

Status of Six Marine Protected Areas in Palawan, Philippines Based on the Perception of the MPA Managers and the Local Communities

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ABSTRACT

Establishment of Marine Protected Areas is a very useful approach in conservation and fishery management. Despite the large areas of MPAs established all over Palawan, knowledge on the current status of many MPAs and their effects to the communities and the environment around them are limited. Here, the status of six MPAs, namely, Sabang Rasa, Seven Line, Johnson, Port Barton and Pambato, were assessed in terms of basic features of a functioning MPA. The data on biodiversity monitoring of the MPAs collected from the municipalities were not complete or files may have been lost. In general, the MPAs have not been able to meet their objectives on the protection of biodiversity and restoration of damaged habitats. Among the MPAs, only Rasa and Seven Line have annual budget allocation. The communities of Sabang, Rasa, Seven Line, and Pambato are involved in the monitoring and patrolling of illegal fishing activities but no monitoring is conducted in Port Barton and Johnson. Law enforcement was limited as only few bantay-dagat members were assigned to monitor and patrol the MPA. The managers reported that they are not fully focused on managing the MPA as they also have other priority tasks in their respective offices. The lack of funds, lack of capable focused managers, and lack of community involvement all together would cause the MPA to fail. Addressing these lapses head-on is critical for the success of the MPA. The results here will serve as baseline information to develop new strategies for improved and effective management of MPAs in the Philippines.

Keywords: Status, marine protected areas, Palawan, Philippines

INTRODUCTION

Exploitation of coastal marine habitats like coral reef, mangroves, and seagrass areas beyond their capacity to recover is one of the biggest issues the world is facing today. For example, coral reefs worldwide are suffering from massive declines mainly due to anthropogenic activities (Wilkinson, 2004). Worm and colleagues (2006) projected that fisheries may decline fast enough to be exhausted by the year 2048 if not managed properly and immediately. From those declines, the establishment of protected areas is a leading strategy to mitigate ongoing losses in biodiversity and to secure fishery production (Mora and Sale, 2011).

Establishment of marine protected areas (MPAs) such as reserves, sanctuaries and parks are very useful approaches to protect well-defined areas and critical habitats (Agardy, 1997). This has been adopted by two of the world's leading conservation organizations, the World Wide Fund for Nature (WWF) and the IUCN-The World Conservation Union, as number one objective in global strategy for conserving areas of high biological importance and productivity. The IUCN defines MPA as an area within the marine environment that is "a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural value" (Dudley, 2008). Selection of an area to be declared as MPA includes the area's high productivity or because it serves a special ecological function like spawning and/or feeding ground for marine species (DENR et al., 2001).

Over the last two decades, establishment of MPAs have become a high profile strategy for marine conservation. This is demonstrated by the increasing number of MPA designations as well as international policies like Target 11 of the 2010 Aichi Biodiversity Targets under the United Nations Convention on Biological Diversity, which aims to protect more than 10% of coastal and marine areas globally by 2020 (Wallmo and Kosaka, 2017). As of 2016, there are about 5,000 MPAs designated around the world covering 0.8% of the world's ocean, which is based on the information that were tracked, monitored and compiled by IUCN and the World Conservation Monitoring Center (UNEP-WCMC and IUCN, 2016).

Most MPAs are located along or close to the coast and mostly found in the tropics (UNEP-WCMC and IUCN, 2016). In the Philippines, the first municipal marine park or fish sanctuary was established in 1974 on Sumilon Island, Cebu with the assistance of Siliman University and its marine laboratory (Alcala, 2001). Another MPA, the Apo Island Marine Reserve, was established in early 1980s in Negros

Occidental. Both MPAs became successful and often cited in the Philippines and even internationally as the best example why coral reef fish sanctuaries contribute in the improvement of reef fisheries (White, 1987; Russ and Alcala, 1996a; Alcala, 2001; Abesamis, 2006; Babcock et al., 2010). These happened because all fishing activities in the area, especially the destructive methods, were stopped. In Sumilon Island, there were no fishing activities for 10 years that allowed the corals and fish to grow and recover. Its living coral cover more than doubled and the fish abundance on the reef, as measured in terms of fish individuals per 500 m², increased that the annual catch of fishermen reached 36 t/km² from 14 t/km² (Russ and Alcala, 1996a; 1996b). This unprecedented fish catch and large measurable increase convinced scientists, reef managers, and fishers, that fish sanctuaries really enhanced reef fisheries (Abesamis, 2006; Babcock et al., 2010; Aburto-Oropeza et al., 2011).

