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SCALING UP MANAGEMENT OF SOCIAL-ECOLOGICAL SYSTEMS: A CASE STUDY ON COMMUNITY-BASED MARINE PROTECTED AREAS IN THE PHILIPPINES

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Ad majorem Dei gloriam.

Resumo

Sistemas ‘sociais-ecológicos’ são desafiando de serem controlados, não apenas por seus muitos componentes de interação, mas também, porque funcionam em escalas de interações múltiplas, que são frequentemente ignoradas. Este estudo, procurou responder a pergunta de quais elementos são necessários na escamação acima da gerência de sistemas sociais-ecológicos. Uma aproximação do estudo de caso foi usada, examinando a escamação-acima da gerência marinha community-based da área protegida (MPA) nas Filipinas, do console às escalas municipais, provinciais e do nacional. Derivando a informação das entrevistas chaves do informador e da literatura disponível, os processos do estabelecimento, as estruturas de gerência, e as funções do MPA de cada escala foram comparadas. Um sistema de avaliação foi desenvolvido para medir a contribuição relativa de cada ator à gerência do MPA. As conclusões principais mostram que os três elementos cruciais à escamação acima da gerência são: 1) a estrutura legal e institucional existente, 2) a capacidade da gerência de unidades de gerência e 3) as características dos líderes destas unidades de gerência. A avaliação destes três elementos é crítica em determinar as necessidades e o potencial do capacity-building para a escamação-acima dos sistemas de gestão existentes. As recomendações essenciais, incluem a concessão de mandatos legais aos gerentes de fato e às partes interessadas que possuam recursos existentes para atuar como enlaces, e às capacidades do edifício de líderes e de unidades de gerência baseadas em suas forças escalares-relacionadas. Uma estrutura geral é proposta para a escamação-acima da administração de sistemas ecológicos-sociais.

Palavras-chaves: sistemas sociais-ecológicos, escala, áreas protegidas marinhas, Filipinas, console do Apo

Abstract

Social-ecological systems are challenging to manage not only because of their many interacting components, but also because they function at multiple interacting scales, many of which are often ignored. This study sought to answer the question of what elements are necessary in scaling up the management of social-ecological systems. A case study approach was used by examining the scaling-up of community-based marine protected area (MPA) management in the Philippines from island to municipal, provincial and national scales. Deriving information from key informant interviews and available literature, MPA establishment processes, management structures, and functions ateach scale were compared. A rating system was developed to measure the relative contribution of each actor to MPA management. Key findings show that the three crucial elements to scaling up management are 1) the existing legal and institutional framework, 2) management capacities of management units, and 3) characteristics of leaders of these management units. The assessment of these three elements is critical in determining the capacity-building needs and potential for scaling-up of existing management systems. Key recommendations include granting legal mandates to *de facto* managers and to stakeholders that possess existing resources to act as cross-scale linkages, and building capacities of leaders and management units based on their scale-related strengths. A general framework is proposed for the scaling-up of social-ecological system management.

Keywords: social-ecological systems, scale, marine protected areas, Philippines, Apo Island

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

This thesis is submitted in partial fulfilment of the academic requirements of the Erasmus Mundus Master in Water and Coastal Management. The topic chosen is appropriate for this course because it examines how the management of coastal social-ecological systems such as marine protected areas may be scaled up. Marine protected areas are recognised to be an important tool in coastal and marine resource management worldwide.

1.1. Background

Social-ecological systems are systems that arise from regular interactions between human societies and ecosystems (Liu et al., 2007, Anderies et al., 2004). They are complex adaptive systems, and as such are self-organising and have emergent properties (Finnigan, 2005). These interactions may therefore result in several different outcomes. Holling (2001) argues that what makes a social-ecological system complex is not just the interaction of its various human and environmental components, but also the interactions of its different scales. Because of its nested nature, the sustainability of a social-ecological system depends on its being managed at multiple scales.

Marine protected areas (MPAs) are an example of a social-ecological system, where interventions implemented by a management body in the coastal zone produce feedback loops that have an impact on the well-being of users and other stakeholders as well. Prohibiting all forms of fishing, for example, may eventually lead to a spillover of fish biomass into non-MPA areas, resulting in increased fish catch; on the other hand, allowing excessive tourism may result in habitat degradation, which may affect incomes through reduced tourism.

Being social-ecological systems, MPAs need to be managed at several scales, one reason being that many of the species targeted for protection are mobile and make use of different ecosystems at different phases in their life cycle. Sea turtles, for example, may be protected on one island, only to be captured for food when they lay their eggs on another island. For protection to be effective, MPA management needs to be scaled up. Different scales, however, have different properties; what management structures and approaches are effective at one scale may not function at another (Berkes, 2006). It is therefore of primary concern to determine which elements are necessary for successfully scaling up the management of a social-ecological system.

Apo Island in the Philippines, the world's first successful community-based MPA, is an example of how the technology of community-managed, no-take MPAs to manage fisheries and conserve biodiversity has been adapted at higher scales of management in the Philippines and even in the region. This study draws lessons from the model of Apo Island and the networks of MPAs that have been formed at the municipal, provincial and national scales through its pioneering experience.

1.2. Objectives

This study aims to:

1) compare the characteristics of community-based MPA management systems in the Philippines at four different scales;
2) analyse the relative importance of actors contributing to MPA establishment, management and learning at each scale;
3) propose a general framework for scaling up the management of social-ecological systems based on the findings from the case study.

2. REVIEW OF LITERATURE

In the last two decades, both research and policy have undergone a radical paradigm shift from viewing ecosystems as storehouses of resources that simply need to be maintained in equilibrium, to human life-support systems that may have several states of equilibrium, or regimes (Folke et al., 2007, Walker et al., 2004). There is now growing recognition that social systems and ecological systems are not merely linked but are inextricable components of a complex social-ecological system whose parts are constantly evolving and interacting (Galaz et al., 2006).

Initiatives such as the Land-Ocean Interactions in the Coastal Zone (LOICZ) contribute to this awareness by supporting projects that combine social and ecological data, providing a holistic analysis of social-ecological systems. These projects demonstrate how changes in society such as policies, agricultural land use, per capita income, and lifestyles result in corresponding changes in nutrient budgets in river basins and seas (e.g. Langmead et al., 2009, Artioli et al., 2008, Borbor-Cordova et al., 2006, Seitzinger et al., 2005). At the same time, these projects reveal how environmental factors such as rising sea surface temperatures and basin circulation may result in non-linear feedbacks that modify anthropogenic inputs and management initiatives (McQuatters-Gollop et al., 2009, Artioli et al., 2008, McQuatters-Gollop et al., 2008). Projects such as these enable better understanding of properties that are inherent to complex adaptive systems.

Holling (2001) further defines the complexity of systems as referring also to the interaction of nested social-ecological systems functioning at different scales, called a "panarchy". Scale refers to both spatial and temporal dimensions, with sociological components having the additional dimensions of representation and organisation (Cumming et al., 2006, Westley et al., 2002). Garmestani et al. (2009) identify changes

in scale in relation to discontinuities in size classes as observed in the structure of both ecological and social systems; the existence of a particular size class therefore indicates the presence of new functions that match emergent scale-specific properties.

Because social-ecological systems consist of nested scales, the dynamics at one scale may be influenced by pressures and drivers at higher or lower scales, and from other domains or systems (Folke et al., 2002, Berkes, 2006). The Coastal Futures project in Germany highlights how activities in one river basin, for example, may be driven by policies at both regional and national scales, each with its own management approach and priorities (Bruns and Gee, 2009, Glaeser et al., 2009). Another study by the SCOPE Biofuels project shows how the global trend of ethanol use for biofuel will lead to national-scale changes in agricultural land use in the United States, which in turn will greatly increase losses of nitrogen and phosphorus to local rivers and lakes (Simpson et al., 2008).

Management of social-ecological systems therefore cannot be restricted to scales where the problem is most apparent. Of particular concern are catastrophic events, which often come as surprises that are generated through cross-scale interactions, where dominant processes at a particular point in time at one scale interact with those at another scale (Peters et al., 2004). Small changes at one scale may cause a cascade of effects and regime shifts crossing ecological to social and political domains (Kinzig et al., 2006).

Among the challenges related to management at different scales is ignorance, or the lack of awareness that the phenomenon being observed is a product of cross-scale dynamics. Another is plurality, or the assumption that a single set of solutions will suffice to solve a problem at multiple scales (Cash et al., 2006). Cumming et al. (2006) attribute many of the current resource management problems to mismatches in scale, i.e. differences in

both the spatial and temporal scales at which human organisations and ecosystems function. Societies often manage resources for particular objectives, such as single-resource extraction, therefore ignoring the larger-scale processes that support resource production. Folke et al. (2007) call this the "problem of fit", noting that resources are not evenly distributed over space and time, with distribution patterns also changing over time. Social institutions that do not adapt to this variability may disrupt ecosystem structures and processes. This includes the misperception of the actual scale of the ecosystem, such as managing fisheries on a large scale when individual species spawn at a local scale (Wilson et al., 1999).

Some options for realigning management scales are the restructuring of organisations to function at the appropriate social-ecological scale, or redefining human-imposed ecosystem boundaries (Cumming et al., 2006). Olsson et al. (2007) suggest that the fit between governance systems and ecosystems may be enhanced by the creation of the right links among different groups of actors across different scales, at the right time and around the right issues; bridging organisations with visionary leadership may fulfil this function. These cross-scale linkages enable adaptive management by bringing together groups with local but broad foci and those with trans-local but narrow mandates (Wilson et al., 2006).

Examples of institutions embodying cross-scale linkages are multistakeholder bodies, capacity-building institutions, donor and other organisations that link local with regional concerns, research and management approaches that involve several scales, mechanisms for citizen science, boundary organisations between scientists and decision-makers within and across scales to effectively inform policy-making, and co-management networks, or collaborative arrangements between the State and the private sector (Carlsson and Berkes, 2005, Berkes, 2002, Cash and Moser, 2000). These cross-scale

linkages serve a coordinating function by enabling the exchange or pooling of knowledge and ideas, material and financial resources, and efforts within and across scales, across different types of stakeholders (Christie et al., 2009a).

Cash et al. (2006) particularly point out the need for structures or arrangements that allow co-production of knowledge and translation between groups of different disciplines. The combination of local, traditional and scientific knowledge, for example, or of factual information and community perception, allows management systems to better adapt to uncertainty and change (Olsson et al., 2007, Pahl-Wostl, 2007, Olsson et al., 2004, Berkes and Folke, 2002). In Europe, the ENCORA Coordination Action project provides opportunities for scientists, managers and policymakers to collaborate on and standardise innovative scientific solutions to management problems (e.g. Ducrotoy, 2009, Kratzer and Tett, 2009, Derous et al., 2007). The CABRI (Cooperation Along a Big River) project demonstrates how the simple sharing of experiences by various stakeholders (e.g. from politics, business, academe, NGO) from different countries is a way for Russia to learn about appropriate management measures and build its capacity for water governance (Nikitina et al., 2009).

Adger et al. (2005) put forward the view that cross-scale linkages are inherent to any resource management system, emerging naturally from the interplay of power among stakeholders, i.e. interactions are made depending on the costs and benefits to the stakeholder undertaking them. They caution that some cross-scale linkages may reinforce the uneven distribution of power when those who can afford to create these linkages do so only to benefit themselves; this results in mistrust and conflict rather than in improved communication and management.

The scaling up of MPA management to match the scale of ecosystems has been the subject of empirical study in the last decade in the Philippines as well as worldwide. Some methods that have been explored for scaling up include the creation of inter-municipal and reef-wide management councils (Armada et al., 2009, Eisma-Osorio et al., 2009), multistakeholder national networks and channel-wide working groups (IUCN-WCPA, 2008), a national marine reserve system (WB, 2006), and a tri-national management committee covering a marine ecoregion (Miclat, 2008, Miclat et al., 2006). Best practices and guidelines on the social, governance and biophysical settings necessary for scaling up MPAs have also been published (e.g. Lowry et al., 2009, IUCN-WCPA, 2008, WB, 2006). Given the relatively advanced strides in the management of this particular social-ecological system, this study analyses which elements may be applied in the scaling-up of social-ecological systems in general.

3. METHODOLOGY

3.1. Case Study

The case study examines MPA management at four scales: island, municipal, provincial and national. For each scale, information on the history of MPA establishment, management structure and strategies, and cross-scale learning and diffusion was gathered from published literature and semi-structured key informant interviews. Two key informants were interviewed for each scale of MPA management in November and December 2009. Informants were selected based on their roles in the establishment and management of MPAs at their respective scales, as evidenced in published literature as well as according to the legal and institutional framework (see Table 11 in Annex).

The case study was then analysed to compare social-ecological features, establishment histories, key management roles and functions, and cross-scale learning and diffusion methods.

3.2. Comparison of Actor Contributions

Several studies have been made to quantitatively determine what factors are correlated with the success of MPAs, many of them done in Central Visayas in the Philippines. Measures of MPA success included both biological and sociological variables, such as increase in fish abundance and improved coral cover, and community compliance with MPA regulations and community empowerment (Christie et al., 2009b, Pietri et al., 2009, Crawford et al., 2006, McClanahan et al., 2006, Walmsley and White, 2003, Pollnac et al., 2001, Pomeroy et al., 1997). Factors tested for correlation with MPA success included social, political, economic and geographic variables as well as project-related variables, such as strategies and post-implementation activities. These factors

were culled from papers published on several long-term case studies and focus group discussions (e.g. Lowry et al., 2009, White et al., 2005, Christie et al., 2002, Crawford et al., 2000, White, 1986).

Success factors identified by these studies were selected as criteria for measuring the contribution of each actor to the establishment and management of MPAs at each scale. Only relevant factors, which depend on the delivery of services by assisting organisations or management bodies, were used. Table 1 shows the relevant success factors and their descriptions. The last two factors pertain particularly to the success of MPA networks.

Table 1. Services contributing to MPA success and their descriptions

SUCCESS FACTOR / SERVICE	DESCRIPTION
Awareness of Environmental Problem	One success factor identified was the perception of the community that their fishery was in crisis. This is attributed to environmental information and education activities, both formal and informal, which may have different target audiences within the community. (1,7)
Successful Alternative Income	Alternative income refers to sources of income other than fishing, and may include supplementary livelihoods that complement income from fishing. (1)
Community Participation in Decision-Making	Community capacity to be involved in decision-making was also attributed to environmental education activities. However, for the purposes of this study, this factor refers solely to opportunities for community members to contribute their opinions and knowledge, and to actually make decisions that translate into policies. Examples would be community consultations, elections, and "counterparting" or community contributions (e.g. labour, materials) in MPA management. (1, 3, 6)
Continuing Advice	The accessibility of assisting organisations by community members seeking advice was found to be one MPA success factor. This includes the proximity of the organisation to the community and the strength of relationships formed at the community level. (1, 3)

SUCCESS FACTOR / SERVICE	DESCRIPTION
Fair and Effective Enforcement	Enforcement refers to the conduct of regular patrols, and the appropriate punishment being carried out when violations are committed. Activities contributing to this may include the organisation of enforcement teams, or the training of community members to become deputised fish wardens. (2, 3)
Management Inputs	Management inputs refer specifically to MPA management infrastructure, such as marker buoys, sanctuary sign boards, patrol boats and guardhouses, or funding that is allocated for these infrastructure. Activities contributing to these include the monitoring of marine resources and the delineation of MPA boundaries. (1, 2)
Capacity Development of MPA Managers	Clear MPA leadership and participation in continuing training are two factors identified by different studies as contributing to MPA success. This service refers specifically to training activities targeted at equipping MPA managers, rather than the whole community, with specific skills related to MPA management. This may include activities that develop leadership among particular individuals. (3, 5)
Social Learning among MPA Communities	Participation in cross-site visits, or visits to other MPAs, in combination with community environmental education where there is personal exchange, as opposed to formal trainings, has been identified as a success factor for MPA networks. A score is given to actors that enable MPA communities at a particular scale to learn from or share knowledge with other MPA communities, regardless of what scale the other communities are on. (4, 5)
Coordination of management units	Collaboration among management units, especially village-level management committees and governments, has been found to correlate with perceived effectiveness of MPA management. A score is given to institutions that facilitate the interaction of different units within a management system, especially across scales. (3, 4, 5)

1) Pollnac et al., 2001, 2) Walmsley and White, 2003, 3) Christie et al., 2009b, 4) Lowry et al., 2009, 5) Pietri et al., 2009, 6) Pomeroy et al., 1997, 7) Crawford et al., 2006

Similar to approaches used by Pollnac et al. (2001) and Christie et al. (2009b) to assess factors contributing to MPA success, actors identified at each scale by key informants and mentioned in literature were rated on a scale of 1 to 5 based on the extent of in delivery of the critical services, as attributed by key informants and available literature. The extent of service delivery was weighted based on the length of time the service was

provided. Table 2 shows the rating system for both extent of service delivery and length of time.

