

## Marine Protected Area Networking in the Center of the World's Marine Shorefish Biodiversity Abundance: Verde Island Passage Marine Corridor

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### Key Message

- Effectively managed marine protected area (MPA) sites and networks yield optimal ecological and socioeconomic benefits. Not only do the networks help in the recovery of fisheries, but they also meet other environment and human needs such as maintenance of coastal water quality, shoreline protection, and increased opportunities in livelihood and tourism.
- MPA sites and networks can successfully raise the awareness, vigilance, and participation among local communities in the network. Instead of tension and resentment toward conservation programs, MPA sites and networks are able to secure the support of primary stakeholders, i.e., the communities. In Batangas, greater appreciation was observed among local fishers on the significance and direct benefits of MPAs in their locality, the linkages between MPAs of adjacent municipalities and fishing grounds, and the necessity to protect areas beyond their jurisdiction. The strict enforcement of local ordinances and fishery laws lessened the incidence of illegal fishing.
- The Batangas MPA network proved to be an effective management mechanism that can be scaled up for broader coverage of the Verde Island Passage Marine Corridor, the main center of the world's marine shorefish biodiversity.
- Collaboration between donors and international organizations greatly enhanced management efforts in addressing environmental and other sustainable challenges.
- The ICM program contributed to a successful and sustainable MPA network.

### Abstract

The Philippines is known for being one of the world's centers of marine biodiversity (Roberts, et al., 2002; Carpenter and Springer, 2005; Box 1). However, climate threats and human activities were constantly endangering its marine resources like fishing overcapacity and destructive fishing practices (Cabral, et al., 2014). In order to protect the coastal habitats, conserve biodiversity, sustain the fisheries resources, and improve the livelihood



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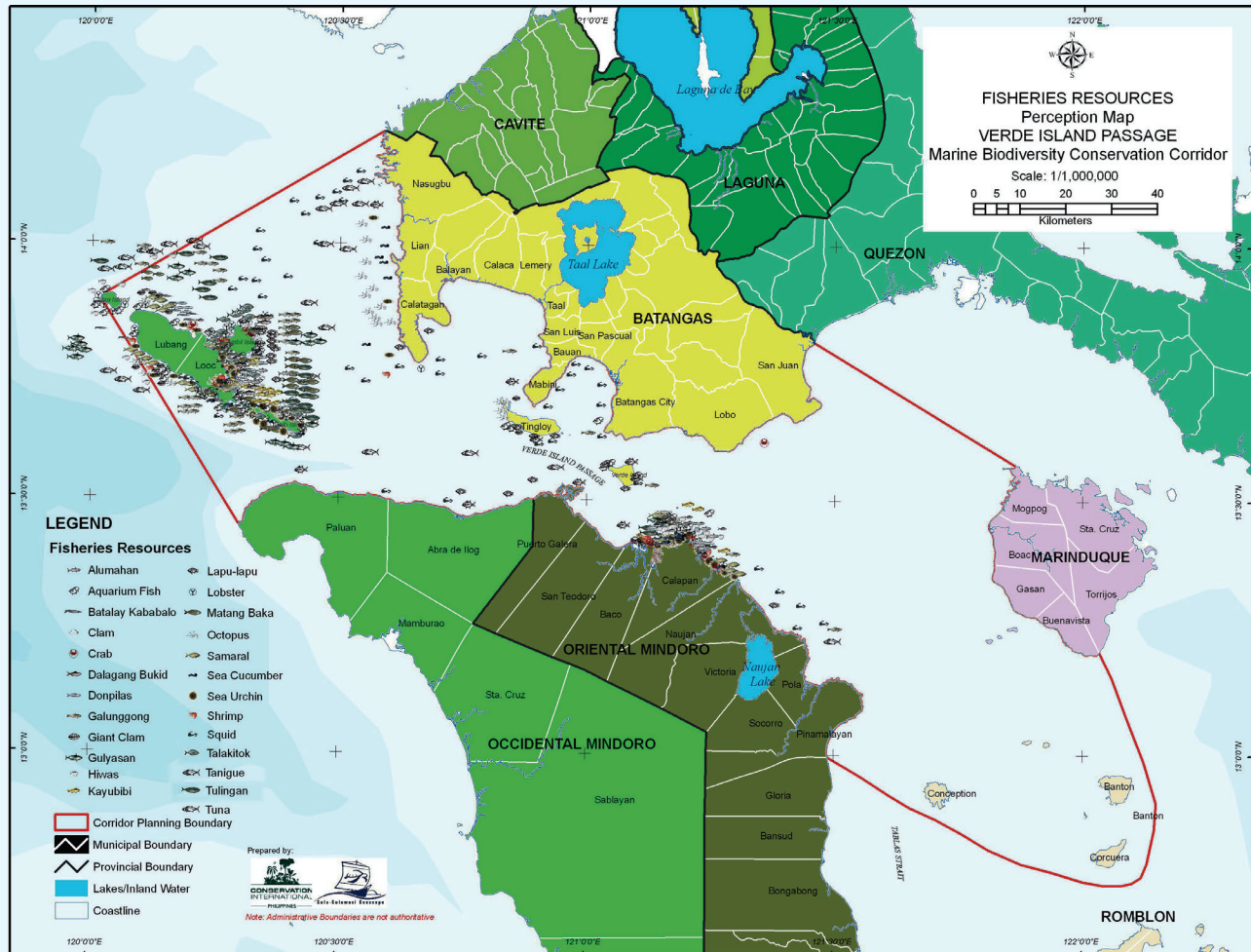
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### Box 1. Verde Island Passage Marine Corridor.

