of income diversification for fishers to enable the conservation effort to be sustainable. Otherwise, conflict among them may occur with the limited fishing grounds, and this could affect the MPAs.

The income level of enrolled and not-enrolled fishers from fishing has increased since the implementation of the CCRMP, as shown in Figure 18. The effect of the Project on the lives of the fishers, whether enrolled or not-enrolled, was the same since both use the same fishing grounds. The effect of conservation efforts through “spillover” of fish from the MPAs will be beneficial to all fishers. Not-enrolled fishers in Camiguin

also indirectly benefited from the implementation of the Project, as shown in their other sources of income. Eighteen not-enrolled fishers were working as snorkeling guides, Bantay Dagat, seaweed farmers, and pump boat operators. Although the number may be small, it just shows that the CCRMP implementation directly and indirectly affected the lives of the coastal communities. Whether the impact of the Project in the conservation effort will result in the increase or decrease in the volume of fish and development of ecotourism-based enterprises, it is already evident that CCRMP benefited both enrolled and not-enrolled fishers.



**Figure 19.** Estimated previous and current income

```
. mean Proj_IncomeF if Enroll ==2
```

Mean estimation		Number of obs	=	141
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	Mean	Std. Err.	[95% Conf. Interval]	
Proj_IncomeF	7508.431	664.0635	6195.542	8821.32

```
. mean Proj_Income if Enroll ==2
```

Mean estimation		Number of obs	=	141
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	Mean	Std. Err.	[95% Conf. Interval]	
Proj_Income	8286.799	661.7583	6978.467	9595.131

**Figure 20.** Inflation-adjusted income of enrolled fishers



Factoring in the inflation rate, the current monthly income of enrolled fishers from fishing which was Php10,066.67, stands at Php 7,508.43 in inflation-adjusted real income. For their current monthly income of Php 14,566.02, the inflation adjusted income is Php 8,286.79. For the not-enrolled fishers, current monthly income in fishing was Php 16,346.40, and its inflation-adjusted real income Php 8,822.42. The current monthly income of Php 21,060.37 is estimated at Php 8,826.32, with inflation. With the positive computed monthly income of fishers, they were considered as belonging above the poverty line threshold per household population in the area of Php 21,000.00 annually. This indicates an improved quality of life of fishers after the institutionalization of MPAs and the implementation of the alternative livelihoods.

. mean Proj_IncomeF if Enroll == 1				
Mean estimation		Number of obs		= 111
	Mean	Std. Err.	[95% Conf. Interval]	
Proj_IncomeF	8822.424	787.6071	7261.572	10383.28
. mean Proj_Income if Enroll ==1				
Mean estimation		Number of obs		= 111
	Mean	Std. Err.	[95% Conf. Interval]	
Proj_Income	8826.325	848.39683	7143.869	10508.78

**Figure 21.** Inflation-adjusted income of non-enrolled fishers

## Effectiveness

The establishment of Marine Protected Areas has been the focus of discussion of many respondents. Many advantages and disadvantages of the MPA were enumerated. Majority of the respondents perceived the establishment of the MPAs to be beneficial in the long run, since they observed an increase in fish volume. However, the impact of this increase was not felt at this time. Respondents noted a decreasing trend of fish catch in the past five years. Various factors were cited for the decrease, such as the increased number of fishers and commercial fishing. The MPAs were traditionally considered rich fishing areas, which had resulted in their overfishing and degradation. With the establishment of the MPAs, access to these traditional fishing grounds was restricted to enable these to regenerate, which reduced the fishing areas of the fishers.

As shown in Table 13, 56 (39.72%) of the 141 enrolled fishers said that they believed the change in income was better, while 48 (34.04%) said that it was the same, and 36 (25.53%) opined it was worse. Compared to ten years ago, more respondents for the enrolled observed that their income was better. For the 111 not-enrolled fishers, 37 (33.33%) said

that it was better, 55 (49.55%) said it was the same, and 19 (17.12%) answered it was worse.

Table 13. Perception of respondents on income

Enrolled FF	Frequency	Percentage
Better	56	39.72
Same	48	34.04
Worse	36	25.53
No answer	1	.071

Non-enrolled	Frequency	Percentage
Better	37	33.33
Same	55	49.55
Worse	19	17.12

Table 14 showed that majority of the respondents, both enrolled and not-enrolled, observed a decreasing trend in fish catch. The reasons they cited were the increase in numbers of the fisherfolk and commercial fishing; some viewed the establishment of MPAs as one reason too. Those who perceived an increase in fish catch said this was mainly due to the establishment of the MPAs.