Table 2. Rating system for actors delivering services contributing to MPA success

SCORE	EXTENT OF SERVICE DELIVERY	SCORE	LENGTH OF TIME SERVICE PROVIDED
1	Has the mandate to provide service	0.1	Intermittent activities or ≤ 1yr
2	Initiates activities contributing to service	0.2	2 to 3 yrs
3	Assists in delivery of service on the ground	0.3	4 to 9 yrs
4	Delivers service on the ground	0.4	≥ 10 yrs
5	Service delivered resulting in change in target beneficiaries	0.5	Institutionalised by legislation or other binding agreement

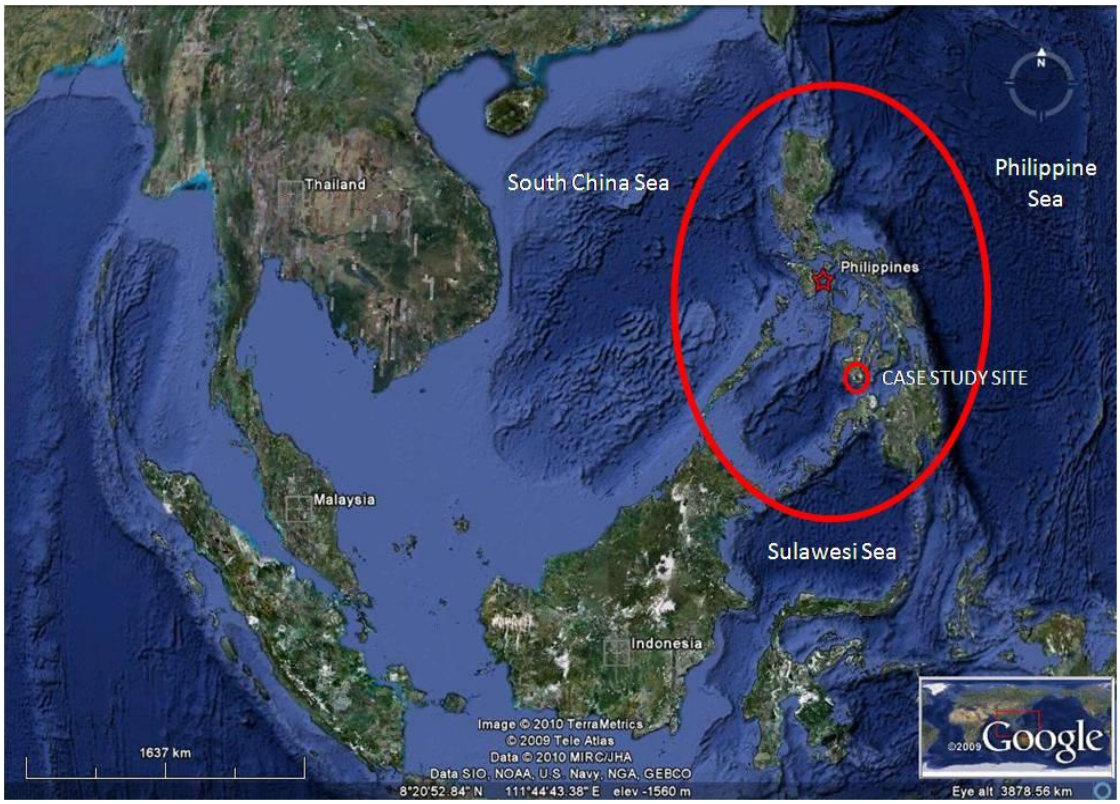
The scores for the extent of service delivery range from whether the actor has the potential capacity to provide the service should the community seek its assistance (score 1), to whether the delivery of the service has produced an evident change in the recipients of the service, such as a change in behaviour (score 5). Score 2 refers to activities that may lead to the actual success factor or service being implemented, but do not directly result in the service being provided. Score 3 refers to the role of the actor as secondary in providing the service, such as in providing personnel or funding, but with another actor taking on the lead role in implementation. Score 4 is given to actors that take on a primary role in implementation of the service on the ground, having direct contact with the community.

The ranges for length of time are based on durations of both project and political longevity. Typical development projects in the Philippines are funded for 2 to 3 years, whilst a single political term in local government also lasts 3 years. An indicator of

sustained MPA initiatives is when they are carried on beyond this typical time frame through a continuation in leadership or a project extension. Local government officials are allowed to serve for three consecutive terms, or 9 years. Sustaining the delivery of a service for longer than this implies the establishment of an institutional relationship or system that goes beyond changes in leadership or personalities. This is further strengthened and has a higher probability of being sustained when the delivery of the service becomes officially part of the system or management structure as indicated by a written commitment such as a law, since binding agreements are more likely to have built-in financing. This refers to laws or agreements that pertain to the service being provided to the particular MPAs, rather than just a general mandate. This does not include short-term binding agreements, or those that are effective for less than ten years.

Ratings of actors were compared within and across scales. The ratings were also analysed using Multi-dimensional Scaling (MDS), Analysis of Similarities (ANOSIM) and Cluster Analysis using Euclidean distance and group average as measures of similarity (Clarke and Warwick, 2001).

4. CASE STUDY



Adapted from Google Earth (2010)

Figure 1. Location of the Philippines in Southeast Asia

The Philippines is an archipelago of more than 7,100 islands in Southeast Asia (Figure 1). It is located approximately between 4^{o}23'N and 21^{o}25'N longitude and 112^{o}E and 127^{o}E latitude. It is the second largest archipelago in the world, with an aggregate coastline of 36,289 km (WB, 2005). The country is divided into three main island groups: Luzon in the north, Visayas in the central region, and Mindanao in the south. It is bounded on the east by the Philippine Sea and the Pacific Ocean, on the west and north by the South China Sea, and on the south by the Sulawesi (Celebes) Sea. It is part of the Indo-Malay-Philippines coral triangle, which has been found to have the highest biodiversity of corals and marine shorefish in the world (Carpenter and Springer, 2005).

As of August 2007, the country's population was 88.5 million, projected to increase to 92.23 million in 2009 (NSO, 2009); about 62% of this population lives in coastal areas, and approximately 1.4 million are dependent on fisheries (WB, 2005).

From the first no-take fish sanctuary established in 1974, there are now over 1,300 established and proposed MPAs in the country; however, more than 50% are less than 10 hectares in size (Campos and Aliño, 2008). The Philippine Marine Sanctuary Strategy aims to put 10% of the country's 27,000 km^2 of coral reef under full protection by 2020 (CTI, 2009). At present, only 1,459 km^2 of Philippine reefs are within no-take MPAs (Weeks et al., 2009).

This case study demonstrates how the technology of community-based no-take MPAs as a tool for coastal and marine resources management has been adopted at different scales of management in the Philippines. Community-based no-take MPAs in the Philippines are defined as MPAs where 1) all forms of human extraction of resources are permanently prohibited within the boundaries, and 2) management decisions and implementation of MPA rules are in large part the responsibility of the local community through institutions created by the local government, or through a community-based people's organisation in the area (Crawford et al., 2000). These MPAs may also locally be known as marine sanctuaries, fish sanctuaries and marine reserves.

In the following case study, a background on the institutional and legal framework for the establishment of MPAs in the Philippines is first provided, after which descriptions of MPA management at island, municipal, provincial and national scales are presented.

4.0.1 Institutional framework

The Philippines is a democratic republic run by three branches of government: the legislative, executive and judicial. The legislative branch creates laws, the executive

branch implements the laws, and the judicial branch deliberates on violations of the laws.

Politically, the country is divided into provinces, which are headed by governors (Table 3). For administrative purposes, provinces are grouped into regions, with the country having a total of 17 regions at present. Provinces are sub-divided into municipalities and cities, headed by mayors. Municipalities and cities are grouped into legislative districts, which are represented at the national level by elected officials in the House of Representatives. Each municipality and city is further sub-divided into *barangays* or villages headed by barangay captains. The barangay is the smallest political unit. Each level of government has a council that acts as the local government's legislative branch. The council passes ordinances, which are laws that apply to its respective province, municipality/city or barangay. The governor or mayor may create offices as needed to implement national and local laws, such as a Coastal Resource Management Office or a Fisheries and Agriculture Office. Each local chief executive and council member serves a term of three years, for a maximum of three consecutive terms.

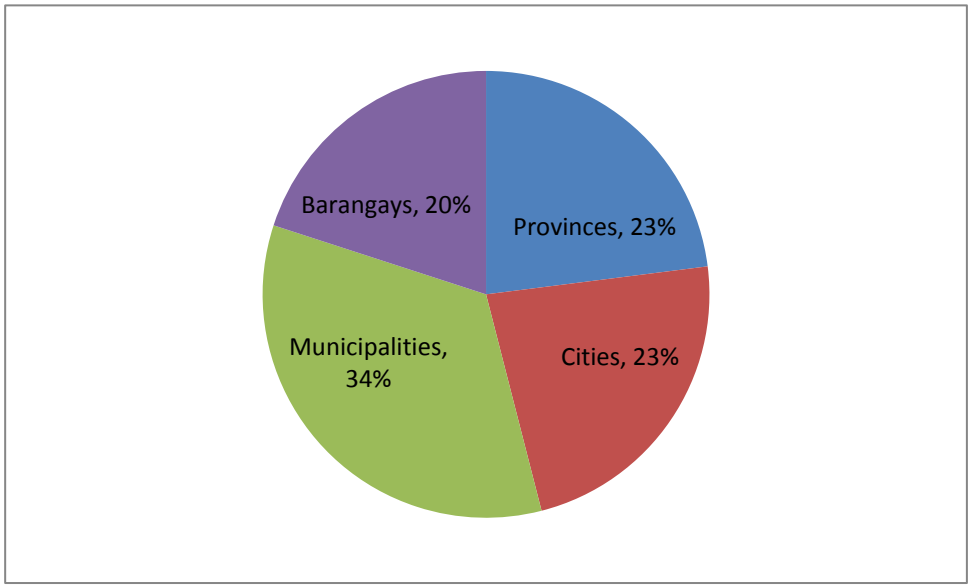
At the national level, the legislative branch is composed of the House of Representatives and the Senate. National laws or Republic Acts (RAs) are proposed and jointly passed by these two bodies, with final approval given by the President of the Philippines. The President, as head of the executive branch, may also issue Executive Orders that pertain to the implementation of national laws. Also part of the executive branch and reporting to the President are national line agencies, such as the Department of Environment and Natural Resources, that implement activities as mandated by law. These national line agencies are each headed by a Department Secretary, with Regional Executive Directors implementing national directives at the regional level. National line agencies may also have officers assigned at the provincial and municipal/city level. Department Secretaries

may issue Department Administrative Orders (DAOs) that serve as implementing rules of national laws.

Table 3. Institutional framework of the Philippine government

	LEVEL OF GOVERNMENT	EXECUTIVE BRANCH	LEGISLATIVE BRANCH
	National	President	Congress (Senate and House of Representatives)
Administrative Regions	Provincial	Governor	Sangguniang Panlalawigan (Provincial Board)
Legislative Districts	Municipal / City	Mayor	Sangguniang Bayan / Panglungsod (Municipal / City Council)
	Barangay	Barangay Captain	Barangay Council

Forty percent of the taxes collected by the national government are shared by the local government units (LGUs) as their internal revenue allotment (IRA) (RA 7160, Sec. 284). Of this 40% share, 23% each is allotted to provinces and cities, 34% to municipalities, and 20% to barangays (Figure 2). The IRAs are expected to fund the delivery of basic services at local levels, although each LGU also has the autonomy to create its own sources of income, such as from issuing permits and licenses. The actual amount released to each LGU is based on its population and land area, as well as on the total number of LGUs in the country. Of each LGU's annual IRA, at least 20% is required to be spent on development projects. This is commonly known as the "20% economic development fund".



Source: RA 7160, Sec. 284

Figure 2. Distribution of local government share (40%) of national internal revenues

4.0.2 Legal framework

The 1987 Philippine Constitution is the primary law of the country, with which all other laws must be harmonised. It mandates the State to protect each citizen's right to "a healthful and balanced ecology" (Article II, Sec. 16) as well as "the nation's marine wealth...to reserve its use and enjoyment exclusively to Filipino citizens" (Article XII, Sec. 2). It specifically states that "the State shall protect the rights of subsistence fishermen, especially of local communities, to the preferential use of the communal marine and fishing resources, both inland and offshore." (Article XIII, Sec. 7).

MPAs may be established by law either by the national government or the municipal government (Figure 3). The Local Government Code of 1991 (RA 7160) assigns the primary responsibility over coastal waters to municipal governments. It gives exclusive authority of granting fishery privileges within municipal waters to the municipal or city government (RA 7160, Sec. 149). The law defines municipal waters as all inland water bodies as well as coastal waters within 15 km of the municipality's or city's coastline (RA 7160, Sec. 131). Regulations pertaining to the use of municipal waters are

institutionalised through the legislation of municipal ordinances. The law also devolves several environmental management functions, such as solid waste and community-based forestry management and fishery law enforcement, to be provided as basic services by the province and municipality/city. Section 35 encourages local governments to partner with people's organisations (POs) and non-government organisations (NGOs) in delivering these basic services.

The Philippine Fisheries Code of 1998 (RA 8550) specifically addresses the establishment of MPAs. Under Section 81 of this law, at least 15% of a town's municipal waters are to be designated as fish sanctuary for food security purposes. The lead implementing agency of the Fisheries Code is the Bureau of Fisheries and Aquatic Resources (BFAR) of the Department of Agriculture. Under the old Fisheries Code of 1974, the BFAR centrally managed all fish sanctuaries in the country; the Fisheries Code of 1998 devolves fisheries management primarily to municipal governments with technical assistance from the BFAR. The BFAR, however, may also declare areas as fish sanctuaries and refuges, as well as manage all marine reserves already established by Congress or the President (RA 8550, Sec. 81).

Some MPAs, on the other hand, are established under the National Integrated Protected Areas System or NIPAS Act of 1992 (RA 7586). These may be declared either by Congress or the President upon the recommendation of the Department of Environment and Natural Resources (DENR). In this case, the DENR is the lead authority in the management of the MPA instead of the municipal government. All bodies of water that are declared to be under national protection are excluded from the municipal waters of a municipality or city (RA 7160, Sec. 131).

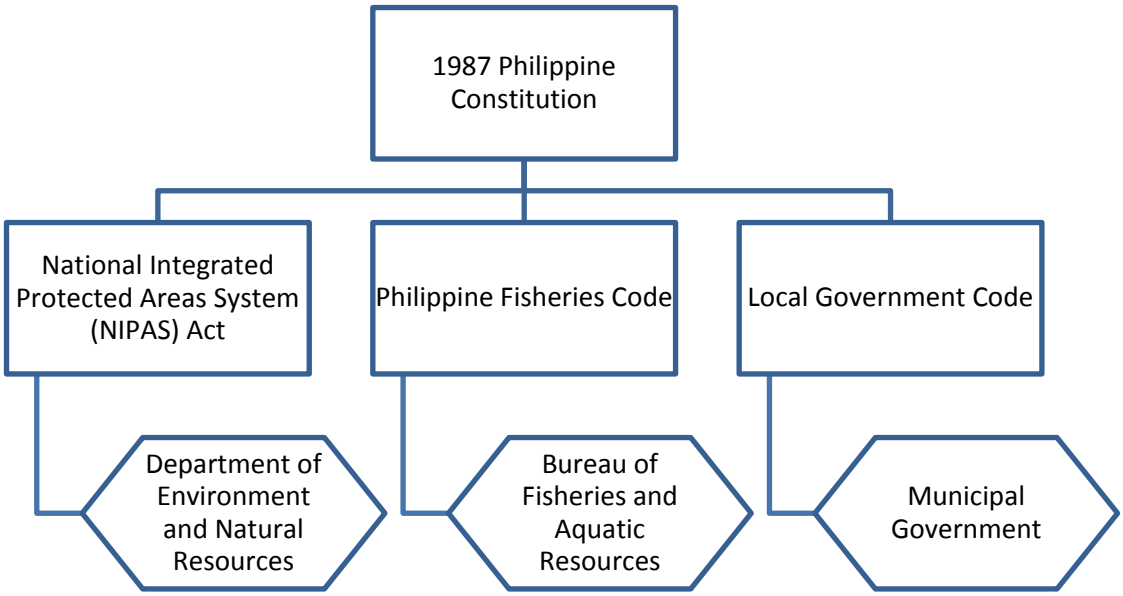
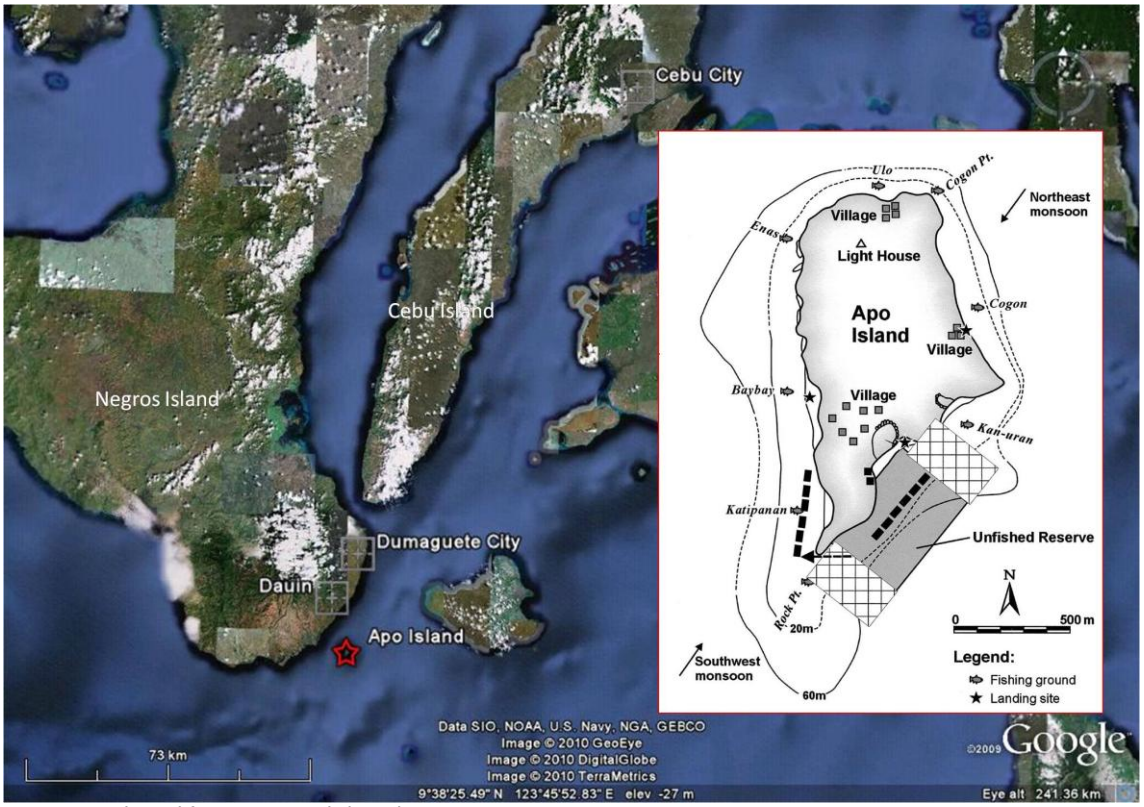


Figure 3. Legal framework for MPA establishment and the primary management bodies

4.1. Island

Apo Island is a 0.74-km^2 volcanic island in the Bohol Sea, about 5 km southeast of Negros Island (Russ and Alcala, 1999). Politically, the island is a barangay within the municipality of Dauin in the province of Negros Oriental in Central Visayas (Region VII), Philippines (Figure 4). As of 2007, it had a population of 745 (NSO, 2007), from a population of about 700 in 2001 and 460 in 1986 (Raymundo and White, 2004). It has a wide fringing reef of about 106 hectares from the shoreline up to a depth of 60 m, with a recorded 54 species of hard coral and 146 species of fish (PAMB and DENR, 2007). Its 15-hectare MPA is found on the southeastern part of the island. Currently, the MPA is part of a bigger Apo Island Protected Landscape and Seascape that is managed under the NIPAS. This section discusses only the period of management under the community-based Marine Management Committee from 1985 to 1994.