Establishment of MPAs can bring different socioeconomic and ecological benefits (Agardy, 2000; Ruiz-Frau et al., 2015). It can bring socioeconomic advantages to the communities through increasing employment, tourism revenues, promoting livelihood strategies, protecting traditional culture and enhancing ecosystem service supply (Dudley et al., 2013). However, the capability of MPAs to bring those benefits may be hampered by social and economic problems, especially in the areas that are poorly planned and managed (Agardy et al., 2011).

Palawan serves as repositories of diverse species of flora and fauna. It is home to 379 species of corals, 13 species of seagrasses and 31 species of mangroves (e.g. Chou et al., 2002; Long and Giri, 2011). Thus, MPAs were established to mitigate the threats on the coastal marine ecosystems. Currently, there are 189 MPAs spread all over Palawan covering a total area of 680,542.64 has (PCSD, 2015; PCSD unpublished report). Despite the large areas of MPAs established all over Palawan, knowledge on the current status of many MPAs and their effect to the communities and the environment around them are limited. Here, the status of six MPAs, namely, Sabang Reef Fish Sanctuary, Rasa Island Southwestern Tip Fish Sanctuary, Seven Line MPA, Johnson Island MPA, Port Barton MPA and Pambato Reef Marine Sanctuary, were assessed in terms of basic features of a functioning MPA with effect to the environment and community, as well governance, as indicator categories. The status of the MPAs were determined by interviews with the MPA managers and local communities. This study contributes in determining the factors that influence the status of the respective MPAs, which can be used as baseline information to develop new strategies for improved and effective management of MPAs in the Philippines.

MATERIALS AND METHODS

The study sites

Six MPAs were selected for the study, namely, Rasa Island Southwestern Tip Fish Sanctuary (Rasa) in the municipality of Narra, Seven Line MPA (Seven Line) in Aborlan, Pambato Reef MPA (Pambato) and Sabang Reef Fish Sanctuary (Sabang), both in Puerto Princesa City, Johnson Island MPA (Johnson) in Roxas, and Port Barton MPA (Port Barton) in San Vicente (Fig. 1). Of these, Rasa, Seven Line, Pambato, and Sabang were identified to be active, defined as working and operating, based on the information gathered from the Palawan Council for Sustainable Development, the Bureau of Fisheries and Aquatic Resources and the City Agricultural Office. On the other hand, Johnson and Port Barton were identified to be in inactive status. Table 1 shows the respective information on the MPAs including their status.