Table 14. Perception of respondents on trends of fish catch

Enrolled FF	Frequency	Percentage
Decreasing	83	58.87
Increasing	32	22.70
Same	18	12.77
No answer	8	5.67

Non-enrolled	Frequency	Percentage
Decreasing	80	72.07
Increasing	11	9.91
Same	15	13.51
No answer	4	4.50

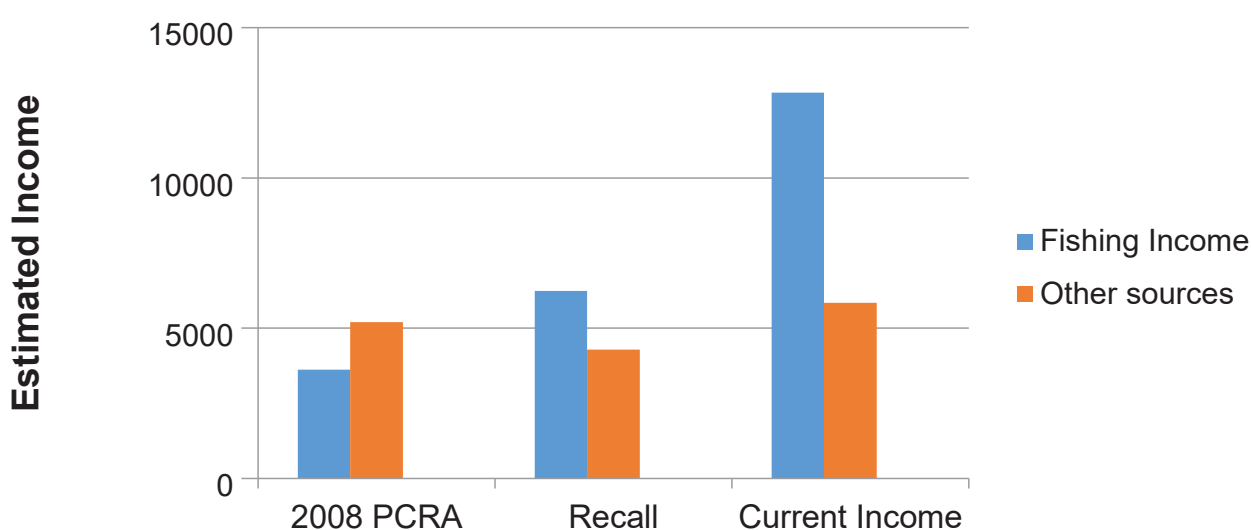
## Efficiency

While there was a general perception of increase in income from fishing, other factors came into play that counter-balanced the positive effects of the establishment of MPAs. Productivity of the coastal marine resources, at this point, has not yet translated into a net increase in fish catch that in turn should have increased income. The perceived increase in volume of fish in the MPAs could not be associated to increase in fish catch since “spillover” of fishes is still irregular.

Some fishers and stakeholders observed that fishes tend to stay inside the MPAs, which limits their fish catch. This resulted in fishers having to venture far from the coastline to fish, where they compete with the commercial fishers. This perception was corroborated by the result of

Outcome 1, which showed that the fish densities outside the MPAs were very poor compared to the condition inside the MPAs. The number of variety and density of target species were also poor outside the MPAs, which explain the decrease in fish catch. This is aggravated by the observed increase in the number of fishers in the community.

On the other hand, the provision of alternative livelihoods was limited to direct beneficiaries, some of whom are no longer active in the projects. The limited number of enrolled fishers in the alternative livelihoods translated into a very low coverage and distribution of benefits from the eight alternative livelihood projects. Moreover, with the decline in the fishers who continued to implement their alternative livelihood activities, the potential benefits coming from the said livelihoods further declined.