Inset map adapted from Russ et al. (2004)

Figure 4. Location of Apo Island and its MPA

4.1.1. History of establishment

Researchers from Silliman University in Dumaguete City, Negros Oriental came to the island in 1976 to introduce the idea of a no-take marine reserve. This initiative came after the same researchers established the Philippines' first no-take MPA on Sumilon Island, in the neighbouring province of Cebu, in 1974 (Russ and Alcala, 1999). On Apo Island, however, it was decided that the strategy would be community-based rather than academic-led. The Marine Conservation Program (MCP) of Silliman University, funded by the United Board for Christian Higher Education in Asia (UBCHEA), was implemented from 1979 to 1980, using non-formal environmental education by community workers as a strategy. The programme also included the first survey of the island's marine resources by marine biologists. Work on the island was facilitated by relationships already formed by scientists with island residents during a previous study

of amphibians and reptiles on the island in the 1950's (Alcala, 2001, Raymundo and White, 2004).

After this initial programme ended, community work was continued by the Marine Conservation and Development Program (MCDP), also implemented by Silliman University and funded by the United States Agency for International Development (USAID) through The Asia Foundation (TAF) from 1984 to 1986. The MCDP's role was to provide education in organisational development, finance and resource management, and to act as conduit between the community and the municipal government, provincial police, the BFAR, as well as other interested agencies. Support for alternative livelihood schemes such as mat-weaving was also given, although none of these schemes were sustained (White and Savina, 1987).

By 1982, the community had agreed to select a 0.45 km stretch of reef to become the no-take area (Russ and Alcala, 1999). Silliman University went into an agreement with the municipal government of Dauin to strengthen this move. However, it was not until April 1985 that the community developed a management plan for the MPA as well as for the entire fringing reef up to 500 m from the shoreline. This was supported by a municipal council resolution in October that same year; the MPA was officially established by a municipal ordinance in November 1986 (PAMB and DENR, 2007, White and Savina, 1987). MPA management was to be done in conjunction with the Dauin municipal council with assistance from the BFAR and the provincial police, and management advice from the MCDP (Sangguniang Bayan of Dauin, 1986).

In 1985, members of a Marine Management Committee (MMC) were elected by the island residents to take responsibility for implementing the management plan. As stated in the ordinance, the MMC was the primary authority for MPA management from that

time until the entire island was placed under the NIPAS by the President of the Philippines in August 1994.

Silliman University continued to assist the MMC beyond the MCDP in the form of reef monitoring, technical advice on MPA guidelines, and projects such as giant clam restocking (Calumpong, 18 December 2009). Other organisations, such as the NGO Haribon Foundation based in Manila, also provided assistance in the form of funds for infrastructure and educational materials (Suan, 04 December 2009). Under the DENR's Coastal Environmental Program, a cooperative was set up and livelihood projects introduced (Cababasay-Lizada, 2008).

4.1.2. Management structure

The MMC, being the main management body, met monthly to formulate policies, which would then be approved by the general assembly consisting of all island residents (Pascobello, 03 December 2009) (Figure 5). Decisions on the MPA location and size, however, were made prior to the creation of the MMC by the whole community on the island. Before the MMC was formed, management was done by the barangay council in concert with the municipal council of Dauin and advice from the MCDP. Problems were brought up in community assemblies and barangay meetings. Enforcement was the responsibility of the MMC in cooperation with the provincial police, but implemented by rotating shifts of volunteer residents (White and Savina, 1987, Suan, 04 December 2009). Eventually, a volunteer Bantay Dagat or fish warden organisation was organised by the provincial government to act as the official enforcement team (Pascobello, 11 February 2010).

Donations given by users as well as benefactors were collected by the MMC. The municipal council received part of the revenues subject to the submission of a plan that

had to be approved by the barangay council (Cababasay-Lizada, 2008). Fixed user fees, instead of donations, could not be collected as the MMC had no legal personality.

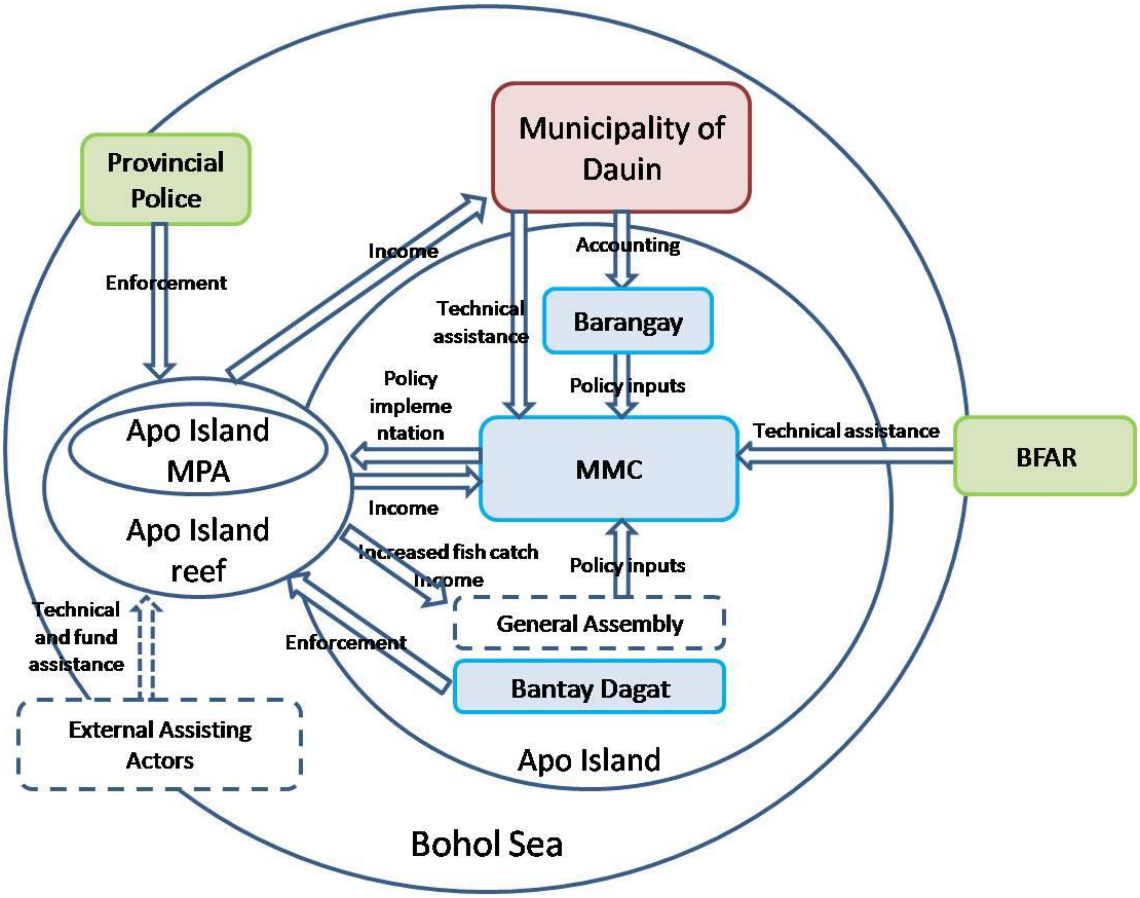


Figure 5. MPA management structure of Apo Island (1985-1994)

Boxes with same colour indicate units at same management level; dashed boxes and arrow indicate units and function not part of the legislated management structure. Circles represent social-ecological systems. Arrows indicate inputs or action directed towards other units/systems.

4.1.3. Objectives and motivations

White and Savina (1987) cite the initial objectives of establishing an MPA on Apo Island as "to prevent destructive fishing, increase the abundance and diversity of coral reef fishes at the islands, and increase long-term fish yields". Part of the objective of the MCDP was to organise groups of local people to undertake marine resource management and set up alternative livelihoods. The primary aim in the beginning, therefore, was the conservation of fish stocks by engaging local participation, rather than income generation for the community (White, 14 November 2008).

On the part of the islanders, the initial reaction to the MPA was resistance, due to fears that the entire island would be closed to fishing, and that the residents would be ejected (Pascobello, 03 December 2009). The motivation to accept the idea of a no-take marine reserve stemmed from the lack of any other solution to the problem of overfishing. The decrease in fish catch had reached a point at which the people were willing to experiment on the no-take reserve proposed by researchers from Silliman University (Pascobello, 03 December 2009, Suan, 04 December 2009). This was, however, subject to the condition set by the barangay council that if no results were seen after two years, the community would revert to the open access regime. When a 2% to 3% increase in hard coral cover and increasing fish yields were seen after about two years, the whole community was convinced to make the MPA permanent (White and Savina, 1987).

4.1.4. Strategies and methods

The concept of the community-based approach to resource management originated from work with upland rice farmers by the Silliman University Research, Extension and Development Office (White, 13 November 2009). Dr. Angel C. Alcala, who at that time was vice-president of the office and had been monitoring the reefs in the Bohol Sea since the mid-1970's as part of the first nationwide Coral Reef Survey Project of the University of the Philippines, decided to apply the community-based approach to the management of fisheries resources off the islands in the area. According to Alcala (07 December 2009), the primary principle in the work with upland farmers was to stimulate their thinking and enable them to help themselves by adopting new technology and sharing ideas with their neighbours. This would then result in cooperative schemes such as several villages joining together to form organisations that provided health services and livelihood, for example.

Two key processes were adopted in the coastal application of this methodology: 1) the organisation of communities for certain purposes, and 2) the education of communities about ecosystem processes linked to food production. The organisations resulting from these two processes were envisioned to implement resource management measures using a no-take marine reserve as a tool (Alcala, 07 December 2009). The strategy was to send full-time community development workers trained in marine ecological principles and water skills such as SCUBA diving to live on the island rather than sending marine scientists trained to be community workers (White and Savina, 1987).

Non-formal education was a deliberate strategy used to increase awareness, especially in the early part of the project. This refers to slideshows, group discussions, one-on-one conversations, posters, and interviews done with the support of local leaders both political and social to win the commitment of the villagers (Cabanban and White, 1982, White and Savina, 1987). This strategy worked by drawing out local problems and knowledge as a starting point for the introduction of scientific methods. A participatory approach to data collection was also used by having fishermen list their daily fish catch for a period of 12 months; the data were then compiled by Silliman and presented to the general assembly in graphs (White and Savina, 1987).

Alcala says that choosing the leaders was important, since they were the ones who dispersed information and ideas to the rest of the community (07 December 2009, Cabanban and White, 1982). The people who were to become part of the MMC were identified through their interest and management skills during an initial community project, which was the building of a community centre (White and Savina, 1987). As an incentive to those involved in MPA management, 10% of the income was given to the collector, 5% to the caretaker, and 15% to the MMC officers (Calumpong and Cadiz, 2003).

4.1.5. Benefits

The Apo Island MPA is one of the few MPAs in the world with sufficient long-term monitoring data to demonstrate a spillover effect. Not only has an increase in the biomass of target fish species been seen inside the reserve, but also a significantly higher total catch of major fish families after reserve establishment, and reduced fishing effort (Alcala et al., 2005, Russ et al., 2004). Higher catch per unit effort has been documented up to 200 to 300 m away from the MPA boundaries, with almost 63% of all hook-and-line catches coming only from this area, or 11% of the total fishing ground (Abesamis et al., 2006, Abesamis and Russ, 2005, Russ and Alcala, 2003, Russ et al., 2003). These changes are especially noteworthy because the MPA was established in a small, highly degraded area that the community could afford to give up rather than in their traditional fishing ground (Alcala, 2001).

In the final year of the MMC's operation, donations amounting to Php 29,916 were collected from April to November 1999 (Calumpong and Cadiz, 2003). Income from donations was used to fund barangay development projects such as infrastructure, health and education (Pascobello, 11 February 2010, Cababasay-Lizada, 2008).

4.1.6. Learning and diffusion

Inputs to the MMC came primarily as technical advice from Silliman University. The island's success story was diffused to other scales, however, through several channels, although Silliman University as a research institution was a major one. The model was replicated by Silliman University on other islands in the Bohol Sea through similar projects (Alcala, 2001). The experience has also been widely publicised through MPA workshops, seminars and publications of NGOs, word-of mouth by people who have visited Apo Island, books and reports such as those published by the Coral Reef Information Network of the Philippines (PhilReefs), and both popular and technical

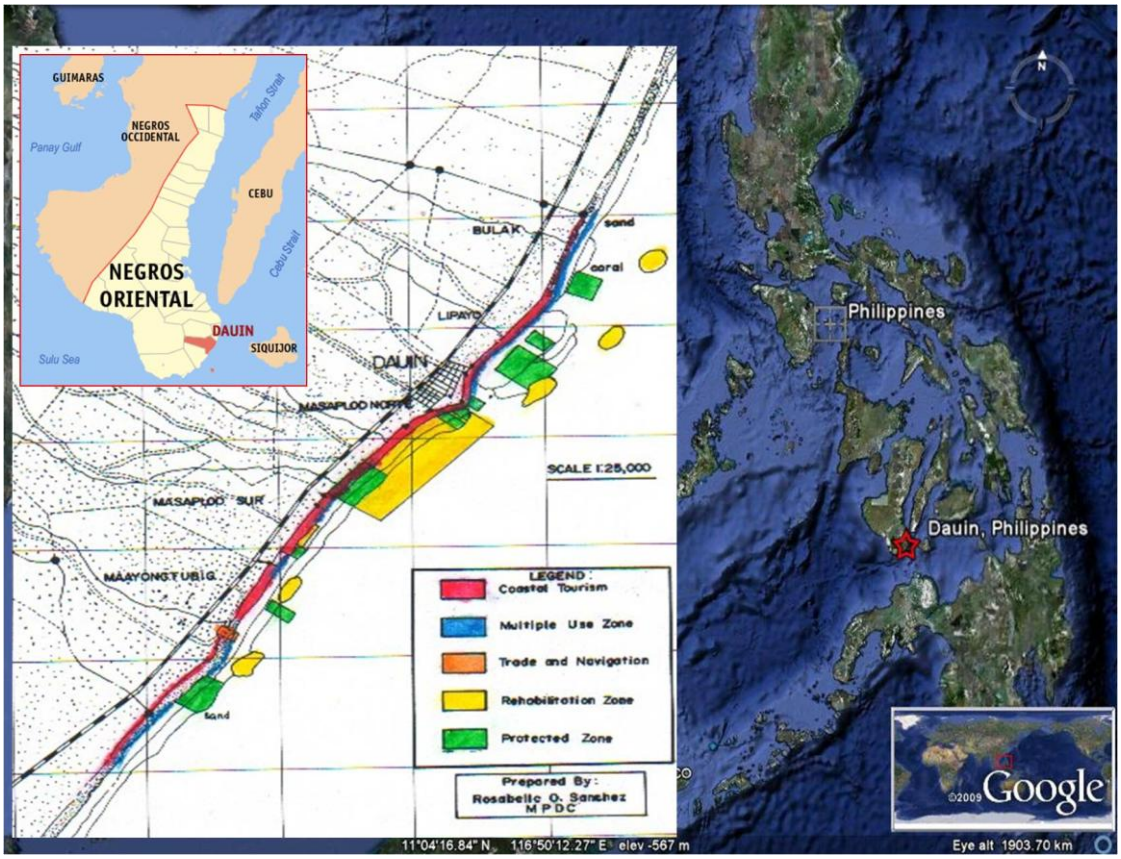
publications such as those published by the Silliman University Angelo King Center for Research and Environmental Management (SUAKCREM), and newspaper columns written by Alcala himself for provincial and national newspapers (Alcala, 07 December 2009, Alcala, 2001).

Another important channel of diffusion is cross-site visits, or other MPA communities and local government officials visiting Apo Island and having direct contact with the MMC. These have been facilitated by organisations and projects such as the Coastal Resource Management Project (CRMP), the Central Visayas Regional Project (CVRP), Haribon Foundation, and the University of the Philippines Marine Science Institute (UP-MSI) (Pascobello, 03 December 2009). Mario Pascobello, former MMC head and barangay captain, was also brought by Indonesia's own USAID-funded Coastal Resource Management Project to personally teach communities in North Sulawesi the practical aspects of MPA management as part of its strategy. Pascobello (03 December 2009) also cites personal conversations, such as with the municipal mayor, as a way of passing on knowledge from the management of the Apo Island MPA. On the other hand, the national MPA network Pambansang Alyansa ng Maliliit na Mangingisda at Komunidad na Nangangalaga ng Karagatan at Sanktwaryo sa Pilipinas (PAMANA KA SA PILIPINAS) has also been a venue for the MMC to share their experiences.

4.2. Municipal

Dauin is a municipality in the province of Negros Oriental. It is bounded on the north by the municipality of Bacong, on the south by the municipality of Zamboanguita, on the west by the municipality of Sta. Catalina, and on the east by the Bohol Sea (Figure 6). It has a total area of 144.32 km^2 and a population of 23,681 in 2007 from 19,609 in 1995 (NSO, 2007). It has a total of 23 barangays, nine of which are coastal, including Apo Island. The coastline is approximately 12 km long (Muncipality of Dauin, 2001). The

total population of all coastal barangays on the mainland is 12,027. At present, it has nine MPAs in seven of its eight mainland coastal barangays (Alanano and Enumeradellon, 2006). The mainland MPAs range from 2.21 to 13 hectares in size, covering 57.12 hectares of the municipal waters (Alanano, 2009). Almost all of its reserves are rated functional by Alcala et al. (2008), and have achieved good to excellent status (Levels 3 to 5) on White et al.'s (2006) MPA rating system (see Table 12 in Annex).