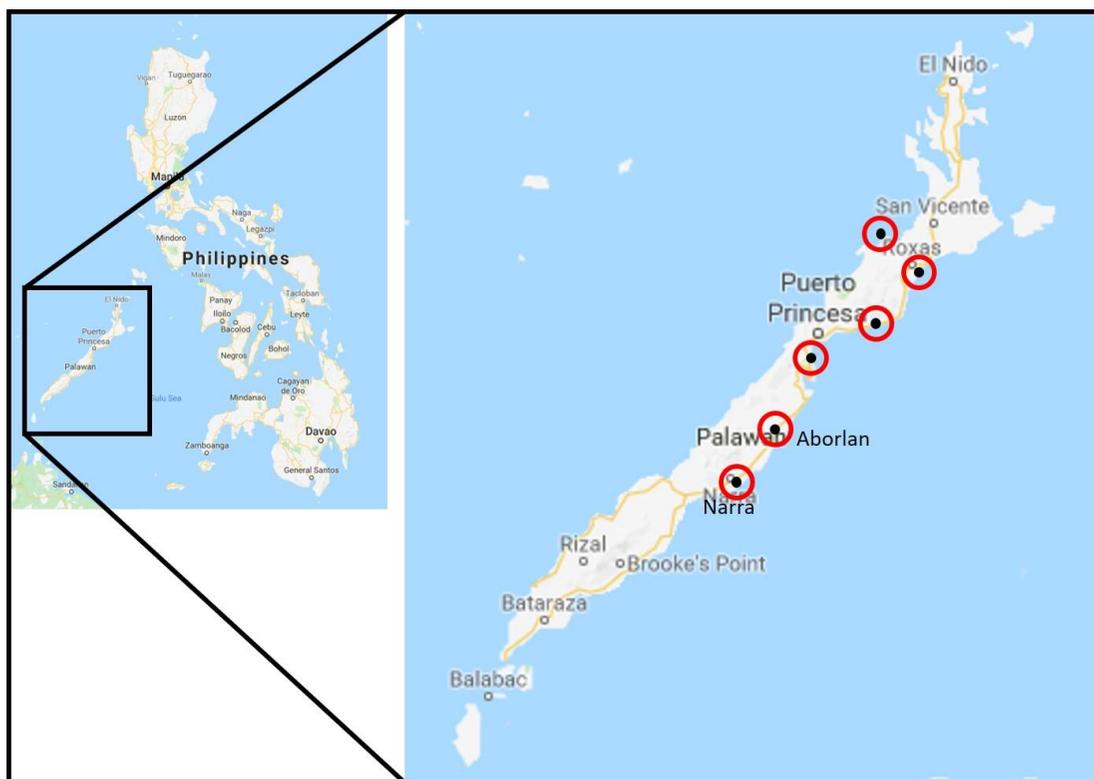


Figure 1. Map of Palawan showing the six study sites (in red circles).

Table 1. The MPAs included in this study and their respective status.

Municipality	MPA name	Year established	Instrument of Declaration	Declared area (has)	Status*
Aborlan	Seven line MPA	2016	Municipal Ordinance No. 08 s2016	79, 910	Active
Narra	Rasa Island Southwestern Tip Fish Sanctuary	2005	Municipal Ordinance No. 2005-159	63.88	Active
Puerto Princesa City	Pambato Reef Marine Sanctuary	2008	Ordinance No. 390; amended by Ordinance 574	16.84	Active
	Sabang Reef Fish Sanctuary	2002	Ordinance No. 192	40	Active
Roxas	Brgy Johnson Island MPA	2007	Barangay Resolution No.3 Series of 2007; Municipal Ordinance No. 339, s2007;	1, 514.76	Inactive
San Vicente	Port Barton Marine Protected Area	1997	Resolution No. 126 Series 1997 & Municipal Ordinance No. 10 Series 1997; Resolution No. 110 Series 1997 & Municipal Ordinance No. 03 s1997 ; Ordinance No. 01-A; Resolution No. 13 Series 1998 ; Executive Order No. 0018 1999	7, 482	Inactive