**Figure 22.** Estimated income: previous vs. current

**Table 15.** Estimated income: previous vs. current

Previous Income (10 years ago)	Current Income (2017)				
Range (Php)	Frequency	Percentage	Range (Php)	Frequency	Percentage
0	28	11.11	0	8	3.17
5000-below	106	42.06	5000-below	32	12.70
5001-10000	77	30.56	5001-10000	90	35.71
10001-15000	25	9.92	10001-15000	59	23.41
15001-20000	8	3.17	15001-20000	29	11.51
20001-25000	2	0.79	20001-25000	10	3.97
25001-30000	4	1.59	25001-30000	16	6.35
30001-35000	1	0.40	30001-35000	5	1.98
35001-35000	1	0.40	35001-35000	3	1.19

With respect to benefit and cost analysis, ICI Asia x OMC looked into the Livelihood and Enterprise Monitoring Matrix of the CCRMP that was continued by the local stakeholders, even after the Project ended in September 2014. Based on the enterprise and livelihood monitoring, from the start of CCRMP in 2007 up to the first quarter of 2017, the total revenue and users fees generated amounted to Php 76,607,549.

**Table 16.** Enterprise and livelihood income from 2007 to 2017 (1st Quarter)

<b>Income from various users fees</b>	<b>₱ 11,812,627</b>
<b>Income from other enterprises and livelihoods</b>	<b>₱ 62,780,767</b>
<b>Income from the eight alternative livelihoods</b>	<b>₱ 2,014,155</b>

Viewed against the CCRMP Phase II project cost of ₱14,839,832, the total revenue and users' fees generated in past ten years shows a 416 percent return on investment. However, if we only look at the users fees and the eight alternative livelihoods, then the return on investment over the ten-year period is -7 percent. If we project this further by another ten years, then the possible return on investment will be potentially 86 percent, assuming status quo.

### Sustainability

The increased productivity and enhanced integrity of coastal and marine resources affect the sources of income of the fisherfolk who rely on fishing as their main source of livelihood. Fishers were aware that enforcement of coastal laws was needed to protect and regenerate marine resources. To sustain the protection of the MPAs, fishers were aware that community participation was vital in the conservation efforts. Conservation effort was foreseen to eventually benefit the fisherfolk community and improve their income.

## Other gains, innovative and effective strategies in the implementation of the project

### Institutionalization

Coastal law enforcement. The enforcement of coastal laws and ordinances to protect the MPAs would not be possible without the deputized fish wardens who are in the forefront of the conservation effort. Their presence was recognized by the fisherfolk who were aware that any illegal fishing method will be reported, resulting in their apprehension by the authorities. This changed the fishing habits of the fishers who knew that the government was serious in implementing the coastal and marine laws.

Registration of fishers from other areas. To address encroachment of fishers from outside the municipality, the LGU required them to register to be able to fish within the municipal waters. This policy was instituted to regulate fishers coming from other areas who would compete with the municipal fisherfolk of the five municipalities in Camiguin. The registration also controlled the use of illegal fishing gears used by these fishers.

Through their IEC campaign on the rich but delicate resources of the island, the Project helped to strike a balance between conservation and utilization, especially when Mantigue Island residents were re-settled to the mainland. The purpose of this was to manage the small island and position it as a top tourism destination for marine biodiversity conservation, as well as to showcase the seaweed farming practices and how they manage their fishery resources for sustainable harvest in the future.

### **Community-based projects**

Protecting the MPA was like a family enterprise in Brgy. Cantaan. “Even the children in the community are the ones reminding others to stay away from the sanctuaries.” It was suggested that this approach be adopted in other barangays who would otherwise suffer the consequences of the depletion of coastal and marine resources. This, coupled with continuous IEC, would strengthen the fisherfolk’s awareness of the importance of MPAs.

### **Resource mobilization**

Convergence of development interventions of the different government agencies, NGOs, and private sector. The implementation of the Project brought about convergence of the different development interventions for the fishers in the coastal communities. Various government agencies, NGOs, and private sectors had provided interventions in different aspects of the project implementation. The merging of assistance provided the support mechanism needed by the Project and the beneficiaries. Skills training, product development, and provision of fishing gears were some of these interventions. For future implementation of similar project, this component will have an impact on the sustainability of the project.

**Mayor Jurdin Jesus M. Romualdo – Municipality of Mambajao**

***“Tanang programs sa CCRMP na implement like alternative livelihood ug pag-establish sa MPAs dinhi sa Camiguin.”***

Mayor Romualdo stated that all programs of the CCRMP had been implemented such as the alternative livelihood and establishment of the MPAs in Camiguin. There were trainings conducted and one main objective was to make fishers further realize the importance of MPAs in the coastal community. There was Coastal Management in place and CRMP has provided boats to many fisher folks.