Inset maps adapted from Mike Gonzalez (http://upload.wikimedia.org) and Alanano (2009)

Figure 6. Location of the Municipality of Dauin and its coastal barangays

4.2.1. History of establishment

According to Alanano and Enumeradellon (2006), the first initiative for MPA establishment on mainland Dauin was in 1978 through Silliman University's Marine Conservation and Development Program (MCDP), which was also implemented on Apo Island. This was in Barangay Lipayo. In 1986, the municipal council passed an

ordinance taking responsibility for the MPA. However, an unwillingness among community members to accept the MPA, which in turn led to a lack of political will in higher authorities to enforce, caused the MPA to fail. Two years later, the Central Visayas Regional Project – Phase I (CVRP-I) Nearshore Fisheries Component funded by the World Bank and implemented by the provincial government of Negros Oriental introduced artificial reefs and fish catch monitoring to improve fisherfolk incomes in the town. Two of the current MPAs are founded on artificial reefs (ENRD-Office of the Governor, 2009, CCEF, 2009).

Reef surveys were done in 1994 by the Centre for the Establishment of Marine Reserves in Negros Oriental (CEMRINO), funded by the European Union and implemented by the University of Bremen with assistance from the German Development Service (GDS) and the Resource Management Division (RMD) of Negros Oriental (Alanano and Enumeradellon, 2006). The surveys enabled the identification of potential MPA sites. The RMD helped organise fisherfolk communities as a first step to having community-managed MPAs. A follow-up project, the Synergetic Management of Coastal Resources (SYMCOR), assisted in the establishment of some MPAs (ENRD-Office of the Governor, 2009).

This initiative was followed by the Coastal Resource Management Project (CRMP) funded by the USAID, which conducted trainings and workshops in preparation for the drafting of a five-year coastal resource management (CRM) plan. Participatory planning workshops and validation sessions took place between 1999 and 2001 (Muncipality of Dauin, 2001); the CRM plan was approved by the municipal council in 2001. As part of the process, the CRMP also assisted in delineating the municipal waters in 2001 so that they could be zoned for different uses.

Between 2001 and 2005, several MPAs were established with the assistance of the Environment and Natural Resources Division (ENRD, formerly RMD) of the provincial government and the Coastal Conservation and Education Foundation (CCEF), an NGO based in Cebu City in the province of Cebu, and its Saving Philippine Reefs Project (Alanano and Enumeradellon, 2006). Fishermen's associations were organised in every coastal barangay to manage their respective MPAs. CCEF contributed funds and technical assistance, particularly in the form of reef monitoring and trainings. This intervention included the application of an MPA rating tool that assessed the status of MPAs based on the presence of basic infrastructure and financial sustainability measures, among other things. The ENRD deployed community organisers to form the fisherfolk associations (Diaz Jr., 08 December 2009). The DENR provided technical assistance in delineating the MPAs (Alanano, 2009). Public hearings were held to resolve any resistance from community members.

In 2005, a CRM Ordinance was passed, incorporating the CRM Plan into the municipal revenue code. The ordinance sets the boundaries of the MPAs, and specifies user fees as well as the distribution of income from these user fees. No new MPAs have been established since 2005, but efforts are being made to increase the sizes of existing MPAs.

4.2.2. Management structure

Registered and accredited fishermen's associations (FAs) are the primary managers of the MPAs (Figure 7). These are organised groups of fishers composed of at least 15 members, with a set of officers and by-laws (Sangguniang Bayan of Dauin, 2005). Before being eligible to become MPA managers, they must first be accredited by the Department of Labor and Employment, and registered with the municipal government.

The FAs decide on the size and location of the MPA, and propose this to the municipal council. They are also responsible for implementing MPA rules, such as the collection of user fees. The municipal council alone has the authority to pass a municipal ordinance to legally establish the MPA. Municipal ordinances are needed as well to enforce any regulations regarding resource use in the municipal waters. Municipal ordinances receive final approval from the Mayor. At present, Ordinance No. 05-01 of 2005 sets uniform rules for all the MPAs.

Bantay Dagat, literally "sea watch" or fish wardens, are organised and deputised in each barangay to enforce the MPA rules in coordination with the Police Environmental Desk Officer of the Philippine National Police (PNP) stationed at the municipality. Members are also usually FA members. The Bantay Dagat units meet monthly with the Mayor to discuss issues and work on common problems (Alanano, 04 December 2009, Diaz Jr., 08 December 2009). Together, all the Bantay Dagat units of the barangays form a municipal Bantay Dagat (Sangguniang Bayan of Dauin, 2005). The current Mayor has his own network of "moles" who monitor the performance of the Bantay Dagat and update him on lapses in enforcement (Alanano, 04 December 2009).

The Coastal Resource Management (CRM) Office, created by the same CRM ordinance under the Office of the Mayor, is tasked to propose measures related to CRM and to coordinate with government bodies and NGOs in the delivery of CRM as a basic service (Sangguniang Bayan of Dauin, 2005). The CRM Office also coordinates with the FAs in the disbursement of income from user fees and fines.

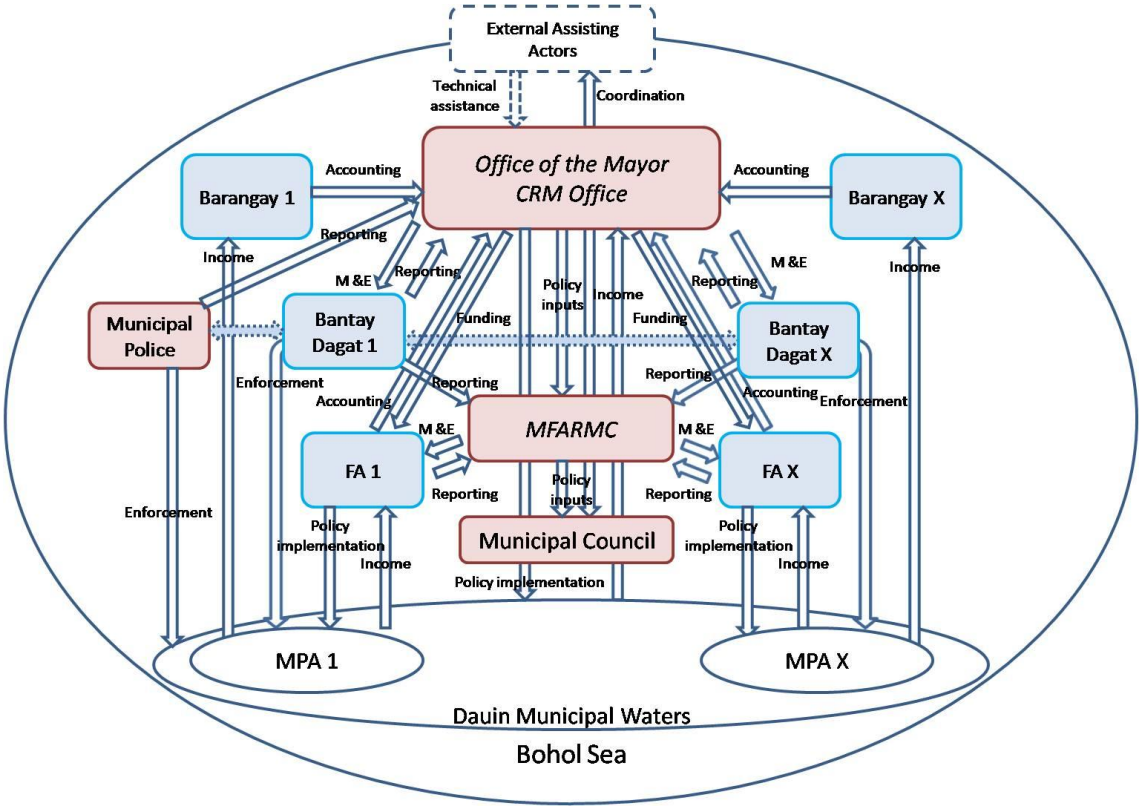


Figure 7. MPA management structure of the Municipality of Dauin

Boxes with same colour indicate units at same management level; dashed box and arrow indicate a unit and function not part of the legislated management structure. Units in italics indicate coordinating bodies; shaded arrows indicate interaction initiated by coordinating body. Circles represent social-ecological systems. Arrows indicate inputs or action directed towards other units/systems.

The Municipal Fisheries and Aquatic Resources Management Council (MFARMC) is an advisory body that is tasked to assist the municipal mayor and the municipal council in the formulation and implementation of CRM policies. Under the Fisheries Code, the municipal government must establish MPAs in consultation with the MFARMC, and the MFARMC itself may recommend areas for protection (RA 8550, Sec. 81). It is designed as a multistakeholder body that includes representatives from the national and municipal governments, NGO, private sector, and different fisheries sectors, including women and the youth (RA 8550, Sec. 75). At present, the Dauin MFARMC is composed of government representatives, such as the municipal agriculture officer and the Mayor, representatives of vendors' associations, all FA presidents, and Bantay Dagat representatives; it meets monthly (Diaz Jr., 08 December 2009). One of its

specific functions is to evaluate proposals for MPAs and FA accreditation, and also to investigate FAs that are no longer performing as they should.

The ENRD continues to validate proposed sites for MPA establishment as needed (Alanano, 04 December 2009). Reef monitoring is conducted intermittently as part of projects or studies usually implemented through Silliman University, or by the ENRD when requested by the municipal government.

4.2.3. Objectives and motivation

Municipal mayor Rodrigo Alanano, who is generally credited for the establishment and revival of Dauin's MPAs, says that his motivation was the municipality's ranking as one of the dirtiest in the country and one of the poorest in the province (04 December 2009). When he came into office in 2001, the coastline was heavily polluted by commercial fishing boats and vendors throwing their waste into the coastal waters. Due to the accessibility of transportation in the town, about 72 to 100 commercial fishing boats would dock every day. This prompted him to implement the CRM Plan, and enforce the provisions of the Philippine Fisheries Code, which meant banning all commercial fishers from the municipal waters in coordination with the BFAR.

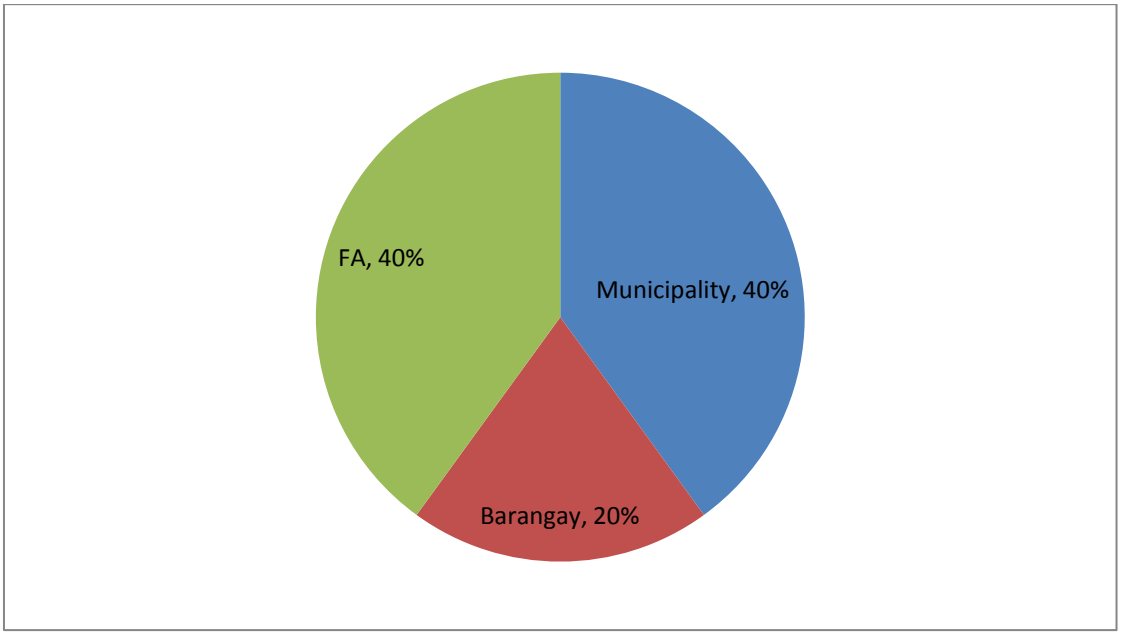
After the commercial fishers had been driven out, the Mayor then met with about 100 municipal fishermen, out of which only 10% agreed to have an MPA. With this minority and 5 representatives from vendors, the first FA was created spanning two barangays (Alanano, 04 December 2009). The network of MPAs was inspired by the Apo Island model of deriving incomes from user fees (Alanano, 04 December 2009, Pascobello, 03 December 2009). As a municipal councilor of Dauin during the 1980's, Alanano was already familiar with how the Apo Island MPA was being managed. The stated objective for setting up MPAs is "to improve the quality of life and livelihood

outcomes among people living in coastal communities and enhance adequate supply of food" (Alanano, 2009).

4.2.4. Strategies and methods

Similar to Apo Island, community-organising was the main strategy used to establish the MPAs in each barangay. MPA management is grounded on an income-sharing scheme institutionalised by Ordinance No. 05-01. The MPA user fees are distributed in a scheme where 40% goes to the municipal trust fund, 20% to the barangay general fund where the MPA is located, and 40% to the FA or cooperative managing the MPA (Figure 8); the Bantay Dagat receive a monthly honorarium taken from the CRM trust fund. Recently, however, the municipal share has accrued directly to the general fund rather than to a special CRM trust fund. The share of the barangays and FAs is released back to them by the municipality subject to their submission of an accomplishment report and work and financial plan approved by their respective general assemblies (Alanano, 04 December 2009).

Income is also earned from fines for violations of prohibited acts within municipal waters. Ten percent of fines collected within the barangay are shared equally by the barangay council and the FA. However, a portion of the FA's income and of the barangay's and municipality's 20% economic development fund is required to be allocated for MPA management yearly (Sangguniang Bayan of Dauin, 2005). On top of the funds received from user fees and fines, the Office of the Mayor also contributes a counterpart fund for MPA infrastructure and equipment in each barangay such as marker buoys and guardhouses, as well as funds for training.



Source: Ordinance No. 05-01 of the Municipality of Dauin

Figure 8. Income-sharing scheme for MPA user fees

One strategy deliberately employed by the Mayor is distancing himself from the tourism sector and focusing on fostering relationships with the FAs to give priority to the rights of municipal fisherfolk rather than to sources of municipal revenue (Alanano and Enumeradellon, 2006). Another strategy is frequent and personal meetings with law enforcers and MPA managers to quickly resolve problems that come up, and to directly communicate changes in regulations.

To increase awareness of marine conservation activities, a festival was created, with each barangay required to allot funds for participation, and a hymn professing love for Dauin's natural features composed to be sung at every public gathering (Alanano and Enumeradellon, 2006).

4.2.5. Benefits

Alanano and Enumeradellon (2006) cite studies that document improved coral cover and fish abundance within MPAs, and perceived spillover and increased catch per unit effort within two years of MPA establishment, but this has not been empirically studied.

High species richness and high target fish density in two surveyed MPAs are attributed to good management (White et al., 2002). Alanano (04 December 2009) also says that the current catch rate is 20 kg per week in fish traps and 2 to 5 kg in 3 to 5 hours. Due to almost double the amount of internal revenue from investments due to tourism, Dauin's IRA has risen from Php 800,000 before 2001 to about Php 20 to 30 million at present; tourism potential has also resulted in the increase in valuation of land in Dauin from Php 50 to 100/m^2 to Php 3,000/m^2 (Alanano, 04 December 2009). The annual income from user fees has exceeded the sum of all other municipal sources of income after only five years of implementation of the CRM ordinance, and was recorded to be Php 6,223,600 in 2008, increasing almost 30 times within five years (Alanano, 2009).

4.2.6. Learning and diffusion

About 100 study tours have been made by LGUs from all over the country wanting to learn from Dauin's experience (Alanano, 04 December 2009). Some of the tours were at the invitation of the provincial government. Presentations have also been given by the mayor at conferences, such as those convened by the League of Municipalities of the Philippines (LMP). When Dauin's CRM Program won as a local government best practice in the annual Galing Pook Awards in 2005, the success story was published in a book that is also available online. FA presidents and barangay captains, on the other hand, have been able to share their management experiences in meetings of the PAMANA KA SA PILIPINAS. Barangay Captain Amado Diaz Jr. of Masaplod Norte, for example, has been requested for sample copies of MPA ordinances by community-based managers in the provinces of Sorsogon and Cebu who want to manage a greater number of MPAs in their municipalities (08 December 2009). On the other hand, Diaz has personally learned from other MPA communities by visiting other MPAs such as in the province of Zamboanga in Mindanao.

Within the municipality, MPA managers are able to learn from other barangays perhaps indirectly through the membership of all FA presidents in the MFARMC. However, there is no direct convening of all FAs to allow interaction and exchange.

4.3. Provincial

Negros Oriental is the largest province in the Central Visayas region or Region VII of the Philippines. It is found on the southeastern side of Negros Island, the fourth largest island in the country. It has a total land area of 5,402.3 km^2 and a coastline of 300 km (Murphy et al., 1999, Ablong and Waltemath, 1995). Its population grew to 1,231,904 in 2007 from 1,025,247 in 1995 (NSO, 2007). Currently, it is composed of 20 municipalities and 5 cities, and a total of 557 barangays; these are grouped into three legislative districts (Province of Negros Oriental, 2009) (Figure 9).

Only four of the province's municipalities are not coastal; it has at least 115 coastal barangays, and about 35% of its population lives in coastal areas (Ablong and Waltemath, 1995). Its coral reefs were estimated in 1995 to cover 26.5 km^2, distributed non-continuously along 186 km of coastline (Yambao et al., 2001). It is bounded on the north and west by the province of Negros Occidental, on the east by the Tañon Strait, on the southwest by the Sulu Sea, and on the southeast by the Bohol Sea. A survey done at three sites in 1997 showed the presence of 121 hard coral species. At present, the provincial government is assisting 49 MPAs in 17 municipalities and cities, ranging from 1 ha to 34.29 ha (ENRD-Office of the Governor, 2009). They cover an aggregate area of approximately 496.44 hectares. A review of MPAs in the Visayas by Alcala et al. (2008), however, put the figure at 46 MPAs in 18 municipalities and cities covering 775.41 hectares, including a 250-hectare mangrove reserve. The smallest is 0.30 ha, and the average size is 16.86 ha. Only 24 MPAs are rated functional, based on number of

years of existence, funding, enforcement, presence of a management body, and good fish biomass and coral cover (Alcala et al., 2008).