The Verde Island Passage Marine Corridor is situated between Southern Luzon (Batangas) and Mindoro. It is about 100 km long and only about 20 km across at its narrowest point. The channel is relatively deep with maximum bathymetry of about 1,000 m along the northwest coast of Mindoro (Figure 1).

**Figure 1. Fisheries Perception Map of the Verde Island Passage Marine Biodiversity Conservation Corridor.**



The South China Sea and Pacific Ocean waters also converge and probably exchange properties within this passage bringing nutrients that sustain the more than 300 species of corals that host nearly 60% of the world's known shorefish species (Carpenter and Springer, 2005). Because of its high marine biodiversity, Verde Passage has been placed at the peak of the "Coral Triangle" that spans the Sulawesi and Sulu Seas and nearby Indonesia. Verde Passage is a vital corridor for marine-based tourism, transportation and international shipping, the conservation efforts have been focused on this important waterway.

The Batangas MPA network is a significant portion of the Verde Island Passage (VIP) MPA network, which is possibly the only network in the Philippines to have biological and social components dedicated for MPA and enforcement initiatives. In fact, the Verde Island Passage marine biodiversity conservation corridor has 36 MPAs – 24 of which are in Batangas and 12 in Oriental Mindoro (Quibilan, et al., 2008).

of coastal communities, the establishment of MPAs and MPA networks in various regions of the country was initiated.

Over the last 20 years, the Province of Batangas showed significant progress in expanding its management strategies for the sustainable development of the coastal and marine areas. This started in 1994, in partnership with PEMSEA, in Batangas Bay wherein the ICM system was demonstrated. The province developed a 15-year Strategic Environmental Management Plan (SEMP) (2005–2020), which was updated to include three action plans, namely habitat restoration and management, water resource protection and management, and fisheries protection and management.

Several approaches were adopted by the concerned municipal governments to more effectively address the above coastal and marine resource development challenges:

- MPAs and MPA networks were identified using scientific criteria;
- The Batangas MPA and a management mechanism composed of various relevant agencies and institutions from the government, NGO, and academe were formally established to support MPA management. The MPA Network was established through a Memorandum of Agreement for collaborative work at the local, regional, and national levels;
- A short-term MPA management plan was developed with targeted goals and actions in accordance with the characteristics of each MPA of the network;
- Public education, communication, and awareness-building programs were implemented and sustained for the stakeholders involved in MPAs;
- The impacts and benefits derived from the MPA network were monitored, assessed, and reported,

and an annual biophysical and socioeconomic monitoring and assessment were conducted to check the health of the marine ecosystem;

- A Recognition Awards Scheme for MPA plans and their implementation to generate sustained interest within the network was organized; and
- Regular and deputized patrols were conducted against MPA violators. All these actions resulted in the increase in both size and number of MPAs and continued financial support.

## Background

The establishment and effective management of MPAs is one of the most effective means of protecting marine and coastal biodiversity (IUCN, 2010). While the Philippines is one of the world's centers of marine biodiversity, its marine resources are constantly endangered by climate threats and unregulated human activities, such as overfishing and destructive fishing practices; increased domestic, agricultural, and industrial runoff from a fast growing population; poor land use; and increased sedimentation from watershed deforestation and unregulated mining activities (Cabral, et al., 2014).