**Francisco Abecia** described the process of safeguarding the MPAs as akin to a “family enterprise” in Brgy. Cantaan, Municipality of Guinsiliban. Luisito Napisa, MPDC, suggested that this approach be adopted by other barangays who would suffer if coastal resources are depleted.

**Felicollo Banaag** (fisherfolk -Poblacion). Fishing is the main source of income in the barangay, including Mr. Banaag's family. He is aware of the establishment of MPAs and that fishing is prohibited in some areas. He noticed there has since been an increase in the volume of fish in their area.

**Mr. Palarca** is in his first term of office as Catarman Sangguniang Bayan for Environment. He said that people initially rejected the establishment of MPAs in the area, but eventually embraced these when they noticed an increase in the fish population in the shoreline area. For example, they noted the return of the octopus, which had not been seen there for almost ten years. The income of fisherfolk also increased.

**Pedro Portrias**  
CRMP Non-beneficiary

He was aware of a number of activities and programs implemented by the CRM project, including the conservation and strengthening of MPAs and the planting of mangroves. Enrolled members of the project also availed of skills training that they could put to use during the lean seasons for fish catch.

He personally observed that these livelihood activities and other services helped improve the lives of the fisherfolk. Beneficiaries were given fishing gears and capacitated with skills to improve their fish catch. The lives of the beneficiaries' families were made more comfortable with the acquisition of some appliances. The project did not only uplift the lives of the enrolled members, it also improved the lives of the people living in the coastal areas whose livelihood was largely dependent on natural resources like fish.

**an Paclar**  
CRMP Non-beneficiary

The lives of the community living in coastal areas improved with the Project's support. Previously, their fish catch had decreased substantially, he said, mainly due to the increase in the number of fishermen and the catching of juvenile immature fish. Thus, he supports the MPAs which provide shelter to juvenile immature fish, enabling them to grow. Since the Project inception, the community is now vigilant and complies with the laws concerning the protection of marine sanctuaries.

Fishermen are now more conscious about not fishing in MPAs, to avoid being penalized by the local government unit. All these, he said, have been very helpful in maintaining the fish population in the community where fishing is the primary livelihood of hundreds of fisherfolk. Should another project be conceived, he would gladly participate since he believes this would not only help in their livelihood but is also beneficial to the environment.

**Allan B. Sahilan**  
CRMP Non-beneficiary

Allan, now 44 years old, has been a fisherman since his teenage years. Although not a CRM project member, he considers himself a beneficiary of the project's initiatives to strengthen the protection of the marine sanctuaries. He said the establishment of the MPAs protected the juvenile immature fish which can still grow bigger. Other livelihood programs were instituted, such as eco tours to Mantigue Island and the rental of gear for snorkeling and diving. These provided for the financial needs of those living in coastal areas, especially during the lean months. He observed that project beneficiaries greatly improved their lives. Women were taught skills for livelihood programs that generated additional income to the household.

**Charito Yamit**  
CRMP Non-beneficiary

Charito was one of the many fisherfolk affected by the project's initiative to establish the MPA. He was among those who protested since the MPA directly affected their fish catch. However, with constant information dissemination, they were able to understand and embrace the importance of protecting fish sanctuaries to sustain the fish population.

Although not a project member, he knew that the project supported livelihood programs for the fisherfolk. Among these were the eco tours and the bottled sardines production, which provided opportunities for the fishermen's wives to supplement their earnings.

Among the many changes is that fishermen became more disciplined in following the policies on not fishing in

MPAs and using only the recommended fishing methods and gears that are safe for the small fish and the environment.

If given the opportunity to join a similar project, he would definitely support it as he now understands and appreciates the importance of sanctuary conservation, and that there are other livelihood activities he could practice, especially during the off season.

**Hon. Rogerio C. Acle**  
Municipal Mayor, Mahinog, Camiguin

With the inception of the CCRMP, the affected fisherfolk and residents in coastal communities were able to better understand the importance of managing and protecting the MPAs to sustain their living. Apart from the intensive education strategy, the fisherfolk were also able to enjoy the different capacity building activities. These include trainings on the use of appropriate fishing methods and skills training on alternative livelihood activities during the lean months of fish catch.