Adapted from Mike Gonzalez (http://upload.wikimedia.org)

Figure 9. Location of the Province of Negros Oriental and its municipalities and cities in Region VII

4.3.1. History of establishment

The concept for the widespread establishment of MPAs in Negros Oriental began during the provincialisation phase of the World Bank-funded Central Visayas Regional Project – Phase I (CVRP-I) Nearshore Fisheries Component in 1988. Prior to this, the project had introduced the use of artificial reefs and fish aggregating devices in the municipalities of Bindoy and Bayawan as pilot sites in 1984 (Peñalba et al., 1994). The

provincialization phase meant that the CVRP interventions, which were also implemented in the other Region VII provinces (Cebu, Bohol and Siquijor) would be replicated by the provincial governments with initial funding from the project. A Provincial Resource Management Committee (PRMC) was formed to carry out the project in Negros Oriental, resulting in innovations in the CVRP technology (Teves, 2002). An example is the use of used tyres instead of concrete for artificial reefs, an idea derived from developments by Dr. Angel Alcala at Silliman University at that time (Teves, 14 December 2009). The PRMC later evolved into the Negros Oriental Resource Management Office. The project ended in 1992, but as an initiative of Governor Emilio Macias II, the Community-Based Coastal Resource Management (CB-CRM) Program that was initiated by CVRP was sustained with funding from the provincial 20% economic development fund. A permanent Resource Management Division (RMD) was established under the Provincial Planning and Development Office in 1993 after CVRP phased out (Ablong and Waltemath, 1995).

However, RMD staff recognised a lack in technical expertise at their level. This led to the German Development Service (GDS) providing technical assistance, particularly in training and equipping RMD staff to monitor the reefs, and in taking underwater videos. It was these visible proofs of what was happening underwater that allowed GDS volunteer Maike Waltemath to convince Governor Macias to invest in the establishment of MPAs rather than in artificial reefs and fish attracting devices, which actually encouraged greater exploitation of the fisheries rather than allowing fish stocks to recover (Teves, 14 December 2009). As a result of this, the Centre for the Establishment of Marine Reserves in Negros Oriental (CEMRINO) was established in 1994 with funding from the European Union and implemented by the University of Bremen from Germany. The term “marine reserves” was used to avoid the technicality of having the

BFAR centrally manage the MPAs if the term “fish sanctuaries” was used (Teves, 14 December 2009).

A new Provincial Coastal Resource Management Committee (PCRMC) was formed with the RMD, GDS, CEMRINO, Silliman University, DENR, the Provincial Agriculturist’s Office, and the Provincial Pollution Control Office as members, among others. The PCRMC was authorized by the Provincial Board to conduct marine rehabilitation and pollution monitoring, and also to coordinate CRM efforts by different institutions to avoid duplication (Ablong and Waltemath, 1995).

The most important task undertaken by CEMRINO was a survey of the province’s entire coastline and from the survey results, the identification of potential MPA sites; 14 sites were recommended to be MPAs. These results, including the underwater videos, were shown to community members to show them the state of their reefs. Once the fishermen’s association (FA) would submit a petition for an MPA to the barangay council, the GDS and CEMRINO would make a detailed survey of the area and present the information to the barangay, which would submit a resolution to the municipal council (Ablong and Waltemath, 1995). When CEMRINO phased out in 1996, the number of MPAs in the province had increased from 10 to 19, also as a result of workshops in the barangays advocating the benefits that could be derived from MPAs (Vogt and Willoughby, 1998).

In 1996, the USAID-funded Coastal Resource Management Project (CRMP) chose Negros Oriental as a learning area involving nine municipalities as the focal point for integrated coastal management interventions (Yambao et al., 2001, Murphy et al., 1999). CRMP’s focus was on participatory resource assessments and workshops to develop municipal CRM plans, capacity-building of enforcement teams, creation of

FARMCs, and advocacy for the creation of a CRM budget by municipal governments to to sustain the MPAs and other CRM initiatives (White and Vogt, 2000, Ablong et al., 1998). It contracted local NGOs to organise communities. Support was also given to Silliman University for the establishment of a Coastal Resource Management Center of Excellence and a Legal Environmental Advocacy Program (Ablong et al., 1998). A follow-up project to CEMRINO, the Synergetic Management of Coastal Resources (SYMCOR), was funded by the German Agency for Technical Cooperation (GTZ), GDS, Misereor and the United Nations Environmental Programme (UNEP) to establish more MPAs (Teves, 2002). This project focussed on forging and strengthening partnerships with the provincial government, NGOs and FAs.

In 1998, the RMD was re-organised as a separate body under the Office of the Governor and renamed as the Environment and Natural Resources Management Division. In 2001, it was again renamed as the Environment and Natural Resources Division (ENRD), which is how it continues to be called at present.

Another USAID-funded project, the Philippine Environmental Governance Project 2 (ECOGOV 2) began working with the province in 2006 (ECOGOV, 2006). ECOGOV focusses on the networking of LGUs for a more cost-effective and ecosystem-based management of coastal waters. This has resulted in the formation in 2009 of an alliance among the municipalities of Bindoy, Ayungon, Tayasan and Manjuyod called "BATMan", in which the municipal governments jointly address the common problem of commercial fishing encroachment and the proliferation of fish aggregating devices. The alliance covers 17 MPAs in the four municipalities (ECOGOV, 2009a). ECOGOV also assisted in the strengthening the collaboration of Negros Oriental members of a Bohol Sea-wide network of MPA managers, the Hugpong Tagadumala sa Sangtuaryo sa Kadagatan sa Bohol (HUTASAKAB). This involves the municipalities of Dauin,

Zamboanguita, Siaton, and Basay (ECOGOV, 2009b). This particular activity was implemented by Silliman University's Dr. Jovito R. Salonga Center for Law and Development. Other efforts at inter-municipal collaboration have been made by Congressman Pryde Henry Teves, who has initiated a coastal law enforcement cluster for municipalities in southern Negros Oriental, covering District III, which he represents.

4.3.2. Management structure

The ENRD is the main coordinating body for MPA establishment and management at the provincial level (Figure 10). It provides technical assistance in reef monitoring, community-organising, and livelihood support, as requested by the municipal governments, and facilitates funding assistance from different sources. Community organisers are deployed at the municipal level to monitor the progress of FAs and facilitate monthly meetings. These community organisers meet bi-monthly to discuss concerns in their particular district. They also report to the ENRD monthly, especially to raise concerns that cannot be handled by individual municipal governments, such as the encroachment of illegal fishers from outside the province (Teves, 14 December 2009). It is the ENRD that coordinates with the provincial police and the provincial attorney to handle these concerns.

The municipal government, however, is still the primary authority for establishing MPAs by law, and the FAs remain the basic unit for MPA management at the ground level. Municipal ordinances are submitted to the Provincial Board for review as to their consistency with national and other laws, but are in principle already effective at the municipal level. Whilst neither the ENRD nor the Provincial Board has authority to impose uniform MPA regulations on the municipalities, the ENRD holds provincial conferences as needed where they advocate for better CRM practices, such as the

creation of a CRM Office or focal person in every municipality to facilitate assistance from the province. The MPAs have also been grouped into clusters that meet every month to report on their status (Teves, 14 December 2009).

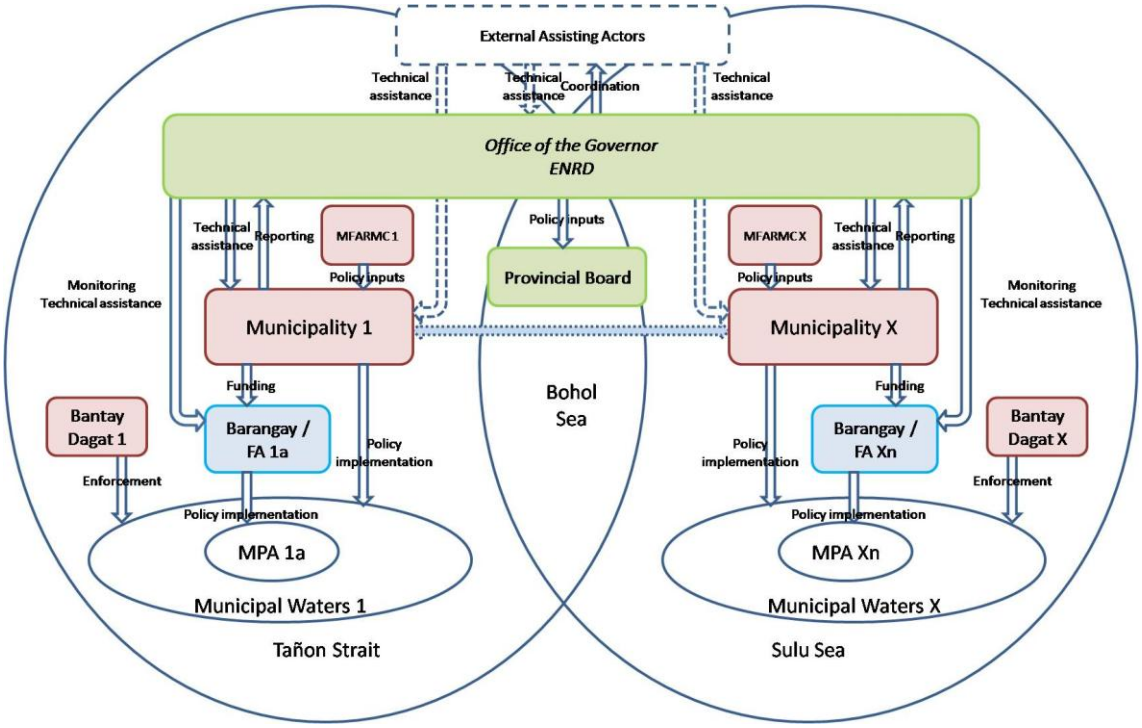


Figure 10. MPA management structure of the Province of Negros Oriental

Boxes with same colour indicate units at same management level; dashed box and arrows indicate unit and functions not part of the legislated management structure. Unit in italics indicates coordinating body; shaded arrow indicates interaction initiated by coordinating body. Circles represent social-ecological systems. Arrows indicate inputs or action directed towards other units/systems.

Management systems at the lower levels vary from municipality to municipality. For example, not all of them may have MFARMCs, and the Bantay Dagat may be an integral part of the FA or an entirely separate group under the Office of the Mayor. In some cases, the municipal or barangay government may have a committee managing the MPA rather than an FA (Alcala et al., 2008). Figure 10 shows a generalised management structure at the municipal level.

4.3.3. Objectives and motivation

The CB-CRM Program of Negros Oriental aims to rehabilitate fish stocks so that small-scale fisheries can become sustainable; core to the concept is the involvement of local

communities in managing their own resources (Ablong and Waltemath, 1995). The two primary issues being addressed are poverty and environmental destruction. The Governor was particularly concerned about increasing the income of small fisherfolk, who are one of the poorest sectors in the province (Teves, 14 December 2009). Murphy et al. (1999) mention that some municipalities have seen a decline in fish catch over two decades from 15 kg/day to < 3kg/day per fisher, as well as a decline in coral cover, which may have made the province receptive to a succession of CRM projects starting in the 1980's.

Interestingly, current ENRD Chief Mercy Teves says that the strategy of using community organisers as a grassroots approach to the adoption of a project intervention was first used in the province from 1975 to 1985 by a USAID-funded population management project (16 December 2009). The provincial government permanently absorbed the community organisers employed by the project by redistributing them in other offices and projects, such as the CVRP. It was this previous experience and rapport already formed with communities that facilitated other community-based interventions such as the establishment of MPAs. This project also resulted in population management being integrated in all of the province's subsequent resource management initiatives.

4.3.4. Strategies and methods

The CVRP specifically aimed to increase the incomes of municipal fishermen and rehabilitate damaged reefs through the following strategies: 1) establishment of fish sanctuaries, 2) installation of concrete artificial reefs and bamboo-based fish attracting devices, 3) mangrove reforestation, 4) mariculture, and 5) seaweed culture. The CB-CRM Program of the province of Negros Oriental, then until now, has employed

community-organising, livelihood support, and marine reserves as basic components in the management of the province's coastal resources.

Ablong and Waltemath (1995) outline the methods and strategies used by the provincial government in the establishment of the MPAs. Instead of one large MPA, several small, no-take MPAs ranging from 6 to 20 hectares in size were aimed for establishment. This was so that the impacts of closing areas to fishing on community income would be mitigated. From these small reserves, larvae and fish fry were expected to disperse to other areas through prevailing currents. However, the decision for establishing an MPA had to come from the communities themselves in the form of a petition to the barangay council.

The two main steps in MPA establishment are the organisation of fisherfolk and their training and education (Ablong, 27 November 2009). The FA then has to be accredited to enable them to apply for projects with NGOs and government agencies. Community-organising in the early years involved courtesy calls with local leaders and heads of government agencies in the area. Environmental education consisted of lectures, underwater video presentations, ecology seminars, and games or contests. Fish catch monitoring was also initiated as an activity among fishermen and their wives, with the activity becoming a competition among the community members (White and Vogt, 2000). Educational activities were not just for fishermen but for a wide range of stakeholders (Ablong and Waltemath, 1995, Murphy et al., 1999). At present, the presence of ENRD's community organisers in almost every coastal municipality keeps the provincial government sensitive to resource management needs at both the municipal and barangay levels.

A provincial award system has been established for well-functioning MPAs based on a CRM Certification scheme devised by CRMP. Good-performing MPAs are given P100,000 in projects each time they go a step higher on the CRM Certification (Teves, 14 December 2009).

4.3.5. Benefits

Little documentation has been done on benefits of MPAs at the provincial scale. Wiedemeyer et al. (2003) have found a 240% increase in catch rates, 12% increase in live coral cover, 22% increase in average grouper size, and an almost 100% decrease in mechanical coral damage and destructive fishing practices after only three years of protection. A fisherman has testified to an increase in fish catch and reduced fishing effort from 0.5 kg per day to 3 kg in half a day (Ablong and Waltemath, 1995).

4.3.6. Learning and diffusion

The CVRP structure provided a mechanism for learning among provinces in Region VII. Site managers were required to report at least every quarter to the CVRP Board, of which all provincial governors in the region were members. It was through this that the governors were educated about environmental issues and learned which strategies were successful (Ablong, 27 November 2009). LGUs in other parts of the Philippines and Vietnam have also learned from the Negros Oriental experience through cross-site visits, presentations in forums, or mayors' conferences where mayors are able to share with other LGUs how their own MPAs have been established with assistance from the provincial government (Teves, 14 December 2009). The Visayas Fisherfolk Symposium, funded by the GDS and GTZ and convened by a coordinating NGO, is one forum where fisherfolk not just from Central Visayas but also from Eastern (Region VIII) and Western (Region VI) Visayas share their experiences and develop solutions to

large-scale problems (Gonzales and Savaris, 2005, Teves, 2002). The first Symposium was convened in 2000 by the St. Catherine Family Helper's Project in Dumaguete.

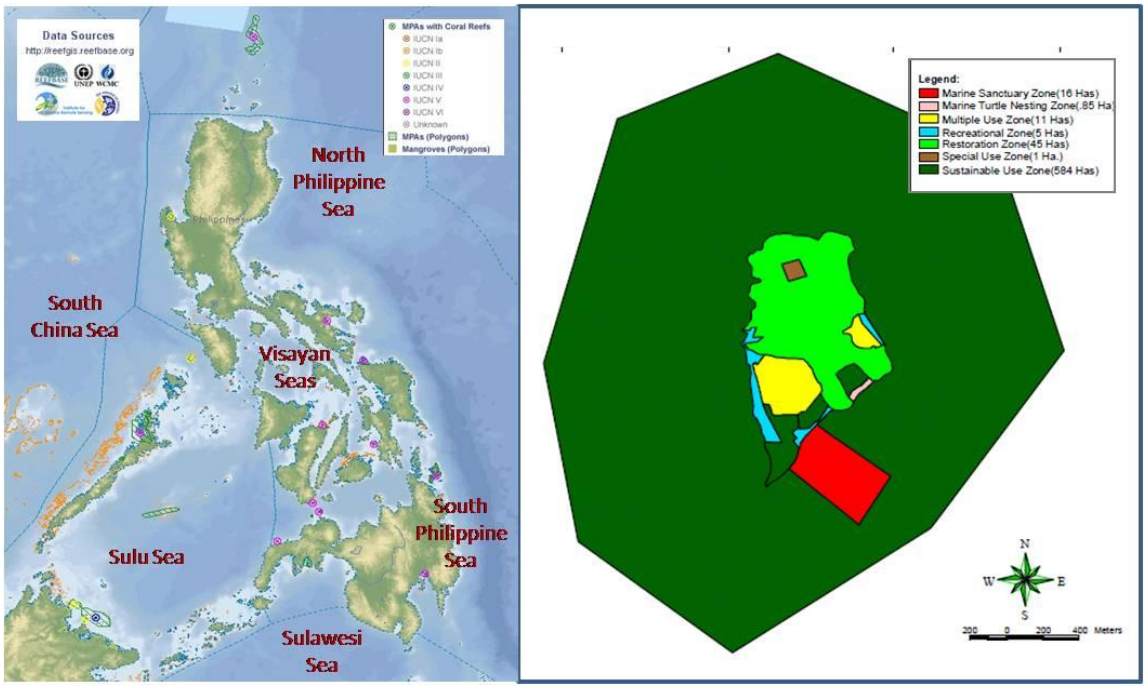
Within the province, exchange among the municipalities is made possible through the occasional provincial conferences, MPA cluster meetings, and the reporting of the community organisers deployed in different municipalities. In addition, the BFAR may convene representatives from successful MFARMCS for reporting at the regional and national levels (Aro, 17 December 2009).

4.4. National

Although there are now almost a thousand MPAs established in the Philippines through the Local Government Code, the Fisheries Code, and the National Integrated Protected Areas System (NIPAS) Act, only those created under the NIPAS are managed within a single management system. This system, however, is not specific to the management of no-take MPAs.