*based on an unpublished technical report by PCSD

Data gathering and synthesis

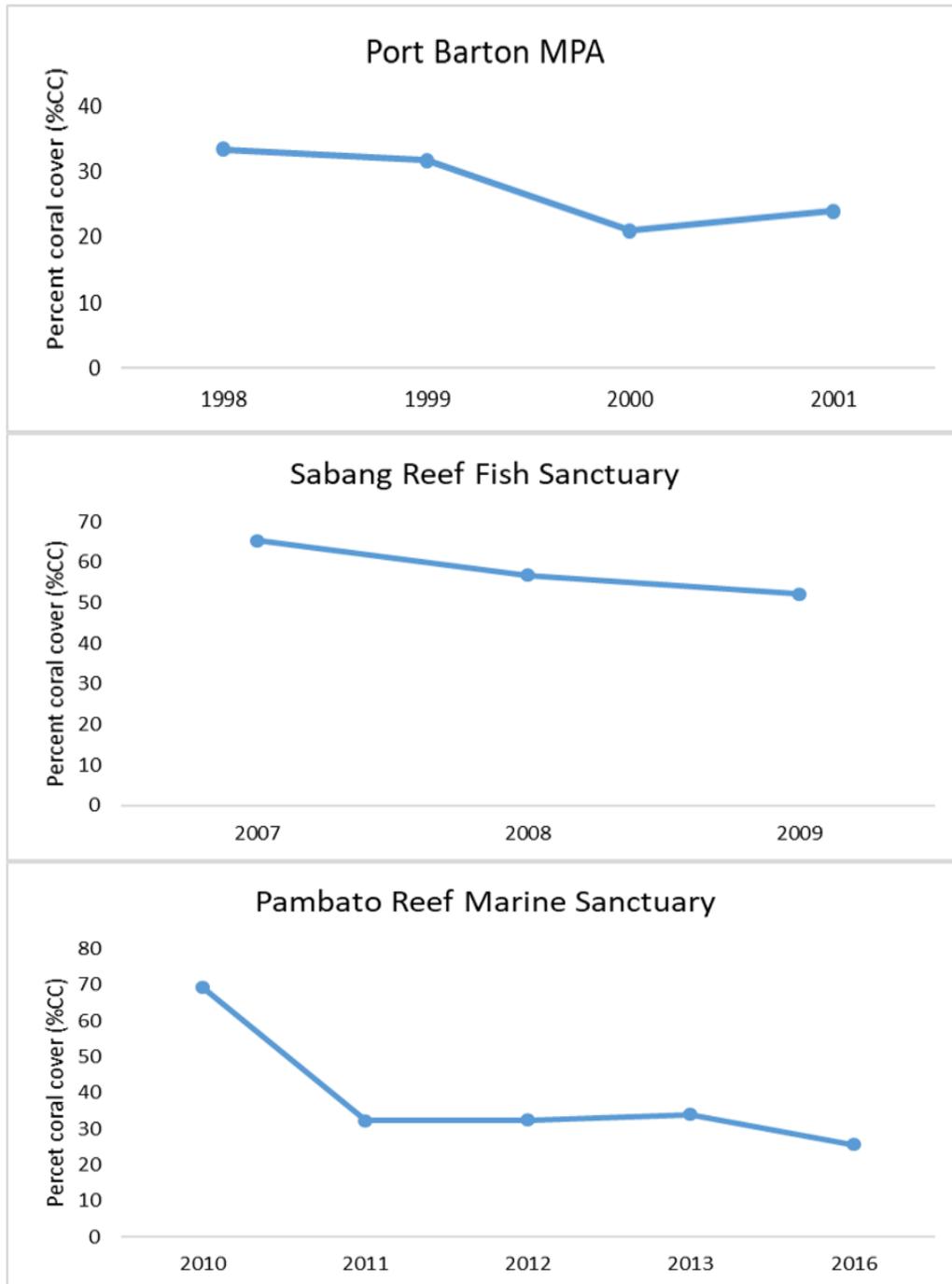
All data related to the establishment and management of the MPAs were gathered from the respective local government offices where they are in. Permission from appropriate offices to gather information and to conduct interviews was first obtained before proceeding to the concerned offices and communities. The study used a descriptive survey method with semi-structured questionnaires designed for two groups of respondents, focal persons who take part in managing the MPAs and the people from the community around the MPAs, to elucidate information about their management practices and the knowledge and satisfaction of the community respondents in the MPA, respectively. One MPA manager from each MPA was interviewed. The MPA managers have designation of either Barangay Kagawad, Fisheries and Aquatic Resource Management Officer or Aquaculture Technologist

with monthly salary ranging from PHP 17,500 to PHP 30,000. On the other hand, 15 coastal community respondents were interviewed from each site who one way or another have activities that are affected by the MPA. The personal information of the respondents were kept confidential but their demographic profiles (gender, age, marital status, length of residency, educational attainment, occupation and monthly income) were characterized. The data gathered have been synthesized and categorized into three indicator categories, the environment, the community and governance, to reflect the factors that influence the status of the respective MPAs.