Because of the project's technical assistance, each coastal barangay in the Municipality of Mahinog was able to create a livelihood association that helped increase the fisherfolk's sales from their catch and provide more strategic business methodologies. These interventions benefited not only the fisherfolk but also their families, thus significantly improving their lives.

**Engr. Sospis Leo U. Tabuan**  
Municipal Agriculture Officer – Mahinog, Camiguin

The CCRM project has helped improve the lives of people living in coastal areas, particularly the fisherfolk. It helped improve the Municipal Agriculture Office's support services. The project's technical assistance ranged from capacity building, provision of fishing gears and pump boats, to guidance in drafting policies. All these immensely improved the delivery of social services to fisherfolk in Mahinog, Camiguin.

With the project's support, they were able to know the status of the fish sanctuaries through biophysical assessment and strengthened their programs and plans. This included a clearer zoning, particularly in the island of Mantigue, where they identified the specific areas for swimming, docking, fishing, and the exclusive marine protected zone. With the project's support, they also mapped out the landscape and seascape of the protected areas in the municipality. The project provided global positioning devices that were used in ground sea topography and zoning. It was with the assistance of the project that the municipality was able to define the zones, create the plan, and refine the boundaries of the 15 km municipal waters and the MPAs.



# Conclusion and Policy Recommendations

## **MPAs have biological and ecological effects, both inside and outside their boundaries.**

Many aspects of their potential effects on fishery resources and fish populations are not clearly understood, and in most cases MPAs should not be the sole fisheries management tool, but one that complements other measures such as but not limited to coastal zoning, coastal law enforcement, coastal and marine pollution management, closed season, reduction in the number of fishers, rotational or periodically harvested area closures, and local resource valuation.

The protective effects inside an MPA will depend on a number of factors, including MPA location, size and number, the nature of protection, movement of animals (home range) in and out of the protected area(s), and activities outside the MPA. Inside MPAs, it is likely that there will be more and bigger animals of some species, more reproductive output – potentially sustaining fish populations, preservation of genetic diversity, protection of habitats, increases in biodiversity, and reduction of bycatch and discards.

Outside MPAs, the potential positive effects include spillover and dispersal of fish eggs and larvae from within MPAs. MPAs may contribute to higher fishery production by making this spillover available to catch and by an increase in reproductive output, contributing to recruitment to the fishery. However, there is little evidence that there is a net gain in yield compared to areas without MPAs. Available information indicates that management of fisheries solely using MPA spatial approaches results in a lower potential yield than if the fishery is regulated by conventional fisheries management. Potential negative effects include an increase in fishing pressure outside the MPA, and high costs per unit of catch.

Networking of various MPAs (a total of 31 in Camiguin) is a useful management tool, especially for fish populations of sedentary target species, specific life stages of different species, and preservation of ecosystem functions. Combining MPAs with other fisheries management tools will, in all probability, make fisheries management more robust and resilient to uncertainties and management failures.

## **MPAs are a popular management measure for biodiversity conservation and fisheries management objectives.**

MPAs are established with a variety of objectives. With a view to facilitate understanding of the purpose of MPAs and their effects, characteristics of this conservation as a management tool must be clearly defined within a particular context and purpose. Any additional impacts, positive/negative social effects, and other unintended effects must also be identified and considered. The process by which an MPA is planned, implemented, and monitored greatly influences its outcome. Applying a participatory approach involving concerned resource users and other stakeholders is fundamental to successful MPA planning and implementation.

## **MPAs should be complemented with other management options to produce better effects.**

The management context needs to be understood and combinations of appropriate measures implemented accordingly.

MPAs among fisheries management measures aim to achieve optimal sustainable utilization of fishery resources. The need to take broader ecosystem-based management into account should be considered. Expand the conventional fisheries management framework to explicitly consider a wider range of aspects of the fishery and its ecosystem, including its human dimensions. Promote the use of the best tools and measures available according to defined objectives and case-specific circumstances.

MPAs will generally have both biodiversity conservation and direct fisheries management outcomes, whether or not they have been explicitly established for these purposes. To gain the most benefits, the two concepts need be bridged when planning and implementing MPAs.