National networks of community-based MPA managers exist, such as through the League of Municipalities of the Philippines (LMP) and the Pambansang Alyansa ng Maliliit na Mangingisda at Komunidad na Nangangalaga ng Karagatan at Sanktwaryo sa Pilipinas (PAMANA KA SA PILIPINAS). Apart from its regular meetings, the LMP has held two conferences for coastal municipalities, initiated by the Coastal Resource Management Project (CRMP) in 1999, where the mayors of coastal municipalities in the Philippines are able to share their success stories and come up with resolutions advocating for more coast-relevant policies at the national level. PAMANA KA SA PILIPINAS is a network formed by the NGO Haribon Foundation that is composed of FA presidents and barangay captains of 120 community-based MPAs. It also advocates for national policies that are more sensitive to common fisherfolk concerns. These two

organisations, however, do not function to establish or manage networks of MPAs themselves. On the other hand, organisations such as the MPA Support Network (MSN) and the Coral Reef Information Network (PhilReefs) are networks of institutions that assist in MPA management; members would be the academe, NGOs, and national government agencies. For purposes of comparison, this section discusses only the NIPAS management system, of which Apo Island has been a part of from 1994 until the present.



Map of Philippine MPAs adapted from http://reefgis.reefbase.org; AIPLS map adapted from PAMB and DENR (2007)

Figure 11. Location of national MPAs in their biogeographic zones (left) and of AIPLS management zones (right)

The Philippines has about 30 proclaimed protected seascapes, marine reserves and marine parks being managed under the NIPAS, totalling approximately 11,400 km^2; only about 24 of these, found in 17 provinces and 10 regions, have reef-based MPAs (PAWB, 2009, CCEF, 2008, PAWB, 2007) (Figure 11). These range in size from 0.74 km^2 to 2,159.5 km^2, including land area, which is an integral part of the protected area being managed where present. Furthermore, only portions of these MPAs are no-take areas. Weeks et al. (2009) have identified the largest no-take area to be 968 km^2, which

is the Tubbataha Reef National Marine Park in Palawan province. The total area of the Apo Island Protected Landscape and Seascape (AIPLS) is 6.81 km^2, 0.15 km^2 of which is designated as the no-take marine sanctuary zone (PAMB and DENR, 2007). Only nine protected seascapes have been rated so far, and of these only five including Apo Island have achieved Level 3 or higher (CCEF, 2008).

4.4.1. History of establishment

The Philippines' first protected areas system was established by Act No. 3915 in 1932, and managed by the Director of Forestry under the supervision of the Secretary of Agriculture and Natural Resources (Act No. 3915, Sec. 3). It was not until 1940 that a protected area included a marine component (Alcala and Cadeliña, 2004). Around 1987, the newly reorganised Department of Environment and Natural Resources (DENR) created a task force with Haribon Foundation, a pioneering environmental conservation NGO in the Philippines, to review the management of all existing protected areas in preparation for the creation of an Integrated Protected Areas System (Haribon Foundation, 2009). The NIPAS Act, or Republic Act No. 7586, was passed by Congress in 1991, but the final version was not approved by the President until almost a year later. The first Implementing Rules and Regulations (IRR) were issued as DENR Administrative Order No. 25 (DAO 25 s. 1992) shortly after this. The national parks and reserves already declared under Act No. 3915 formed the initial components of the system, to be reviewed for their continued inclusion in the NIPAS.

Despite the creation of the law, however, little funds were available to establish and maintain the system (Custodio and Molinyawe, 2001). Two projects were launched in priority protected areas to address this gap. The National Integrated Protected Areas Project (NIPAP) was an EU-funded project implemented with the national government by a consulting firm from 1995 to 2001, whilst the Conservation of Priority Protected

Areas Project (CPPAP) was a World Bank-funded project implemented by the national government in collaboration with a consortium of Philippine NGOs called the NGOs for Integrated Protected Areas from 1994 to 2002 (Senga, 2001). Both projects aimed to use a community-based approach to biodiversity conservation. The latter was implemented in the top ten priority areas of the NIPAS by local member NGOs already working in each area. At present, a community-based biodiversity monitoring system is being developed by the Nordic Agency for Development and Ecology (NORDECO), Haribon Foundation and the DENR, with funding from the Danish International Development Agency (DANIDA), to monitor trends in protected areas (Lim, 25 November 2009).

Apo Island and its surrounding reefs were placed under the NIPAS in 1994 under Presidential Proclamation No. 438 in 1994, creating the AIPLS. Dr. Angel Alcala was the appointed DENR Secretary during this time. However, it was not until 1998 when the AIPLS Protected Area Management Board (PAMB) was established, and 1999 when it began to collect fixed user fees instead of donations (Hind et al., 2010).

4.4.2. Management structure

The PAMB is the main management body of the AIPLS (Figure 12). Under the NIPAS Act, the PAMB must have one representative from each local government unit where the protected area is found, and at least three representatives from NGOs or local community organisations (RA 7586, Sec. 11). When this study was conducted, the AIPLS PAMB consisted of the Regional Executive Director (RED) of DENR Region VII as ex-officio chair, and the provincial development officer of Negros Oriental, the mayor of Dauin, the barangay captain of Apo Island, and the director of the Silliman University Institute of Environmental and Marine Sciences (SU IEMS) representing the academe as members (Grefalde, 08 February 2010). Except for the RED and the

provincial development officer, all PAMB members are appointed by the DENR Secretary for a term of five years (RA 7586, Sec. 11).

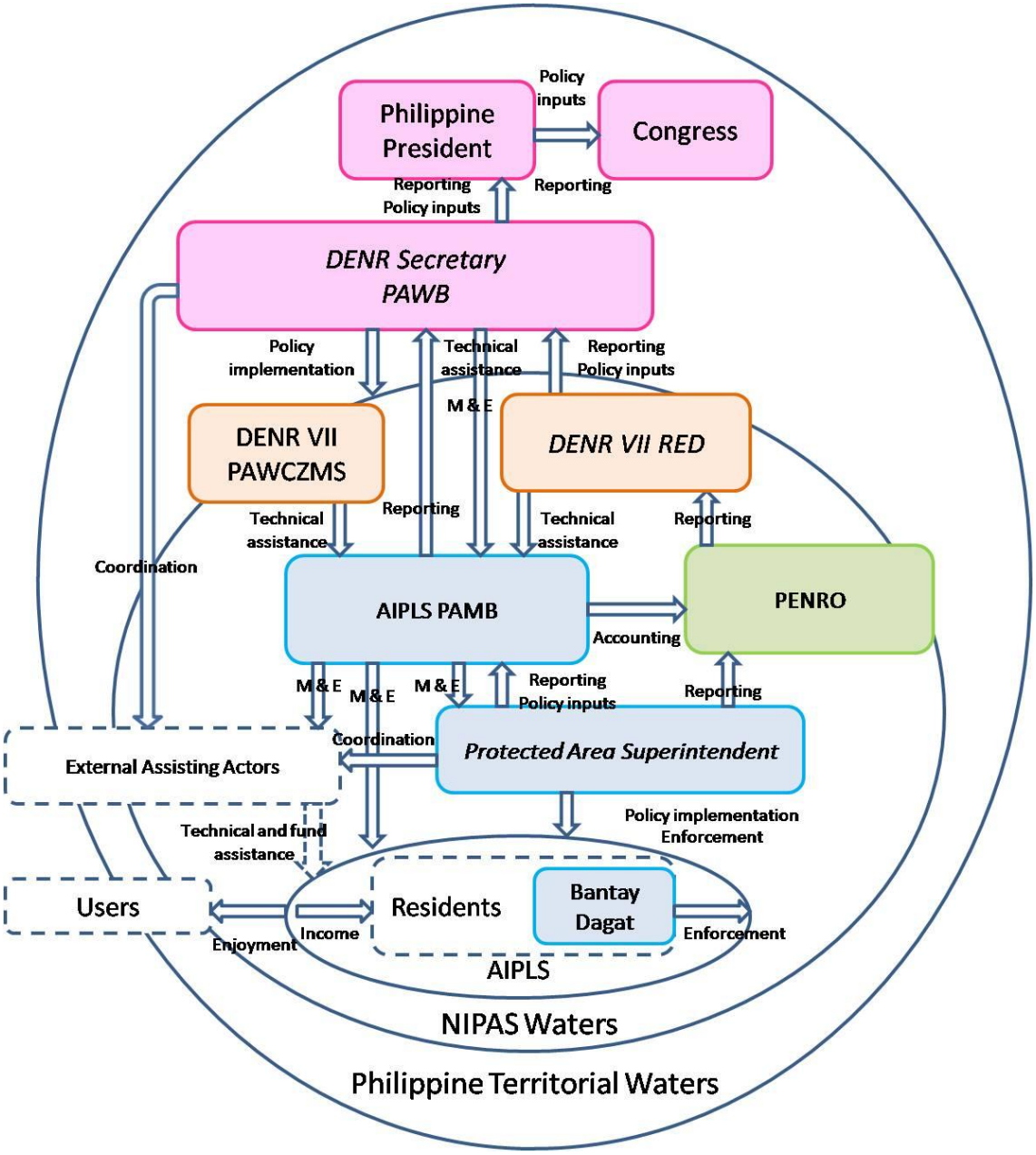


Figure 12. AIPLS management structure (1994-present)

Boxes with same colour indicate units at same management level; dashed boxes and arrows indicate units and functions not part of the legislated management structure. Units in italics indicate coordinating bodies. Circles represent social-ecological systems. Arrows indicate inputs or action directed towards other units/systems.

The PAMB by majority vote decides how the budget is to be allocated, as well as approves proposals for funding. It makes site-specific management decisions and formulates a management plan that must adhere to the general management strategy set

by the DENR Secretary; the plan must be endorsed to the Secretary through the national Protected Areas and Wildlife Bureau (PAWB). Included in the PAMB's functions is the monitoring and evaluation of field staff, NGOs, and community members in their contribution towards biodiversity conservation and sociocultural development (DAO 25 s. 1992, Sec. 18).

The AIPLS PAMB is set to meet quarterly, although the actual frequency of meetings depends on the availability of funds (Calumpong, 18 December 2009). The RED and the Regional Technical Director of the Protected Areas, Wildlife and Coastal Zone Management Service (PAWCZMS) are designated to provide technical guidance to the PAMB (DAO 2008-26, Rule 11.5). A Protected Area Superintendent (PASu) is appointed by the RED, with the PAMB's recommendation, to implement the management plan. The PASu submits a quarterly progress report to the PAMB and also prepares the annual work and financial plan for approval. He also has enforcement powers along with the deputised Bantay Dagat (DAO 25 s. 1992, Sec. 38). The PASu reports on a day-to-day basis to the Provincial Environment and Natural Resources Office (PENRO), which is the DENR's provincial branch (PAMB and DENR, 2007). The PENRO also endorses the PAMB's work and financial plan to the RED so that the budget may be disbursed from the national office (DAO 2008-26, Rule 18.9.2).

The DENR Secretary is the administrator of the entire NIPAS, and as such is authorised to create protected area categories and use zones, as well as specify the types of construction and settlement that may take place within the protected areas (RA 7586, Sec. 10). The PAWB formulates and recommends NIPAS guidelines to the Secretary, assists in the monitoring and assessment of the management of the system, and provides technical assistance to the regional offices (DAO 25 s. 1992, Sec. 32). The Secretary is required to submit a report to Congress annually through the President of the

Philippines on the status of protected areas. Only the President and Congress may declare an area as part of the NIPAS upon the recommendation of the regional DENR and the Secretary, and only a law passed by Congress may disestablish a protected area from the NIPAS (RA 7586, Sec. 7).

4.4.3. Objectives and motivations

The NIPAS Act's Declaration of Policy states that the establishment of a comprehensive integrated protected areas system is meant to "secure for the Filipino people of present and future generations the perpetual existence of all native plants and animals" (RA 7586, Sec. 2). The objective of the NIPAS is clearly for biodiversity conservation, as opposed to the Fisheries Code's goal of food security.

Putting areas under the NIPAS also makes donations to the community for coastal management more systematic, by having one authorised body, the PAMB, manage the funds rather than individuals (Calumpong, 18 December 2009).

From being a community-managed MPA, the entire Apo Island and its waters were placed under national management to prevent its high tourism potential from being exploited by investors who might eventually take over all of the land, ultimately displacing the original community (Raymundo and White, 2004, Calumpong, 18 December 2009).

4.4.4. Strategies and methods

Through centralisation, the NIPAS provides a standardised strategy for management that aligns with international benchmarks. Among the main differences between the first protected areas system and the current one is that it adopts categories of protected areas set by the International Union for Conservation of Nature (IUCN), and that it includes different sectors of stakeholders as part of the management system (Lim, 25 November

2009). It also aims to cover the country's different biogeographic zones (Aliño et al., 2002). Although Act No. 3915 allows provincial governors to be part of an advisory committee (Act No. 3915, Sec. 7), the NIPAS Act for the first time recognises that "effective administration...is possible only through cooperation among national government, local government and concerned private organisations" (RA 7586, Sec. 2). Russ and Alcala (1999) assert that the successful community-based experience of Apo Island has influenced the NIPAS Act's policies. Community participation is given value through representation in the PAMB and public hearings before the protected area is established.

The AIPLS PAMB strives to make management community-based by employing locals in the implementation of its programs, and by involving the community and NGOs in biodiversity monitoring (PAMB and DENR, 2007). It also explores livelihood options for the community, particularly in ecotourism enterprises. A total of 51 locals have been trained and receive some monthly compensation as Bantay Dagat or tour guides (Calumpong, 18 December 2009). Part of the fund generated is used for education, such as the financing of the local high school building and scholarships (PAMB and DENR, 2007). The PAMB is also required to harmonise its management plan with local government plans. Research is a major strategy used by the AIPLS PAMB for determining use guidelines; linkaging is another strategy geared towards sourcing funds externally (PAMB and DENR, 2007).

The NIPAS operates using the Integrated Protected Areas Fund (IPAF), which comes from the incomes of the individual protected areas, usually from visitor and other user fees. Residents of the locality or of the Philippines may pay lower fees than other visitors, depending on each PAMB's rules. Twenty-five percent of the site's total income accrues to the Central IPAF, whilst 75% accrues to the Protected Area Sub-

Fund to be used for the site's operations. The Central IPAF is used for NIPAS projects and operations, such as the management of sites that do not generate enough revenues. Taxes and grants given to the Philippine government in relation to the NIPAS also accrue to the central fund. One of the main complaints about the system has been that the share of the protected areas from the national government is always delayed in its disbursement, hampering day-to-day operations (Hind et al., 2010, Custodio and Molinyawe, 2001). In 2008, a revised IRR was issued as DAO 2008-26 amending the first one. One of the important changes is that any endowments, contributions, donations and grants given specifically to a protected area accrue solely to the management of the site and no longer become part of the national fund (DAO 2008-26, Rule 18.5). The AIPLS is currently the highest-earning protected landscape and seascape in the NIPAS (PAWB, 2009).

4.4.5. Benefits

No data on national-scale changes in biodiversity as a result of the NIPAS are available. Since NIPAS management of Apo Island only began in 1999, changes in biodiversity cannot be attributed to this management system, and are therefore not included here. However, the increase in number of visitors from 12,744 in 2000 to 15,000 in 2009 may be some indication that the biodiversity has at least been maintained (Calumpong, 18 December 2009, Calumpong and Cadiz, 2003).

A marked change in the shift in management from the MMC to the PAMB, however, was the collection of fixed user fees instead of donations. From December 1999 to March 2000, the income from user fees, excluding donations, was Php 509,573, or nearly 20 times the amount previously earned from donations in half the time period (Calumpong and Cadiz, 2003). Of this income, 41% was allocated for the maintenance of the AIPLS, 44% for administration and management, and 15% for livelihood

projects. Income from tourism activities such as diving boat rentals, accommodations and souvenirs was estimated to be Php 7,234,366 for the same period, 20% of which were direct incomes of island residents (Cadiz and Calumpong, 2002).

Incomes from user fees has since increased from a little more than Php 1 million in 2000 to Php 4 million in the first part of 2009 (Calumpong, 18 December 2009, Calumpong and Cadiz, 2003). More than Php 100,000 is allocated per month on salaries of staff, including Bantay Dagat, who are local residents; a grant from the Shedd Aquarium in Chicago has been used to fund livelihood projects such as a bakery and eatery, and scholarships (Calumpong, 18 December 2009). A water tank has also been installed for desalination.

4.4.6. Learning and diffusion

Starting in 2009, PAMB summits were held at regional and national levels as a venue for system-wide concerns to be discussed (Lim, 25 November 2009). Information gathered will serve as a guide for the revision of policies to address common issues in protected areas, such as mining, for example. The AIPLS PAMB itself has hosted a region-wide forum of PAMBs.

One means by which learning is being shared with other countries is through the Philippines' membership in international bodies. The Philippines is currently chair of the MPA Networks Sub-Committee of the Sulu-Sulawesi Marine Ecoregion Tri-national Committee and is also a member of the six-country Coral Triangle Initiative (Miclat, 2008). The PAWB acts as the official Philippine representative. Because the Philippines is signatory to the Convention on Biological Diversity (CBD), the PAWB submits an annual report on key aspects of biodiversity trends in the country. Stakeholder consultations at the level of the protected area and the region are also done

by the DENR to collect information for this purpose. Experiences on the ground are shared with other countries in Southeast Asia through attendance by PASus in international forums such as those sponsored by the Association of Southeast Asian Nations (ASEAN) and the ASEAN Centre for Biodiversity, which are both inter-country organisations (Lim, 25 November 2009).

Among NIPAS areas, cross-site visits are also being made to improve management. For example, the AIPLS PAMB has gone on visits to the St. Paul's Subterranean River in Palawan and the Sagay Marine Reserve in neighbouring Negros Occidental to learn how the PAMBs in those areas are under the leadership of the municipal government or community organisation rather than the DENR RED, making the management of the protected area more community-based (Calumpong, 18 December 2009).

5. RESULTS

5.1. Establishment and Management

As scale increases, coastal population and length of coastline also increase by at least one order of magnitude (Table 4). The increase in size for all variables from provincial to national scale is at least two orders of magnitude. The areas covered by MPAs increase from one reef to several discontinuous reefs spread out in several bodies of water rather than an increase in size of a single reef.