RESULTS AND DISCUSSION

Status of the MPAs on environment

Protection of biodiversity and restoration of damaged habitats were the common objectives for the establishment of MPA in the respective communities. Despite the objectives, the data on biodiversity monitoring of the MPAs collected from the municipalities were not complete. It is either monitoring was not conducted on regular basis or files may have been lost as public administrations changed through time. Based on the available data on coral cover monitoring (Figure 2), Sabang, Pambato and Port Barton showed a declining pattern in the percentage of coral cover. The managers of Sabang and Pambato attribute the decline in coral cover to coral bleaching as a result of the El Niño phenomenon. Rasa only conducted once in 2014 (with 45% live coral cover) while Johnson has no record at all. On the number of target fish species, Port Barton showed to have an increase from 1999 to 2000 but then dropped in 2001 (Table 2). Fish monitoring was conducted only once in Rasa in 2013 and was never followed up while Pambato and Johnson have no record of fish monitoring. Gonzales et al. (2014) reported a decrease in catch per unit effort in Sabang from 2002 to 2004. No follow up survey was conducted after that. Rasa, which started as a composition of different sanctuaries, had data on mangroves in 1997 with 17 species and in 2002 with 18 species. The number of seagrass was also in 2002 with seven species. In 2013, the number of mangrove species in Rasa increased by one species while the number of seagrass species was reduced by one species. No follow up monitoring was conducted after that. As Seven Line was established in 2016, they only have initial record on the number of target fish species (229), number of mangroves (23 species) and number of seagrass (8 species) which were taken in 2015. The other MPAs have no record of mangrove or seagrass survey or monitoring.



*Data taken from unpublished report of respective Municipal/City Agriculture Offices

Figure 2. Summary of the collected data of Port Barton, Sabang and Pambato MPAs on their coral cover monitoring.

Table 2. Summary of the collected data of Seven Line, Rasa and Port Barton MPAs on their monitoring of target fish species, mangroves and seagrass.

Year	Seven Line MPA (since 2016)			Rasa Island (since 2005)			Port Barton (since 1997)		
	No. of target fish species	No. of mangrove species	No. of seagrass species	No. of target fish species	No. of mangrove species	No. of seagrass species	No. of target fish species	No. of mangrove species	No. of seagrass species
1997	-	-	-	-	17	-	-	-	-
1999	-	-	-	-	-	-	183	-	-
2000	-	-	-	-	-	-	204	-	-
2001	-	-	-	-	-	-	128	-	-
2002	-	-	-	-	18	7	-	-	-
2013	-	-	-	214	19	6	-	-	-
2015	229	23	8	-	-	-	-	-	-

*Data taken from unpublished report of respective Municipal/City Agriculture Offices and PCSD; “-“ means no data available.

Marine protected areas are valuable tools for protecting coral reef habitats and managing near-shore fisheries, while playing an essential role in overall conservation of marine biodiversity (Green et al., 2011). The MPA’s effectiveness is commonly measured by comparing values of ecological or biological measures (e.g., sizes of organisms, density and biomass of fish assemblages, species richness, live cover of benthic organisms) in the MPA and adjacent unprotected areas and/or recording biodiversity before and after an MPA has been established (Giakoumi et al., 2018). If the MPA is managed effectively, spillover effects, which can take several years or even decades, should increase biomass outside the protected area which would be reflected as an increase in catch per unit effort (Francini-Filho et al., 2008; Goñi et al., 2008). Gonzales and colleagues (2014) suggested that detailed studies on the spillover effect and recruitment of target fishes be conducted to determine if the fish sanctuary or MPA is managed effectively. Based on the data on biodiversity monitoring, Sabang, Pambato, Port Barton and Johnson have not been able to meet their objectives on the protection of biodiversity and restoration of damaged habitats. On the other hand, Rasa may have shown increase in the number of mangrove species but the number of seagrass species also have decreased. Meanwhile, the management effectiveness of Seven Line, which covers the significantly large area among the MPAs in this study, still remains to be seen.

Status of the MPAs on the communities

Most of the community respondents were males, married, and are mostly residing in their respective communities between 11 and 40 years. Fishing is the major source of income with monthly income ranging between below PHP 10,000 and PHP 20,000. Most of the respondents have finished elementary and high school education but only two out of the total of 90 respondents have finished college.