To address these challenges, the country's national and local governments established MPAs and MPA networks in various regions, mainly to protect coastal habitats, conserve biodiversity, sustain fisheries resources, and improve livelihoods of coastal communities and fishers.

According to IUCN (2010), MPAs play an important role in replenishing biodiversity and contributing to human well-being. For example: (a) "no-take" MPAs quickly double the amount and size of fish; (b) they serve as safe breeding grounds for threatened species while protecting a variety of marine ecosystems, and sustaining the rich biodiversity; and (c) they generate opportunities for tourism, creating jobs and income.

To ensure the sustainable, long-term effects of MPAs, policymakers and enforcers must follow standard practice in the identification, design, and establishment of MPAs, including the establishment of networks based on sustainable conservation perspective or management objective.

As stated by Conservation International (CI)-Philippines, “MPA sites are selected and established based on the results of biological and social research, and those which have the most potential for delivering conservation benefits” (CI-Philippines, 2009). It is also important to note that in the Philippines, the MPA network is regarded as a “means to improve management of existing MPAs by forging collaborative partnerships among local governments to coordinate initiatives and share information and resources” (Horigue, et al., 2014).

One good illustration is the Province of Batangas, Philippines, which features a number of established MPAs and an active enforcement network. The Batangas MPA Network encompasses 11 coastal municipalities (Bauan, Balayan, Calatagan, Lobo, Lemery, Lian, Mabini, Nasugbu, San Juan, San Luis, and Tingloy) and Batangas City, all located in the three major bays of the Province: Batangas Bay, Balayan and adjacent bays, and Tayabas and adjacent bays.

The Province of Batangas, through the coordination of the Provincial Government - Environment and Natural Resources Office (PG-ENRO), made significant progress in expanding its management strategies for sustainable development of the coastal and marine areas over the last 20 years. Starting with Batangas Bay as a demonstration site in 1994, in partnership with PEMSEA, the ICM system was replicated and now covers the entire coastline of the province (extending to Balayan and adjacent bays in year 2000, and Tayabas Bay and adjacent bays in 2005, in partnership with the World Wide Fund for Nature-Philippines [WWF-Philippines] and Conservation International-Philippines [CI-Philippines]).

Batangas Province updated a 15-year Strategic Environmental Management Plan (SEMP) (2005–2020) to address new challenges, explore new development opportunities, enhance management skills, further promote stakeholder cooperation, and strengthen policy and management integration to reduce negative impacts of development on environmental quality throughout the whole province. Three new action components were added: (1) habitat restoration and management; (2) water resource protection and management; and (3) fisheries protection and management.

In order to implement the above action components, the Provincial Government of Batangas, in partnership with CI-Philippines, established, rectified, and expanded the existing MPAs and MPA network, thereby strengthening network operation, communication, and education campaigns as well as capacity development through closer cooperation and partnerships with the 12 coastal city and municipalities of the province.

## Approach and Methodology

### Identify MPAs and set up MPA networks

Identification of MPA sites and establishment of the Batangas MPA Network were undertaken based on scientific criteria. CI-Philippines invested in the conduct of connectivity studies in order to determine potential MPA sites based on their capability to act as efficient sources and sinks of propagules (Box 2). Previous studies revealed: “MPAs located at sink populations often depend upon replenishment from outside areas, thereby diminishing prospects for long-term viability as well as fishery benefits if the source is removed or depleted.” (Pulliam and Danielson, 1991; Roberts 1998; Stewart, et al., 2003 in IUCN-WCPA, 2008).