Table 4. Comparison of social-ecological features of different scales

FEATURES	BARANGAY APO ISLAND	MUNICIPALITY OF DAUIN	PROVINCE OF NEGROS ORIENTAL	COUNTRY OF THE PHILIPPINES
Total land area	0.74 km^2	144.32 km^2	5,402.3 km^2	300,000 km^2
Marine body managed	Bohol Sea	Bohol Sea	Bohol Sea, Tañon Strait, Sulu Sea	All Philippine inland seas and exclusive economic zone
Length of coastline	ca. 4 km	12 km	300 km	36,289 km
Aggregate reef area	1.06 km^2	No data	26.5 km^2	27,000 km^2
Coastal population	745	12,027	ca. 431,200	ca. 54,870,000
Total no-take MPA area	0.15 km^2	0.57 km^2	4.96 km^2	1,459 km^2

NB “ca.” indicates author-estimated figures based on available data

At the first three scales, donor-assisted projects have played a major role in initiating the establishment of MPAs (Table 5). This suggests the influence of international actors in bringing down global agenda to local scales. The academe as initiator and implementer shows the experimental nature of the MPA at this level and era. As seen also in the differences in primary objectives, at island and national scales, the primary objective is

conservation-oriented, whereas at municipal and provincial scales, the concern relates more explicitly to poverty alleviation by improving the natural resource base. The role of the Office of the Mayor as initiator comes at a time when the concept of community-based MPAs has become a national trend, and the legal framework gives the power for MPA establishment to the municipal government.

Table 5. Comparison of management histories and roles at different scales

	BARANGAY APO ISLAND	**MUNICIPALITY OF DAUIN**	**PROVINCE OF NEGROS ORIENTAL**	**COUNTRY OF THE PHILIPPINES**
Primary objective for establishment	Habitat protection and increase in fish yield	Improved livelihood and food supply of coastal communities	Habitat rehabilitation and increase in fisherfolk income	Biodiversity conservation
Initiator of establishment	Academe / Donor-assisted project	Donor-assisted project / Office of the Mayor	Donor-assisted project	National government / NGO
Year of first establishment*	1985	1997, 2005	1993	1992
Primary implementer of policies	MMC	FA	FA	PASu
Primary policy-making body	MMC	Municipal Council	Municipal Council	DENR Secretary and PAMB
Primary beneficiary	General Assembly	FA	FA	Filipino citizens
Benefits	Increased fish catch, income from tourism	Increased fish catch, income from tourism	Increased fish catch, income from tourism	Conserved biodiversity, income from tourism

*Refers to establishment by Municipal Resolution for the three lowest scales

The strategy is similar for the first three scales. First, community environmental education is conducted to increase awareness about the need for an MPA; second, community organisers facilitate the creation of a community-based group that will manage the MPA; third, the organised group submits a proposal for the formal

establishment of the MPA by legislation. For the national scale, it is the regional-level DENR that recommends the area for protection, and the national-level DENR that chooses the members of the management board. Community environmental education may also be conducted, but only after the area has been recommended for protection.

The primary implementer of MPA policies is in principle the same for the first three scales, in the form of a group of local residents. The only difference is that FAs are organised groups with officers and by-laws, and are accredited by the Department of Labor and Employment; these therefore have legal personalities, which allow them to directly apply for funding from different sources. The MMC, on the other hand, is simply a group elected by local residents. At the national level, a non-local government employee who may hire local staff implements the policies.

The main difference between island and higher scales is that policy-making is a role of the community on the island, whilst in higher scales, policies are made by a municipal council with inputs from the mayor and the multistakeholder MFARMC at local government scales, and by appointed persons at national scale. This implies that whilst at local scales, policy-making and implementation are done through some consensus by a group chosen or elected by the community, these functions are done unilaterally at national scale by individuals who occupy these positions without any community consultation. Also, at higher scales, the roles of implementation and policy-making are split between different management bodies, and as scale increases, policy-making is done by an increasing number of bodies at several levels. This results in the existence of policy-making bodies that have no involvement whatsoever in implementation, and are far removed from the area being managed.

At island scale, the main functions in the management structure are implementation, policy-making, enforcement, and technical assistance. Technical assistance is provided for by legislation through bodies external to the social-ecological system being managed. At municipal scale, additional functions such as accounting, reporting and monitoring and evaluation (M & E) become important, indicating the presence of structures for check and balance. Coordination with external actors is also an emergent function as a means to direct assistance to the appropriate management units. Technical assistance, however, is no longer part of the official management functions, suggesting a certain self-sufficiency within the system, but also a reliance on intermittent actors external to the system as the need for technical knowledge or skills arises.

At the provincial and national scales, technical assistance appears again as a function, but here provided by bodies within the managed social-ecological system itself, indicating the internal development of specialised knowledge that is not present in lower-scale management systems. External actors tend to provide technical assistance at municipal level, even when the initiative is at provincial scale. Accounting and evaluation, however, are not present at provincial scale; some check-and-balance mechanism is still in place in the form of monitoring and reporting, but no accountability or imposition of consequences for poor performance is being administered at this scale. At national scale, the PAMB is tasked to monitor and evaluate actors that are external to the management system. Another notable difference at this scale is that management bodies that are required to report to higher levels are involved in the policy-making process.

All scales derive benefit from the managed social-ecological system through income from tourism. The primary beneficiary changes somewhat from island to provincial scale, although local communities are consistently the main target. At the island scale,

all residents and the main management body benefit from the income from donations, because this is used for community development projects. Spillover of fish biomass is easily seen as a benefit, due to long-term data, a small population, and the whole population's dependence on fishing as livelihood.

At municipal and provincial scales, the primary beneficiary is the fishermen's association, which receives income and other assistance directly rather than diffused into the whole coastal population. At the provincial scale, the Office of the Governor is not a beneficiary despite it being a management unit, and benefits received are less clear at municipal and barangay levels, because management structures at these levels are varied. A radical shift occurs at the national scale in that the primary beneficiaries, the Filipino citizens or the "users", are not necessarily within the social-ecological systems being managed; the benefit of "enjoyment" of the conserved biodiversity, which may be derived not only from actual visits but also from the mere knowledge that it exists, is also more difficult to measure in terms of improved human welfare.

5.2. Actors and Services

The actors mentioned as contributing to MPA establishment and management may be classified into two: those that are part of the permanent management structure created by legislation, which may be called management units, and those external to the permanent structure that assist in management either through a project or as requested by the management units.

5.2.1. Island

Silliman University has the highest score at 8.5, followed by the MMC at 7.2 (Figure 13). The next highest score was received by the MCDP at 6.2. This shows that the MCDP, although implemented only for two years, had a very high contribution to the

success of the Apo Island MPA compared to all other assisting actors, because it introduced all the services identified as MPA success factors. Silliman University, whose score does not include its work done as implementer of the MCDP, rates high because it was able to sustain most of these services for longer than 10 years. Being the primary management body, the MMC has a large contribution even though it provides only four of the services, because it implements these services itself on the ground and has the legal mandate to do so. The services it does not provide all relate to enhancing knowledge and management capacity, which it receives externally from Silliman University, an academic institution.

All other assisting actors, both government and non-government, have provided one-time services, and therefore have not had a sustained presence in the barangay. The barangay delivers none of the key services, as all ground-level management responsibilities have clearly been given to the MMC by the municipal ordinance.

5.2.2. Municipal

At the municipal level, the highest scorer is the FA at 6.1, followed by the Office of the Mayor at 5.7 (Figure 14). The Office of the Mayor is able to assist in providing 6 out of 7 services, many of which are already part of legislation, but it is the FA that implements the actual services on the ground. Again, the services not provided by both have to do with education. The next highest scorers are the MFARMC (4.1), ENRD (3.5) of the provincial government, and CRMP (3.1), which is a donor-assisted project. The MFARMC scores highest for “continuing advice”, being a mandated multistakeholder advisory body whose recommendations are required for the establishment and maintenance of MPAs. The ENRD and CRMP score highest for community participation and capacity development of MPA managers, respectively, both of which are most relevant during the establishment of new MPAs.

The municipal council (0.9), although crucial to the process as the sole legislative body, does not deliver any services on the ground. Furthermore, the ordinances that it passes are highly dependent on the receptiveness of its elected members to MPA-related issues, which makes its actual contribution subject to political changes.

Silliman University (2.8) scores higher than most assisting organisations primarily because of its activities in implementing the MCDP at this level. However, its contribution is closely matched by the CCEF (1.9), an NGO, which chose Dauin in particular as a project area in the province. It has a relatively high contribution despite its shorter-term presence compared to Silliman, because this was during the period when a series of MPAs were being established by the Office of the Mayor, and also because its project focus was MPA management. Other actors with lower scores are concerned mainly with delivering only enforcement on the ground and assisting with management inputs through one-time interventions.

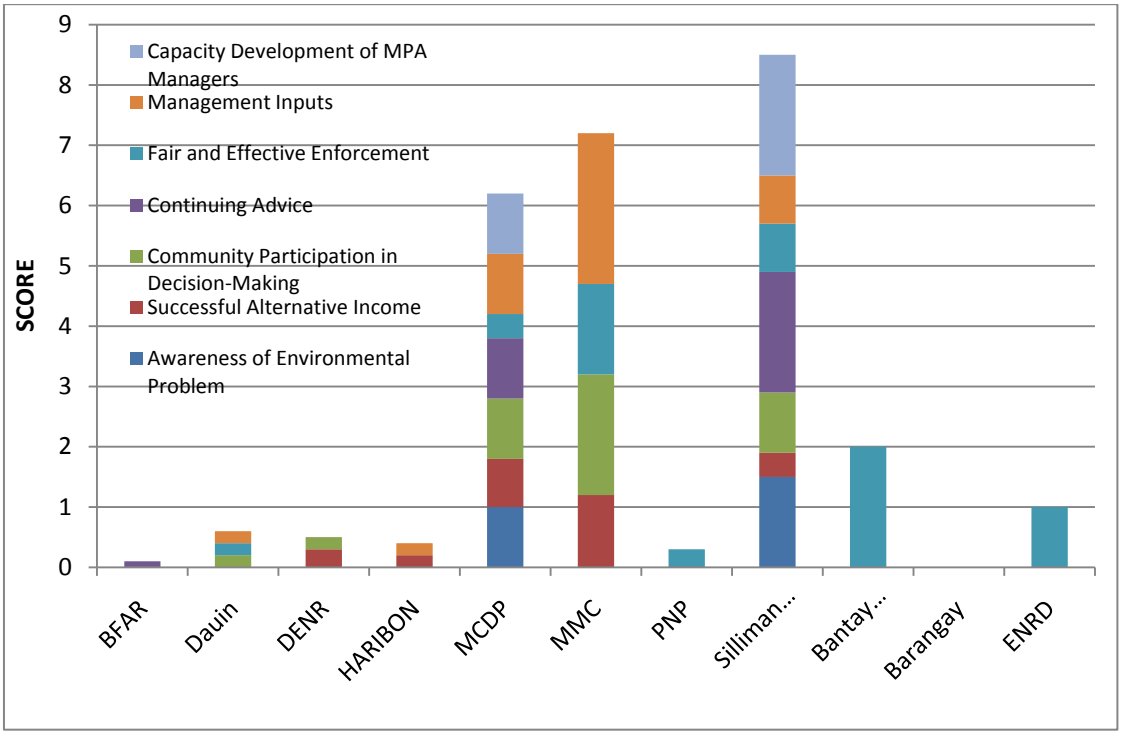


Figure 13. Comparison of service delivery of actors at island scale (1985-1994)

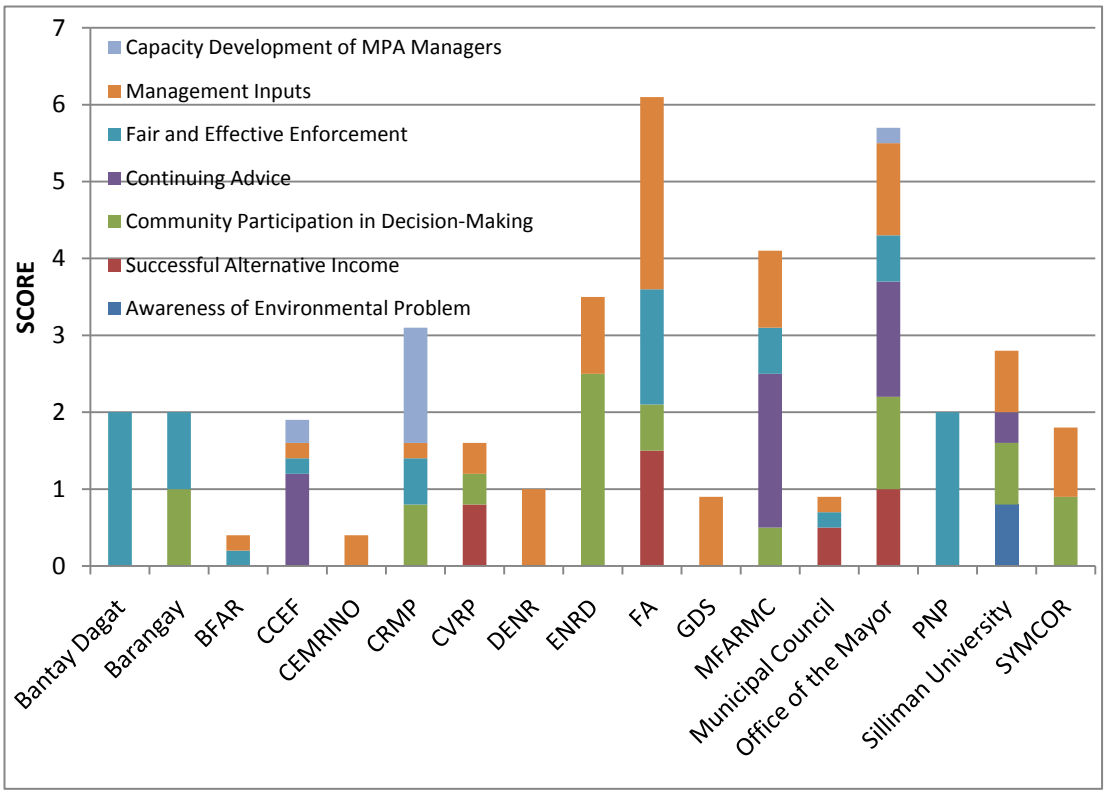


Figure 14. Comparison of service delivery of actors at municipal scale

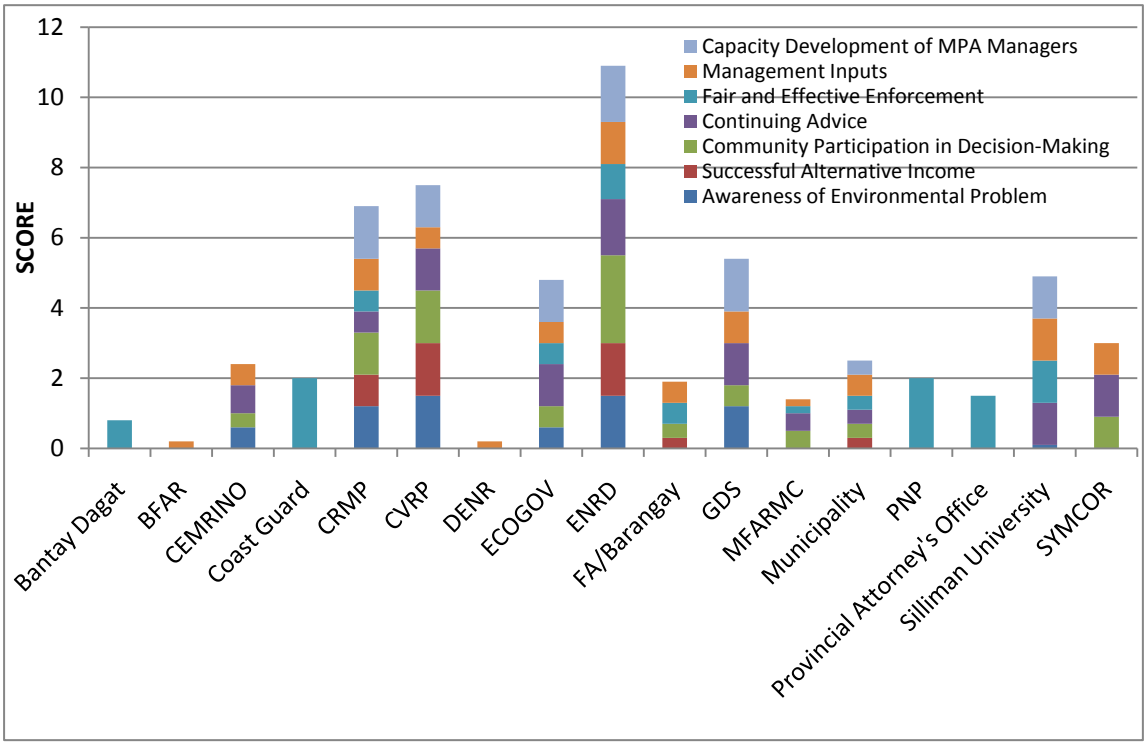


Figure 15. Comparison of service delivery of actors at provincial scale

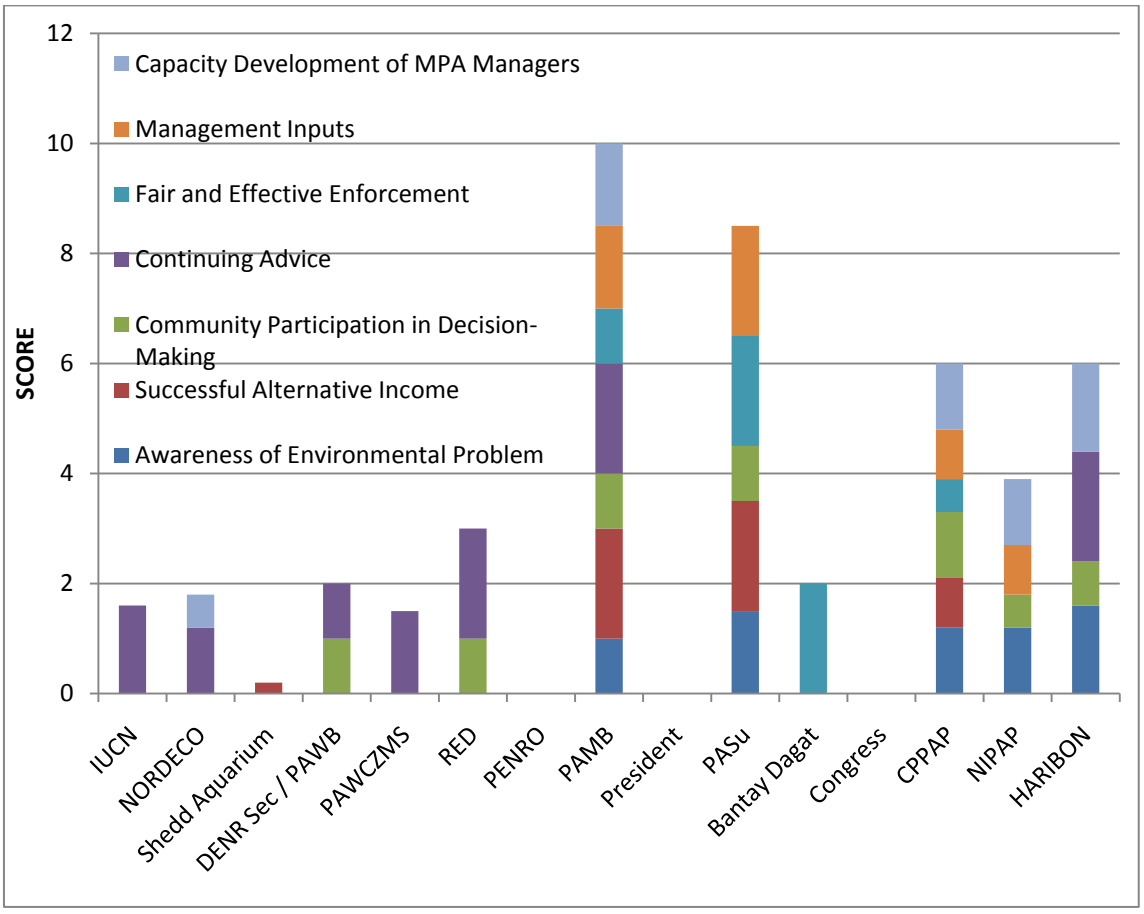


Figure 16. Comparison of service delivery of actors at national scale

5.2.3. Provincial

At the provincial scale, the ENRD scores highest at 10.9, because it provides all crucial services and is mandated by an Executive Order from the Governor to do so (Figure 15). The next highest scores are found among donor-assisted projects (CRMP, 6.9 and CVRP, 7.5) and assisting institutions (GDS, 5.4 and Silliman University, 4.9) that have delivered more than half the services on the ground for extended periods. The others are shorter-term donor-assisted projects, national government agencies, and management units at lower levels.