The establishment of the MPAs has been the focus of discussions of the respondents, who observed many advantages and disadvantages. Majority of the respondents perceived the establishments of the MPAs to be beneficial in the long run since they observed an increase in the volume of fish. However, the impact of this increase is not felt at this time (Liong and Alangilan MPAs). On the contrary, respondents have observed a decreasing trend of fish catch in the past five years. Various factors were cited for the decrease, among these are the increase in number of fishers and commercial fishing. The MPAs have reduced the fishing areas of the fisherfolk since these areas were traditionally considered rich fishing areas, resulted in their overfishing and degradation. With the establishment of the MPAs, access to these traditional fishing grounds is restricted to allow them to regenerate.

The introduction of the alternative livelihoods in every municipality seems to be insignificant to the fishers since only few were involved in it.

There is a common perception that livelihood projects have not benefited the fishers because of low participation. Livelihood projects that relied on raw materials from marine resources also suffered setbacks due to seasonality and availability.

**Table 17.** Estimated income: previous (10years ago) and current (2017)

Previous Income(10 years ago)	Current Income (2017)	Change				
Range (Php)	Frequency	%	Range (Php)	Frequency	%	
0	28	11.11	0	8	3.17	Decreased
5000-below	106	42.06	5000-below	32	12.70	Decreased
5001-10000	77	30.56	5001-10000	90	35.71	Increased
10001-15000	25	9.92	10001-15000	59	23.41	Increased
15001-20000	8	3.17	15001-20000	29	13.41	Increased
20001-25000	2	0.79	20001-25000	10	3.97	Increased
25001-30000	4	1.59	25001-30000	16	6.35	Increased
30001-35000	1	0.40	30001-35000	5	1.98	Increased
35001-40000	1	0.40	35001-40000	3	1.19	Increased

Although Table 17 shows an increase in income of the fishers, the estimated income from the previous period vis-à-vis the current increase was based on their perception. The number of respondents who were earning Php 5,000 and below ten years ago is less in 2017, because more have reported higher income levels. However, this could not be attributed exclusively to the project interventions since there were some negative perceptions about it (Liong and Alangilan MPAs). The provision of alternative livelihoods was limited to direct beneficiaries, many of whom are no longer active in the projects. Productivity of the coastal marine resources at this point did not translate into an increase in fish catch that will eventually increase income.

The perceived increase in volume of fish in the MPAs could not be associated with increase in fish catch since “spillover” of fishes might be irregular and some fishers target pelagic species and demersal reef species. Some respondents observed that fishes tend to stay inside the MPAs, which limits their fish catch. This resulted in fishers venturing far from the coastline to fish, where they compete with the commercial fishers. This perception is corroborated by the result of the Outcome 1 which showed that the fish densities outside the MPAs are very poor. Target species are also poor outside the MPAs, which explains the decrease in fish catch.

The sustainability of the MPAs does not rely on the ordinances and presence of the fish wardens, but on the strict implementation and community participation. The community-based coastal resource management committees that were formed during the project implementation should be reorganized to serve its purpose.

The provision of alternative livelihood has been a challenge to the fishers. Livelihoods projects that rely on marine and coastal resource will always encounter issues of availability and seasonality. Livelihood

assessment could be conducted to determine the issues in the operation of the project and strategize its sustainability. Land-based projects could be an alternative livelihood, but these have to be assessed to make these sustainable.

## Overall Recommendations

After careful examination and consultation on the impact of the CCRMP, ICI Asia and OMC are recommending the following measures in order to further enhance and strengthen the management and sustainable use of Camiguin's coastal resources.

**i.** To become effective for biodiversity conservation and to meet the desired fisheries management objectives, MPAs should be complemented, where applicable, with several other fishery management tools and options. These include harvest control measures such as catch limits, fishing effort limits or restriction on number of fishing trips per gears or boats, restriction or limiting the size of fish to catch, gear restrictions; access controls such issuances of licenses, territorial use rights in fisheries, wherein those holding the user rights allocate resource use sharing or impose restrictions on who can do what within a designated area. All these complement MPAs, and can be balanced with relevant management framework and policies.

**ii.** In establishing new MPAs, a new focus should be on quality and towards networking of the existing 31 MPAs in Camiguin. The design principle will be to develop networks of MPAs, a collection of individual MPAs that cover a variety of habitat types ecologically connected through home ranges movement of larvae, juveniles, and adult key species. This means MPAs should be established to protect not just coral reefs but also sea grass beds, mangroves, or other habitats, as these are interconnected and interdependent, providing benefits to each other. The connection ensures MPAs can facilitate species recovery and replenishment after disturbance. White Island MPA, in particular, is located in an area dominated by sandy substrate and dead coral with algae (DCA) and few rubbles fields. We recommend transferring the location of the MPA to the southern portion of the island where the coral reef is much more intact and, therefore, enhanced productivity/improvement will be achieved faster as compared to the existing location. The other alternative is to deploy artificial reefs in the present location to enhance the reef complexity and thereby augment productivity.