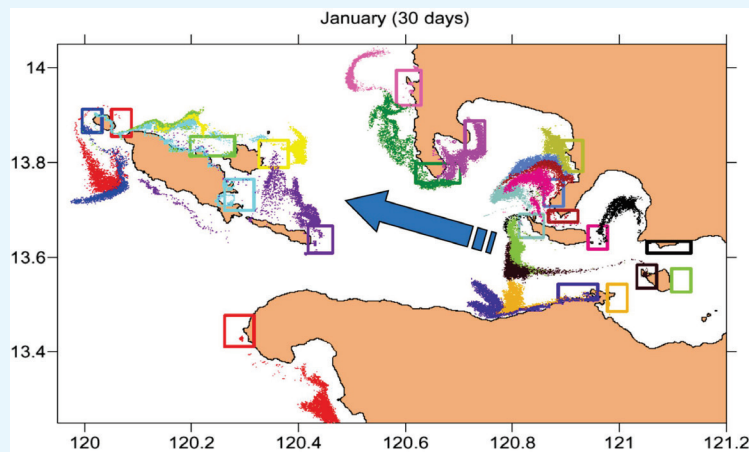


### Box 2. Simulated larval dispersal.

An MPA network enables fish larvae to migrate from one MPA to another. Fish populations are connected to other areas through the process of larval drift (Figure 2). Fish egg and larvae spawned inside MPA in the Verde Island Passage drift along ocean currents. They can re-seed and replenish fish stocks at a distant location, helping fisheries to recover.

The MPA network, thus, provides a framework that unifies the central aims of conservation and fishery management, while also meeting other human needs such as maintenance of coastal water quality, shoreline protection, education, research, and recreational opportunities.

**Figure 2. Simulated larval dispersal patterns.**



The results from the studies were used as basis in rectifying and establishing new MPA sites in the Verde Island Passage. New information (e.g., presence of coral reefs, accurate coordinates, and actual size of MPAs in hectares) was used to correct the profiles of the existing areas to be protected and conserved.

Information obtained from the survey and scientific analysis were also useful for educating the communities. It provided fishers and local leaders a different perspective on the interconnectivity between sites and their importance to marine conservation. Principally, it contributed to greater appreciation among local fishers of the significance of MPAs in sustaining fishery resources and the fishing grounds, better understanding of MPA linkages with those of adjacent municipalities, and the necessity to protect bigger MPA areas beyond jurisdictional boundaries (Box 3).

### Establish a mechanism for improving governance

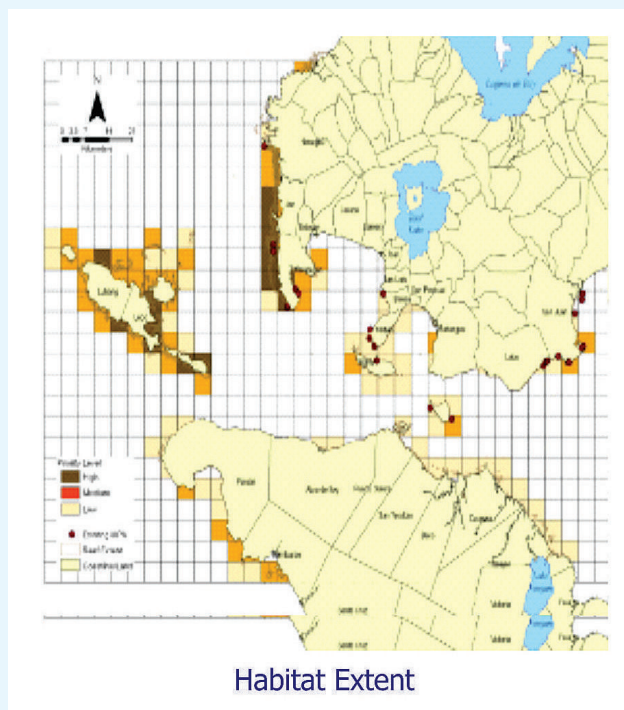
The Batangas MPA Network was established as a multi-sectoral network consisting of government and nongovernment organizations, people's organizations, and academic institutions bound by the terms and conditions of a Memorandum of Agreement (MOA) (Figure 4). The MOA aimed to support MPA actions through complementary and collaborative efforts at the local, regional, and national levels. It was formulated in accordance with the Philippines Marine Sanctuary Strategy (PhilMarSaSt), which sought to contribute to the improvement of MPA management by conserving/protecting at least 10 percent of coastal areas by 2020 (Micalat, et al., 2008).