The response of the local communities on their knowledge and perception on the MPA in their respective areas are summarized in Table 3. Most of the respondents in all sites know about the existence of MPA in their areas and know some general knowledge about MPAs. Among the six MPAs, only the respondents in Sabang and Pambato claimed that public information and report of updates are conducted by the managers of the MPA in their community. More than half of the respondents in Sabang and Pambato claimed that they have benefited from the presence of the MPA through income from tourism. Majority of the respondents in Sabang, Rasa, Seven Line and Pambato claimed to have observed deputized fish wardens or locally known as *bantay-dagat* who monitor the MPA for illegal activities. The respondents have claimed to be involved in the monitoring of illegal activities in the MPAs except that of Port Barton and Johnson. Although majority of the respondents in Sabang, Rasa, Seven Line and Pambato claimed to have observed reduction in the number of illegal fishing activities in their respective areas, all the respondents in Port Barton and Johnson stated that their MPAs have not monitored and patrolled for illegal activities.

For an MPA to be effectively managed, it must actively involve the local community. Horigue and colleagues (2012) stated that it is crucial to include and empower community members together with other local government officials to pursue MPAs and coastal management initiatives. Community-based establishment and management of MPAs increase participation and acceptance by the people affected by the constraints on resource use (Aswani et al., 2007; Horigue et al., 2012). Community-based MPAs have been effective at achieving local-scale fisheries and conservation targets (Alcala and Russ, 2006; Horigue et al., 2012). Although the community respondents did not necessarily receive direct benefits from the presence of the MPA, they still expressed their support for the continued operation of the MPA by serving as volunteers in monitoring and patrolling the MPA, abiding the rules set in the MPA, and helping in the information and education campaign, especially for tourists.

Table 3. The categories and indicators reflecting the status of the six MPAs in Palawan, Philippines.

Categories	Indicators	Sabang (since 2002)	Rasa (since 2005)	Seven Line (since 2016)	Port Barton (since 1997)	Johnson (since 2007)	Pambato (since 2008)
Environment	Increase in:						
	Corals	- (2006-2010)	?	?	-(1997-2002)	?	-(2010-2016)
	Fish	?	?	?	-(1999-2001)	?	?
	Mangrove	?	+(1997-2013)	?	?	?	?
Community	Seagrass	?	-(2002-2013)	?	?	?	?
	Knowledge about the MPA	+	+	+	+	+	+
	Public information/report of updates	+	-	-	-	-	+
	Monitoring of illegal activities	+	+	+	-	-	+
	Increase in fish catch/income generation through ecotourism	+	-	-	-	-	+
	Support for the MPA	+	+	+	+	+	+
	Regular fund allocation	-	+	+	-	-	-
Governance	Regular biodiversity monitoring	+(every 3 years)	+(every 3 years)	-	-	-	+(every 3 years)
	Law enforcement and monitoring	+	+	+	-	-	+
	Public consultation and community involvement	+	+	+	-	-	+
	Meeting of the objectives (protection and conservation of biodiversity)	-	-	-	-	-	-

*In the Environment Category, “+” means increasing trend and “-“ means decreasing trend. In the Community and Governance Categories, “+” means present, “-“ means absent, and “?” means data unknown. Figures in parenthesis (on Environment) indicate years when biodiversity monitoring was conducted.

Status of the MPAs on governance

The composition of offices that manage the MPAs vary. For example, the management of Rasa is made up of the Protected Area Management Board, which is composed of the local government of Narra, the National Fisheries Research Development Institute of the Bureau of Fisheries and Aquatic Resources, and the Department of Environment and Natural Resources. On the other hand, Port Barton management is composed of the local government of San Vicente, Port Barton Marine Park Management Council, Community Associations, DENR and BFAR. Sabang and Pambato are managed by the local government of Puerto Princesa City, the barangay council and non-government organizations. Meanwhile, Seven Line and Johnson only have their respective LGUs managing the MPAs.