**iii.** Intensify research in key aspects in monitoring productivity of coastal and marine resources, including vulnerability to natural hazards and climate change and fisheries, and both broad and specific topics on biology and ecology – spawning areas, technology, environmental science, and economics. Data should be available, accessible, and applicable as basis for setting coastal and marine resources fisheries management objectives.

**iv.** Significant efforts are necessary in several areas of its implementation that include stricter implementation and enforcement of laws, policies, and plans; strengthening judicial and prosecution

process; and to pursue maintenance support structures during patrolling and enforcement activities. In addition, MPA demarcation in Liong MPA in Guinsiliban and Alangilan MPA in Sagay should be in place in order to differentiate it from the regular fishing areas, otherwise fisherfolk can fish inside the sanctuary and make excuses if apprehended.

**v.** Vital to the long-term sustainability of the MPA is the social “buy-in” and compliance of stakeholders, individually and or as a group. They should be able to actively participate in the entire decision-making processes, and be allowed to influence the processes.

**vi.** Development of alternative or supplementary livelihood activities should be undertaken before establishing new MPAs, as suggested by locals in the design process. In the short-run, this will be an important incentive for participation, especially for stakeholders directly affected and economically disrupted from fishing grounds they had traditionally been using and to improve project “buy-in”.

**vii.** Explore opportunities in aquaculture/mariculture and agriculture. With plateauing production from captured fisheries, mariculture can contribute substantially to national and local fish production and nutrition. Smallholder farming has the potential to contribute to household food security and poverty alleviation. To support this, Camiguin should promote pro-smallholder value chains, increase smallholder-friendly financing and investment, and consider risk-mitigation and adaptation strategies. On the other hand, alternative income other than those identified such as fish caging or fish farming can be recommended (e.g., contract growing of Pompano fish), especially for the municipalities of Guinsiliban and Sagay where the sites are ideal for mariculture. This recommendation is intended for those fisherfolk who have the passion for fishing. Those who are not will remain in the production and ecotourism alternative livelihood programs.

**viii.** On the aspect of water quality, all information derived from the monitoring activities should be communicated to all Local Chief Executives and their corresponding departments so that a cohesive and unified sanitation strategy/program to improve further their sanitation condition will be achieved or sustained. One particular direct intervention would be to improve their existing septic tank design in order to meet allowable septic effluent standards (DAO 016-08). Secondary to this would be to establish a centralized septage treatment facility that would treat collected effluents from individual houses/commercial establishments and be managed as a private or public facility.

**ix.** Strengthen implementation of existing policies through the introduction and implementation of real-time monitoring and evaluation activities using technology and maximizing web-based monitoring and information, education, and communications (IEC); utilize Global Positioning System (GPS) mapping and geotagging, submission of narratives and data/report online, and prompt feedback vis-à-vis existing municipal programs/policies for protection.

## Specific Recommendations

### a. At the regional level:

- Support the development of small and medium enterprises, including investment support services, e.g., access to credit financing and access to best management practices
- Enable investments in appropriate infrastructures (roads, septage treatment facility, etc.), organizational structures, and capacity development to support the small-scale fisheries

### b. At the provincial level:

- Support the development of small and medium enterprises, including investment support services, e.g., access to credit financing and access to best management practices
- Enable investments

### c. At the municipal level:

- Strengthen the role and functions of FARMCs in barangays and in the municipality, as defined in the Local Government Code, in planning and implementing policies and programs for the management, conservation, development, and protection of fisheries resources
- Enforce complete delineation, delimitation, and zoning of municipal waters; include the mapping and zoning of foreshore areas for protection and production areas to ensure sustainable fisheries
- Create a lead office in the municipality to oversee the implementation of fisheries management programs and to look after the welfare services of the fishers
- Stakeholders recommended that municipal LGU-funded personnel should serve as Bantay Dagat and/or to provide incentives to volunteers (e.g., allowance/honorarium), as well as to train in scuba diving and provide equipment (underwater camera, etc.).
- Issue fishing permits and licenses according to the approved municipal zoning plan
- Implement and update municipal fishers and gear registration and color coding scheme for fishing boats
- Conduct IEC and social marketing activities on fisheries management
- Implement a solid waste disposal system or environmental management system and services or facilities related to general hygiene and sanitation
- Introduce sanitation program to improve liquid waste (septic, agricultural) management, as mentioned above (provincial level)
- Conduct regular law enforcement operations; maintenance and acquisition of law enforcement operations and assets