To facilitate the operation of the MPA network, a constitution and its by-laws were formulated and adopted. Stipulated in the constitution and

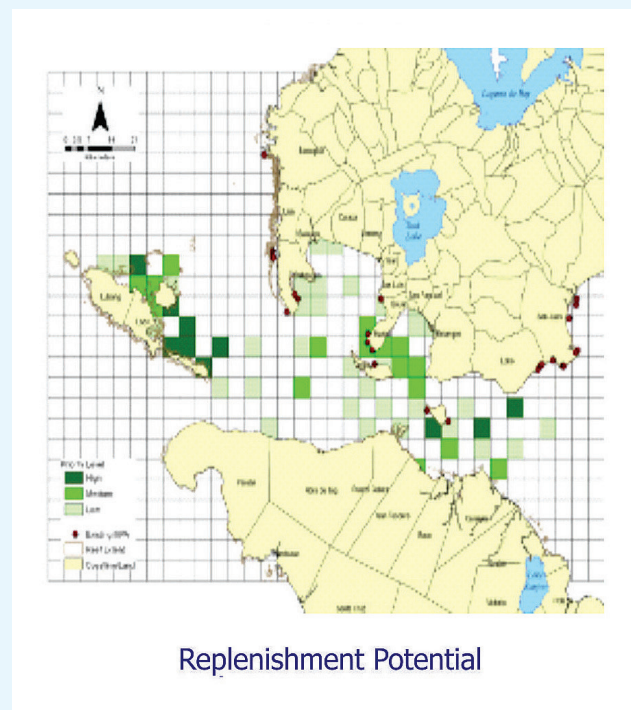
### Box 3. Science-based management.

As in the identification and establishment of MPAs, scientific information should drive the management of MPA networks. Biological information such as profiles and migration patterns of species should be the basis in the design of a resilient ecological MPA network. As experts have discussed and concluded during the East Asian Seas (EAS) Congress in 2009: biological information helps design an effective and efficient network of MPAs, and should be the basis in expanding managed sites as needed to help secure critical habitats.

**Figure 3A. Extent of habitats:** maps and ranks (from high to low), the distribution of habitats (corals, sea grass, mangroves), and spatial extent that can be declared as protected areas.



**Figure 3B. Replenishment potential:** based on the extent of habitats within the area, this map shows the potential sources of fish larvae (and other organisms) which need protection.



by-laws were the vision, mission, goals, policies, functions, and responsibilities of each member and officer of the network.

#### Develop a time-bound MPA management plan with targeted goals and actions

Network members formulated operative management plans for their respective MPAs (Figure 5). In addition to addressing threats on biodiversity from resource use conflicts and natural occurrences, the plans included

setting up a management council, organizing and mobilizing communities, delineating MPA boundaries, designating zoning for approved activities, establishing a user fee system, and carrying out information and education campaigns.

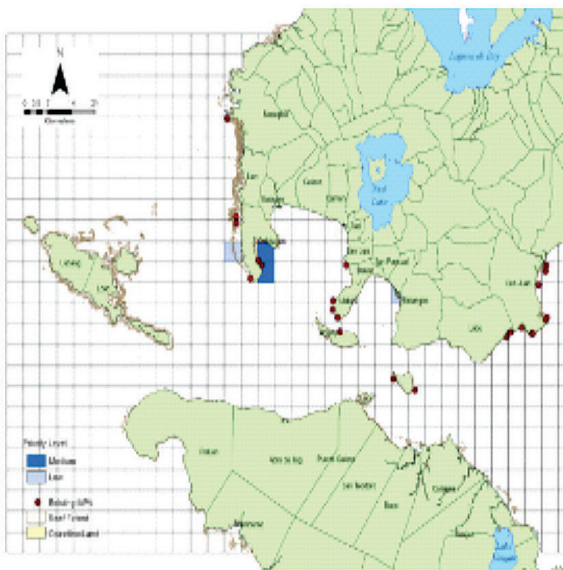
#### Maintain public education, communication, and awareness building programs

Public education and information dissemination activities were initiated at each MPA site to keep

Box 3. Cont.

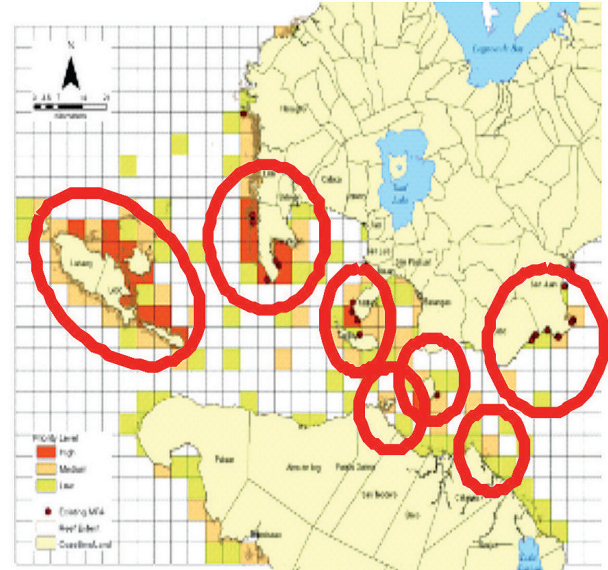
Based on the foregoing, experts proposed that MPA networks should build upon existing MPAs for scale up and better connectivity; streamline existing networks rather than create new ones; and mainstream MPAs within ICM as they cannot exist in isolation without the management of externalities or the effects from outside of the MPA.