The summary of governance indicators reflecting the status of the six MPAs is shown in Table 3. Rasa and Seven Line have annual budget allocation, whereas, Sabang, Pambato and Port Barton have no regular budget allocation. No budget has been allocated by the municipality of Roxas for Johnson. Port Barton was established in 1997 with the assistance of USAID and the Marine Science Institute of the University of the Philippines (UP-MSI) under the Coastal Resource Management Project (CRMP). The funds used to operate the MPA came from the CRMP fund. Initial assessment of the corals and fishes were done by UP-MSI from 1999-2001. It became a flagship of Coastal Resource Management Program for a while. However, when UP-MSI left by the end of the project, the operation of the MPA gradually stopped as financial support became unsustainable. Lack of technical personnel that are capable of managing and missing of management plan added up to the inactivity of the MPA. Johnson also has the same problem as Port Barton. Haribon Foundation initiated CRMP in Roxas in 2004 and World Wildlife Fund joined in 2006. In 2007, Johnson Island was declared as MPA. However, when Haribon Foundation left in 2008 when the project ended, the MPA became inactive due to lack of capable managers, lack of funding and lack of community involvement. A shortage of financial resources and the limited capacity of local agencies to patrol MPA boundaries to ensure compliance with rules and regulations are frequently cited constraints in MPA enforcement (Rossiter and Levine, 2013). The National Socio-Environmental Synthesis Center (2017) stated that lack of funds prevents marine protected areas from meeting its objectives. It is therefore important that the MPA management have the skills in obtaining sustainable funding in order for the MPA to operate continuously and sustainably.

On the implementation of their respective management plans, Sabang, Rasa and Pambato are gradually implementing their management plans following their

respective ordinances. The local ordinances are reviewed every three years. In Seven Line, which was established in 2016, the management plan is reviewed every five years. In the management plans of Sabang, Rasa, Seven Line and Pambato, biodiversity monitoring is conducted every three years. Biodiversity monitoring in Port Barton was conducted irregularly and intermittently. UP-MSI conducted biodiversity monitoring in Port Barton in 2016 but no follow up was made after that. Meanwhile, no biodiversity monitoring was conducted in Johnson.

On monitoring and patrolling the MPA for illegal fishing activities, Rasa, Seven Line and Pambato have four to five bantay-dagat while Sabang only has one. The MPA managers reported that the bantay-dagat receives incentives ranging from PHP 5,500 to PHP 12,000 per month. However, some of the bantay-dagat admitted that they do not do the monitoring on daily basis but only when need arises due to very limited funds they receive. Meanwhile, no bantay-dagat has been designated in Port Barton and Johnson. A common problem among MPAs on patrolling and monitoring of illegal activities is that when their boat that is used to patrol has been damaged, the patrolling activity also stops due to the lack of funds to repair the boat or fabricate a new one. Among the MPAs, only Rasa and Seven Line have put on record the illegal activities, which include illegal fishing with the use of compressors and hook and line. The managers reported that the fines collected are distributed to the apprehending personnel (10%), the LGU trust fund (40%) and maintenance of patrol boat (50%), in accordance to the management plan. However, most of the time, the violators were just asked to leave after being reprimanded to minimize conflict. Sabang, Port Barton, Johnson and Pambato have not recorded any illegal fishing activities in their MPAs. In general, the effectiveness of local community enforcement groups is positively correlated with improved coral reef conditions (Christie et al., 2009; Tupper et al., 2015). Rossiter and Levine (2013) stated that strong enforcement, with clear penalties and sanctions that fit the offense are required in order to preserve MPA integrity.

According to the MPA managers interviewed in this study, they are not fully focused on managing the MPA because aside from this task, they also have other priority tasks in their respective offices. Giakoumi and colleagues (2018) and the National Socio-Environmental Synthesis Center (2017) stated that success in conservation is often related to a key individual, a “leader or a manager”, that would focus on the management and can make things happen. Rossiter and Levine (2013) also stated that strong leadership within MPA governing institutions is critical to the success of the MPA. The problem is that when the “main actors” are no longer around, the projects and the plans backslide. Chua (2006) and Horigue and colleagues (2102)

suggested that MPA management should be institutionalized locally to prevent lapses in governance due to changing political figures and/or termination of donor-assisted projects. Having a political environment at multiple scales (local, regional, and global) with supportive management institutions, which may include governments, NGOs, community groups, local and international organizations, and/or academic institution responsible for the MPA establishment, perpetuation, monitoring, and enforcement, and devolution of shared to authority to local resources users and stakeholder groups in collaboration with the government are critical to the success of the MPA (Rossiter and Levine, 2013).