- » Create an adjudication body organized and trained for fisheries management
- » Organize a monitoring and evaluation team to routinely conduct biophysical, socio-economic, and fish catch monitoring activities for adaptive fisheries management
- » Put in place a data management system for fisheries, where data is retrieved and integrated into the management programs
- » Lead the development of resilient and biodiversity-friendly livelihood and enterprises for municipal fishers
- » Introduce a “contract growing” scheme for fishers where in mariculture investors will tap the fishers’ labor force to run the facility and earn a standard salary as well as performance bonus. However, this should be managed through a cooperative or association model in order to protect their rights and gain better negotiation power to prevent inequality. It is high time for our fishers to evolve from a “hunting/gathering” profession to a “sea farmer” occupation where they become active participants in fishery production and minimize dependence on fishing efforts.
- » Stakeholders recommended that Local Chief Executives appoint a municipal focal person who will facilitate the processing and application of the legal personality of the enterprises and another focal person to facilitate registration requirements of the Food and Drug Administration (FDA).

**d. At the community scale:**

- » Participate in citizens’ watch vs. MPA/ fisheries management violators
- » Stakeholders recommended that barangay LGUs should contribute to the maintenance of MPAs
- » Stakeholders recommended the setting-up of fences to demarcate the MPAs to ensure protection and maintain their integrity; they specified the use of bamboo instead of synthetic buoys
- » Use corporate sectors and private social responsibility funds to encourage actions such as “Adopt an MPA” programs
- » Fisherfolk organizations take an active role in cultivating resilient and biodiversity-friendly livelihood and enterprises in the marine, freshwater, and terrestrial ecosystem

## Alternative Livelihoods Strategies

The establishment of alternative livelihoods in Camiguin has brought about concerted efforts of different government agencies from identification, skills training, product development, packaging, and marketing. These support mechanisms in the livelihood development of fishers in the island have resulted in some positive gains in its initial implementation. However, the effectiveness of the alternative livelihoods could be further developed through a thorough livelihood assessment.

For the sustainability of the alternative livelihood projects introduced by the CCRMP, the following action points and strategies could be adopted by the proponents:

**a. Bottled Sardines Production**

- Scheduling of production based on the seasonality of raw materials
- Facilitate the registration of the enterprise
- Facilitate registration in the FDA

**b. Taguines Lagoon Aquasports and Recreation Facility (TLASRF)**

- Intensify marketing promotion of the facility
- Continuous capacity-building for service providers
- Link facility to province-wide ecotourism package
- Review the profit sharing scheme of the LGU, fishers organization, and eco-paddlers
- Benchmark with similar facilities outside Camiguin

**c. Squid Processing**

- Financial management training for the organization
- Set up a financial management system
- Procure appropriate fishing gears for squid capture
- Research and development of new squid value-added by-products
- Continuous product development and marketing

**d. Coco-sugar Production**

- Source raw materials from other areas
- Review the enterprise plan
- Open membership to other interested coconut farmers
- Set up a financial management system

**e. Cabuan Community Village and Coastal Tour**

- Address the tenure of the project site
- Identify an alternative site for the project

**f. Pasil Reef Eco-tourism Support Services Enterprise**

- Intensify promotions campaign
- Link the enterprise to other tourist spots through a province-wide ecotourism package
- Set up a financial management system

**g. Punta Fun Dive, Snorkeling and Paddling Tour (Public-Private Partnership)**

- Review the MOA between the LGU and the operator
- Conduct monitoring of the enterprise
- Link the enterprise to other tourist spots through a province-wide ecotourism package

**h. Blue Lagoon Fun Dive, Snorkeling and Paddling Tour (Public-Private Partnership)**

- Review MOA between the LGU and the operator
- Conduct monitoring of the enterprise
- Link the enterprise to other tourist spots through a province-wide ecotourism package

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