**Figure 3C. Threats based on assessment:** a composite ranking of threats needed for selection, management, and monitoring of MPAs.



Threats based on assessment

**Figure 3D. Best MPA options:** based on the extent of habitats and potential replenishment; maps the best area on where to declare a MPA.



Best MPA Options

the communities aware of the importance of MPA and sanctuaries and to mobilize them to collectively protect and conserve these natural ecosystems of the province (Figure 6).

Signages pointing to MPA and sanctuaries were put up along the roads. These activities were made possible through a collaborative effort of CI-Philippines, PG-ENRO, and the concerned city/municipality.

### Monitor, assess, and report on the impacts and benefits derived from the MPA network

Regular biophysical and socioeconomic monitoring was carried out annually to assess the health of the marine ecosystem, status of local economy, and resource utilization in the coastal community. Permanent biophysical monitoring sites were also established for the conduct of reef surveys including the monitoring of species and abundance of fishes, invertebrates, and corals.



**Figure 4. Signing of Memorandum of Agreement on Batangas MPA Network.**



MEMORANDUM OF AGREEMENT

KNOW ALL MEN BY THIS PRESENTS:

This Memorandum of Agreement is made and entered into by and among:

The **PROVINCE OF BATANGAS**, with office address at the Provincial Capitol, Batangas City, represented herein by its Honorable Governor Rosa Vilma Santos-Recto, referred to as the Province of Batangas;

The **CITY OF BATANGAS**, with office address at the City Hall, Batangas City, represented by its Honorable Mayor Eduardo B. Dimacucha, hereinafter referred to as the City of Batangas;

The **MUNICIPALITY OF BALAYAN**, with office address at the Municipal Hall, Balayan, Batangas, represented by its Honorable Mayor Emmanuel Salvador O. Fronda, hereinafter referred to as **BALAYAN**;

The **MUNICIPALITY OF BAUAN**, with office address at the Municipal Hall, Bauan, Batangas, represented by its Honorable Mayor Ryan M. Dolor, hereinafter referred to as **BAUAN**;

The **MUNICIPALITY OF CALATAGAN**, with office address at the Municipal Hall, Calatagan, Batangas, represented by its Honorable Mayor Sophia G. Palacio, hereinafter referred to as **CALATAGAN**;

The **MUNICIPALITY OF LOBO**, with office address at the Municipal Hall, Lobo, Batangas, represented by its Honorable Mayor Virgilio R. Manalo, hereinafter referred to as **LOBO**;

The **MUNICIPALITY OF MABINI**, with office address at the Municipal Hall, Mabini, Batangas, represented by its Honorable Mayor Nilo M. Villanueva, hereinafter referred to as **MABINI**;

The **MUNICIPALITY OF NASUGBU**, with office address at the Municipal Hall, Nasugbu, Batangas, represented by its Honorable Mayor Antonio A. Barcelon, hereinafter referred to as **NASUGBU**;

The **MUNICIPALITY OF SAN JUAN**, with office address at the Municipal Hall, San Juan, Batangas, represented by its Honorable Mayor Danilo S. Mindanao, hereinafter referred to as **SAN JUAN**;

The **MUNICIPALITY OF TINGLOY**, with office address at the Municipal Hall, Tingloy, Batangas, represented by its Honorable Mayor Lauro F. Alvarez, hereinafter referred to as **TINGLOY**;

WITNESSETH THAT:

WHEREAS, the coastal marine area of Batangas province, being part of the Verde Island Passage, possess one of the highest marine biodiversity in the country;

WHEREAS, the PGB adopted a Strategic Environmental Management Plan (SEMP), to properly manage and conserve the coastal marine resources of the province through an integrated coastal management (ICM) strategy, wherein all local government units (LGUs) are enjoined to participate and support;