Effective management of MPAs also requires continuous feedback of information to achieve objectives (Pomeroy et al., 2005). The management process involves planning, design, implementation, monitoring, evaluation, communication and adaptation. Evaluation consists of reviewing the results of actions taken and assessing whether these actions are producing the desired outcomes. In order to complete successful evaluations, management teams must develop consistent records of management actions and data. In the Calamianes Islands in northeastern Palawan, the MPAs have Management Board composed of four management committees to address: (1) law enforcement; (2) tourism and planning; (3) information, education and monitoring; and (4) finance and audit (Garces et al., 2013). The performances of the Management Board were assessed in five areas: planning; monitoring; user fee; information, education and communication or IEC; and enforcement.

CONCLUSION AND RECOMMENDATIONS

The status of six MPAs, namely, Sabang, Rasa, Seven Line, Johnson, Port Barton, and Pambato, was assessed by gathering of secondary data and conducting interview with MPA managers and local community respondents. Protection of biodiversity and restoration of damaged habitats were the common objectives for the establishment of MPA, however, biodiversity monitoring was either not conducted regularly in accordance to their management plan or have not been conducted at all. Based on the available data gathered, there was a general decreasing trend in the number of target species. As such, the objectives on protecting biodiversity and restoration of damaged habitats have not been met. Although there was an increase in the number of mangrove species in Rasa from 1997 to 2013, there was a decrease in the number of seagrass species. On the other hand, the management effectiveness of Seven Line, which covers the significantly large area among the MPAs in this study,

still remains to be seen as it has not conducted yet a follow up biodiversity monitoring after it was established in 2016.

Among the MPAs, only Rasa and Seven Line have annual budget allocation while Pambato, Sabang, and Port Barton have no regular allocation. On the other hand, the operation of Johnson, which was established in 2007, stopped after Haribon Foundation left the community in 2008 and when funding was no longer available. There is involvement of the community in monitoring and patrolling of illegal fishing activities in Sabang, Rasa, Seven Line, and Pambato. However, no monitoring is conducted in Port Barton and Johnson. Law enforcement was limited as only few bantay-dagat members were assigned to monitor and patrol the MPA and cases of illegal activities were not appropriately recorded. The managers of the MPAs in this study also reported that they are not fully focused on managing the MPA as they also have other priority tasks in their respective offices. The lack of funds, lack of capable focused managers to operate the MPA, and lack of community involvement result to inability of the MPA to operate and function accordingly, such as to conduct regular monitoring and patrolling for illegal fishing activities as well as to implement regular biodiversity monitoring to determine the status of the target species. These are the factors that would cause the MPA to fail.

When the managers were asked what are the things that need to be done to improve their respective MPAs, the following responses were given: (1) reactivate the management body and update the MPA management plan; (2) appoint technical personnel that will focus only in the management of the MPA; (3) look for funds for sustainable operation of the MPA; (4) update the municipal ordinances to include continued support of the MPA despite the change in political administration; (5) strengthen the involvement of community; (6) rehabilitation of corals, mangroves and seagrasses through transplantation; and (7) promote the area to become tourist attraction.

A focused leader within the MPA governing institutions is critical to the success of the MPA. The main actors of the MPA management should have skills to obtain sustainable funding in order for the MPA to operate continuously and sustainably. A strong and firm law enforcement, with active involvement of the local community, will contribute to the improvement of coral reef conditions and preserve MPA integrity. The MPA management should be institutionalized locally to prevent lapses in governance due to changing political figures and/or termination of donor-assisted projects. Also, effective management of MPAs requires continuous feedback of information to achieve objectives. The management process must be reviewed to determine if the actions taken

are producing the desired outcomes., As such, efficient and consistent record keeping of management actions and data is highly important.

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