**Figure 5. A typical table of contents of MPA management plan.**



| MABINI MARINE PROTECTED AREA MANAGEMENT PLAN |                                                                                                            |  |
|----------------------------------------------|------------------------------------------------------------------------------------------------------------|--|
| Table of Contents                            |                                                                                                            |  |
| Executive Summary                            |                                                                                                            |  |
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|                                              | 1.2. Conditions of Live Hard Corals, Fishes, Living Marine Organisms And Other Assets                      |  |
|                                              | 1.3. Conditions of Sanctuaries Inside the Marine Reserve                                                   |  |
|                                              | 1.3.1. Twin Rocks Sanctuary                                                                                |  |
|                                              | 1.3.2. Arthur's Rock Sanctuary                                                                             |  |
|                                              | 1.3.3. Calabuh Rock Sanctuary                                                                              |  |
|                                              | 1.4. Socio-Economic Profile of the Communities Adjacent to the Marine Protected Areas                      |  |
|                                              | 1.5. Climate Change and Its Impact on the Marine Protected Areas and The Sanctuaries                       |  |
|                                              | 1.5.1. Definition and Impacts of Climate Change                                                            |  |
|                                              | 1.5.2. Climate Change and Coastal Environment in Mabini MPA And Sanctuaries                                |  |
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|                                              | 3.3. Goal                                                                                                  |  |
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|                                              | 3.5. Issue Statements                                                                                      |  |
|                                              | 3.6. Plans, Programs, Projects and Activities                                                              |  |
|                                              | 3.7. Adaptation Options to Climate Change                                                                  |  |
|                                              | 3.7.1. Adaptation Goal: Functional and Healthy Ecosystem                                                   |  |
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|                                              | Adaptation Goal: Functioning and Healthy Ecosystem                                                         |  |
|                                              | Adaptation Measure: Expansion of Marine Protected Areas                                                    |  |
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|                                              | Adaptation Measure: Fisheries Sector Good Practices                                                        |  |
|                                              | 3.7.4. Adaptation Goal: Diversified Livelihood                                                             |  |
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|                                              | 3.7.6. Adaptation Goal: Built Environment Exposed to Less Exposed                                          |  |
|                                              | Adaptation Measure: Coastal Development Setbacks                                                           |  |
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|                                              | Adaptation Measure: Community-Based Disaster Risk Reduction                                                |  |
| 3.8. Organizational Development              |                                                                                                            |  |
|                                              | 3.8.1. Capacity Building for the Management Body: The Marine Reserve-Resource Executive Committee (MR-REC) |  |
|                                              | 3.8.2. Implementation of Premium Fees Collection and Disbursement                                          |  |
|                                              | 3.8.3. Legitimization of the Plan                                                                          |  |
| Chapter IV                                   | Implementation of the Plan                                                                                 |  |
|                                              | 4.1. Maintaining the Plan                                                                                  |  |
|                                              | 4.2. Implementation of the Plan                                                                            |  |
| Chapter V                                    | Monitoring and Evaluation of the Plan                                                                      |  |

**Figure 6. Information campaigns were conducted to increase public awareness.**





In addition, perception surveys were conducted regularly to gauge the level of awareness of the stakeholders, their perceived benefits from the MPA, their perception on the functionality of the management, and their willingness to support the program. The network was appraised of the result of the survey. The designated coordinators in turn developed and implemented improved action programs to achieve effective management in MPAs.

### Recognition award

To generate sustained interest among the MPA implementers at the city/municipal level, the provincial government of Batangas, with the support of CI-Philippines and First Gen Corporation, established an incentive scheme – Recognition Awards for MPA Development Plan drafters and implementers. The awards not only recognized but also popularized good MPA governance practices and performance across members of the Verde Island Passage MPA Network in Batangas coastal city/municipalities. Aside from facilitating transparency and incentives that promote accountability of the management bodies, the award scheme also promoted the significance of MPAs.

### Implement regular and deputized patrols

Management of MPA requires an enforcement system for general compliance. In the case of Batangas, this responsibility falls on the *Bantay Dagat* (Sea Patrol), a group of volunteer fishers from coastal barangays who regularly patrol the municipal waters against illegal fishing. The Bantay Dagat members were legitimate enforcers, deputized by the Philippine Department of Agriculture under the Bureau of Fisheries and Aquatic Resources (BFAR) after undergoing required training. Having been deputized by BFAR, they were recognized by the municipal government to conduct or execute their operational plans in coordination with the Philippine National Police (PNP) and the PNP Maritime Group.

## Results

### Increase in both size and number of MPAs

From a baseline of 445 ha of “no-take” zones and 286 ha of buffer zones in 2008, the Batangas MPA Network expanded its MPAs to 1,924 ha within a span of four years. The 38 MPAs covered 1,400 ha of coral reef and seagrass beds and 523.5 ha of mangrove forest conservation areas. While management and enforcement of these MPAs were being improved, other municipalities likewise initiated the establishment of new MPAs. By 2016, 42 MPAs were added covering an area of 2,093 ha (mangrove: 567.04 ha; coral reef/seagrass: 1,525.851 ha).

The network operation greatly enhanced coordination among stakeholders. Strict enforcement of local ordinances and fishery laws significantly lessened incidents of illegal fishing. Over time, incremental benefits were observed in those municipalities hosting MPAs and these benefits spilled over to other adjacent coastal municipalities.

### Sustainable financing

The MPAs are attractive tourist sites, especially to those interested in coral reefs and marine life. They contribute significantly to the local tourism industry. In Batangas Province, the local governments enacted a Unified Conservation Fee ordinance to finance the management and maintenance of the local tourism industry. User fees were collected from divers and shared between the municipal governments of Mabini and Tingloy. The fee structure consisted of a dive fee of PhP 200/per day (US\$ 4) or an annual fee of PhP 3,400 (US\$ 68) per guest. On the other hand, Mabini and Tingloy residents were required to pay only PhP 1,500 (US\$30) annually. The fees were set aside as a trust fund, 85% of which was intended solely for conservation of MPAs and the

remaining 15% was for the general fund of the local government units (LGU).

In addition, the local governments hosting the MPA network also increased their appropriation in support of the various programs and projects. The provincial government allocation for environment increased from PhP 4.97 million (US\$ 112,000) in 2008 to PhP 14.135 million (US\$ 320,000) in 2014.

## Lessons Learned

**Science plays a major role in the establishment of effective network of MPAs.** Identifying areas to be declared as protected and conservation zones needs to go through scientific assessment to determine the extent of habitats, current and potential threats, and replenishment potential. An understanding of the extent and level of MPA management coverage in terms of biodiversity conservation is vital to the success of the networks. The use of geographical information system to translate scientific information into easily understood maps was an effective tool in convincing stakeholders and communities to be part of the MPA network.

**The ICM program contributed to a successful and sustainable MPA network.** The ICM program provided the concerned city/municipal governments the avenues, collective planning and management framework, partnership platform, and policy and coordinating mechanism conducive for the development and implementation of sustainable network of MPAs. The inter-LGU arrangements, joint fisheries law enforcement, and establishment of bay management councils were some of the outcomes of ICM implementation. The MPA management plans and the subsequent capacity development contributed to the overall objective of sustaining biodiversity conservation of the broader ICM

program. Similarly, effective law enforcement required close interagency coordination and mutual support. For example, the strict enforcement of local ordinances and fishery laws by *Bantay Dagat* not only reduced the incidents of illegal fishing but also contributed to fishing and nursery grounds protection.

In addition, the ICM objectives, frameworks, processes, and platforms offered partnership opportunities for new or additional inputs or investments by other national or international donors/organizations in enhancing conservation and sustainable development objectives. The participation of CI-Philippines presented the mutually reinforcing cooperation and partnership with PEMSEA, which has contributed significantly to the effective functioning and sustainability of the MPA network.

**Build strong partnerships.** Strong collaboration and partnership across national government agencies, NGO, academic institutions, private sector, and other stakeholders in planning, implementation, enforcement, and management was needed to sustain protected area management.

**Ensure suitable livelihood opportunities/options that are part of the MPA network development.**

Local community participation would be difficult to achieve if MPA management did not integrate community development objectives, in particular, employment and livelihoods. Some MPAs in Batangas were managed as ecotourism ventures, largely by people's organizations (e.g., "Ang Pulo" [Calatagan Mangrove Forest Conservation Park]) or by dive site operators. With the increase in tourist arrivals, business plans were developed, which created opportunities for the communities to earn additional income such as tour/dive guides and boatpeople (servicing divers), by serving as crew and staff members in resorts, by selling souvenir items like bags and t-shirts, and by offering food catering services.

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