At this scale, the FA or barangay (1.9) has a lower score than the municipal government (2.5), because it is highly dependent on both legislation and technical assistance from the municipal level, which has the mandate and the funds. These and the Bantay Dagat score relatively low compared to other actors and compared to its counterparts at the municipal scale, however, because service delivery could only be rated for one political term or project duration; given the differences in political dynamics across municipalities, there is no guarantee that MPA initiatives will be sustained beyond this period.

5.2.4. National

The PAMB, which is able to provide all services, has the highest score (10), followed by the PASu (8.5) who implements the management plan (Figure 16). The next highest scorers are the NGO Haribon and the NGO-implemented project CPPAP, both of which have provided site-specific assistance. Understandably, all other management units operating at the national level score lower because the services they provide do not fall under those that contribute to MPA success at the community level. It may also be seen that the services provided at higher levels are more related to technical advice to lower-level management units rather than direct inputs to the MPA.

5.2.5. Comparisons across scales

Fifteen actors were mentioned for service delivery at more than one scale. Figure 17 shows how the contribution of each actor changes across scales. Most actors have peak contribution at provincial scale. Service delivery is lowest at island scale for all actors except Silliman University and the Bantay Dagat, reflecting the long-term relationship between the academe and the residents.

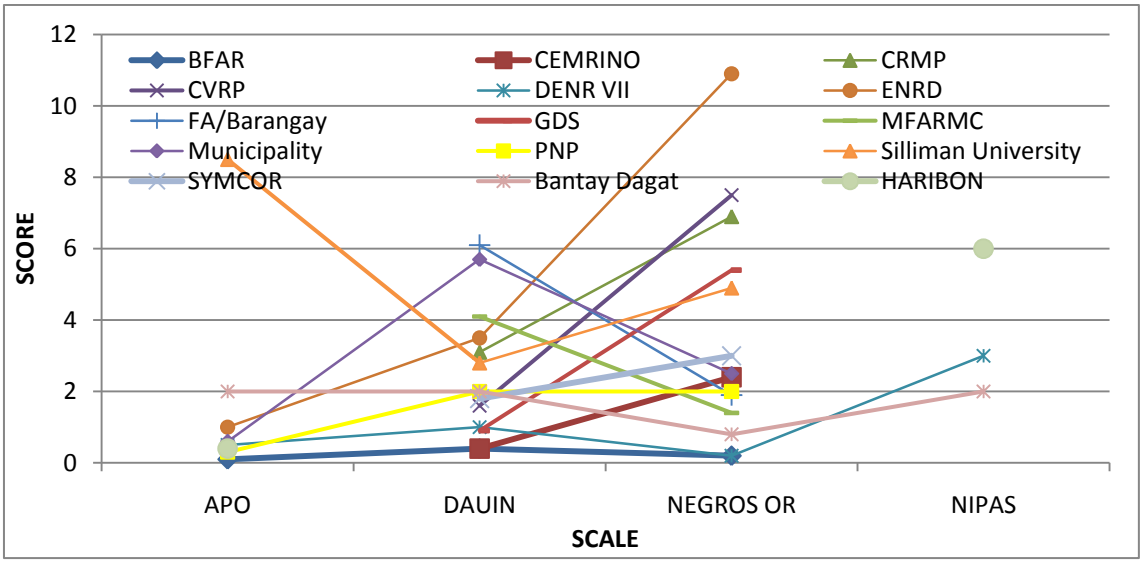


Figure 17. Comparison of total contribution of common actors across scales

Among local government scales, BFAR and DENR make their greatest contribution at the municipal scale, suggesting that these national government agencies work at the municipal scale when requested, rather than implement programs province-wide. The extraordinarily high scores of Silliman University and the ENRD, which provide technical assistance such as livelihood projects, community-organising and reef monitoring that national agencies provide, may also explain why there is not a large niche for these national agencies to occupy at these scales.

All other actors that have their greatest contribution of service delivery at province scale—CRMP, CVRP, CEMRINO and GDS—are donor organisations or donor-assisted

projects that, although they may have implemented interventions at barangay or municipal level, have done so with the objective of improving coastal resource management or fisheries at the provincial level. Their over-all contribution, therefore is seen more at this scale than at a lower one, because of the wider range of services they provide to a greater number of municipalities and barangays.

Table 6. Donor organisations and projects funded at each scale

DONOR ORGANISATION	APO ISLAND	DAUIN	NEGROS ORIENTAL	PHILIPPINES (NIPAS)
DANIDA				Biodiversity Monitoring (>3)
Earthwatch Institute	Saving Philippine Reefs (<1)	Saving Philippine Reefs (<1)		
EU			CEMRINO (2)	NIPAP (6)
GDS		SYMCOR (1)	CEMRINO (2) SYMCOR (5) Visayas Fisherfolk Symposium (>5)	
GTZ			CEMRINO (2) Visayas Fisherfolk Symposium (>5)	
MISEREOR		SYMCOR (1)	SYMCOR (5)	
TAF	MCDP (2)			
UBCHEA	MCP (1)			
UNEP		SYMCOR (1)	SYMCOR (5)	
USAID	MCDP (2)	CRMP (3) ECOGOV (>1)	CRMP (9) ECOGOV (>3)	
World Bank		CVRP (1)	CVRP (8)	CPPAP (8)

NB Numbers in parentheses indicate number of years project was implemented at each scale, estimated from published narratives where no explicit information was available; ongoing projects are indicated by '>'.

To avoid double-scoring for the same contributions, donor organisations mentioned were not included in the ratings but are shown here separately (Table 6). Projects that are national in scope but not implemented within the NIPAS system, such as the CRMP and ECOGOV, were not included under the national scale. The USAID and the World Bank cover the most number of scales, implement the longest-running projects, and have been present for the longest time period, beginning from 1984 with the MCDP and the CVRP, to the CPPAP in 2002 and ECOGOV, which is still being implemented on its second phase at present. European organisations are seen to pool funding and collaborate on projects.

At all scales, the common top three services being provided by actors are fair and effective enforcement, management inputs, and community participation in decision-making (Figure 18). Services having the lowest contribution vary among scales. Continuing advice is a prominent contribution at the two highest scales, suggesting that technical expertise is best channelled at these scales. On the other hand, management inputs and enforcement are given more importance at the two lowest scales, where management units are physically more proximate to the managed area, and the areas of management are more clearly defined and more proximate to each other as well. Capacity development of MPA managers is also a priority service at the provincial level, which reflects the training not just of MPA managers at the community level but also those at higher levels, such as the ENRD.

It is noticeable that services delivered in Dauin are more concentrated towards management inputs, community participation, and enforcement, and much less towards community environmental education and training of MPA managers, unlike the other scales where services delivered are more evenly dirtibuted. This may be explained by the timing of MPA establishment. This occurred in the late 1990's and in 2005. By this

time, the success of Apo Island had made community-based MPAs a popular tool for conservation and fisheries management. Therefore, awareness of the environmental problem was not a service that needed to be provided as much as in the other scales. Also, by this time, the Local Government Code and the Philippine Fisheries Code had been passed and were already starting to be implemented, which defined the municipality's role in fisheries management as well as over its municipal waters. The priority, therefore, was to deliver services that would clearly delineate municipal waters and MPAs, and enforce municipal laws within these boundaries.

The Analysis of Similarities (ANOSIM) shows that the degree and duration of services provided by actors at island scale are significantly different from those provided at all other scales. No distinct differences were identified in service delivery among actor types, which suggests that the degree and duration of service delivery is not particularly associated with the type of institution delivering them.

Multidimensional scaling (MDS) and cluster analyses of services against actors (Figure 19) shows that actors at all scales providing capacity development of MPA managers and awareness of environmental problems tend to be the same ones. Management inputs, alternative income, and community participation may also be provided by the same actors, but in different degrees and durations. Enforcement is clearly a specialised service that a separate group of actors provides.

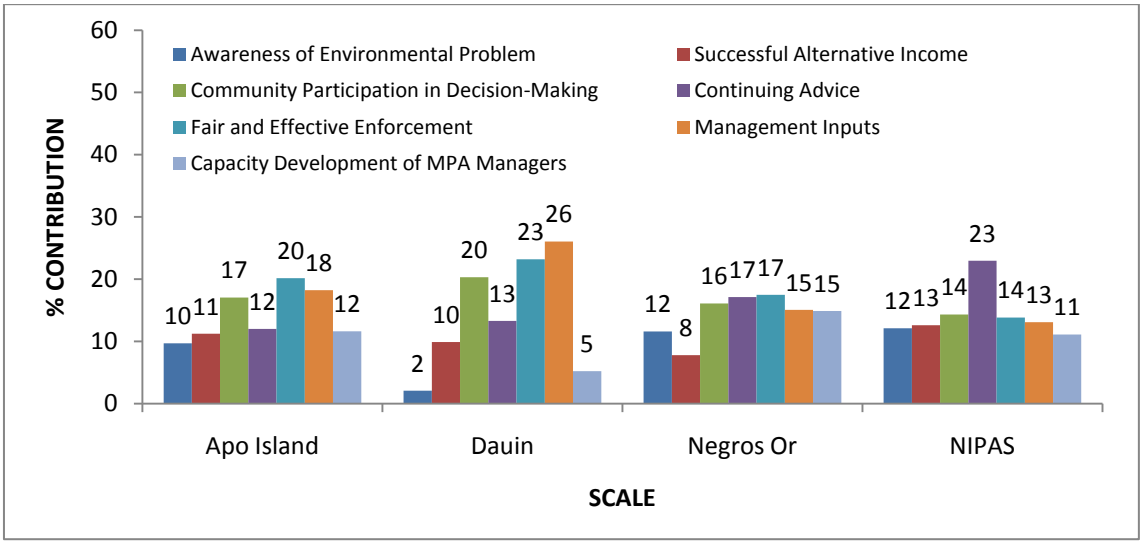


Figure 18. Comparison of distribution of services provided

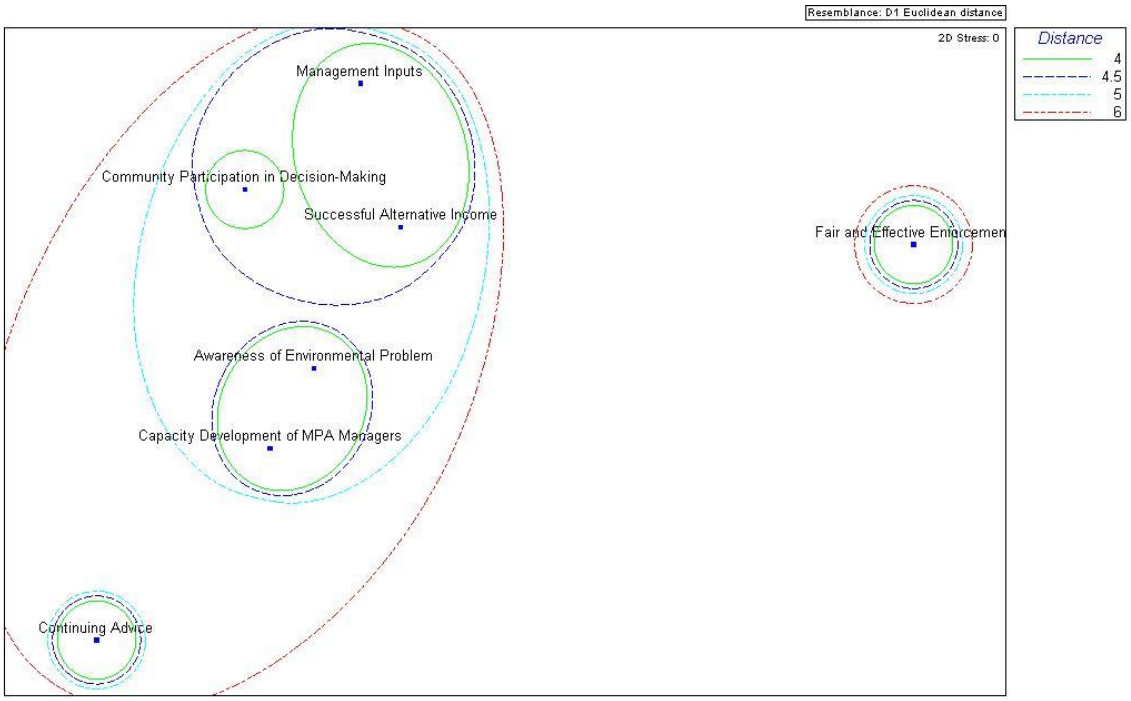


Figure 19. Similarities of services delivered (MDS and cluster analyses)

5.3. Cross-scale Functions

5.3.1. Coordination of management units

Figure 20 shows an increasing number of actors providing coordination for management units with increase in scale. This shows the growing need for coordination as scale increases, because of a greater number of management units. Coordination is done

either by bodies with centralised management functions, by multistakeholder bodies, or by assisting organisations or projects.

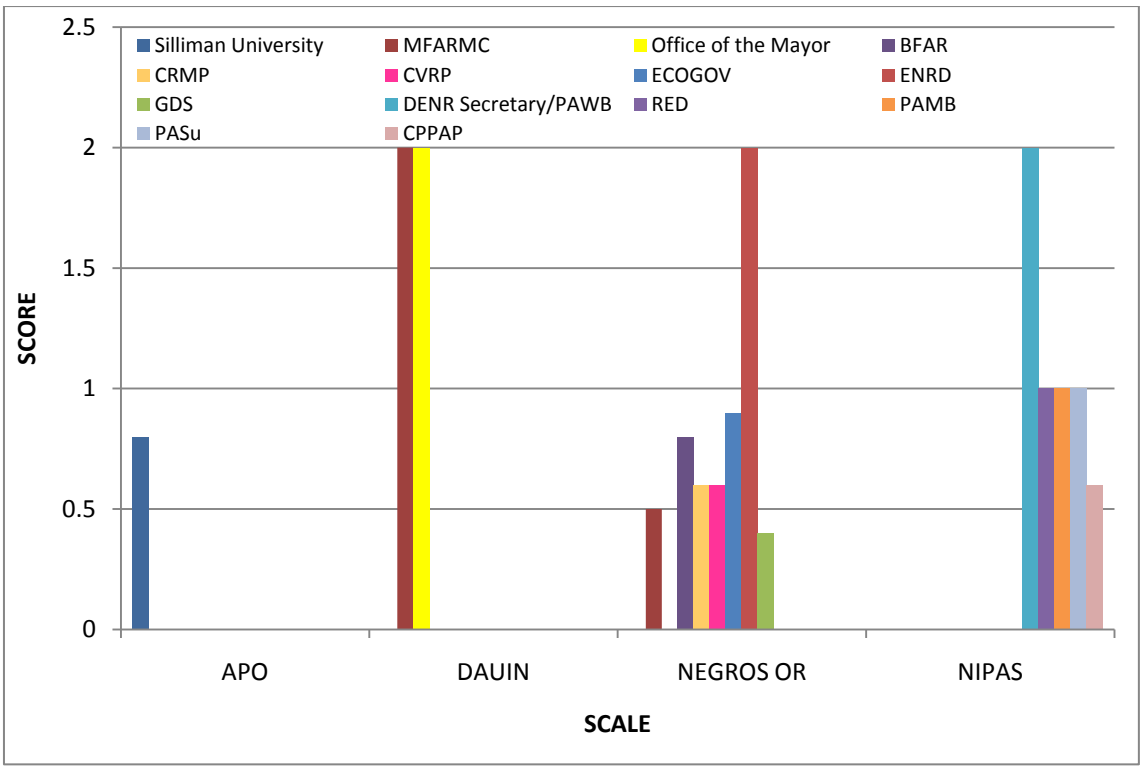


Figure 20. Cross-scale comparison of actors with coordinating functions

At island scale, the academe becomes the island's link to assisting agencies on the mainland, due both to its proximity and its capability and credibility in the larger community in communicating relevant concerns. At higher scales, the coordination required is not just with assisting actors but also among management units at lower levels. The scores for the mandated bodies providing coordination at each scale are equal and much higher than the scores of all other actors within the scale.

The Office of the Mayor coordinates enforcement units (Bantay Dagat) and implementing units (FAs) by monitoring their performance and fee collections, respectively. It also coordinates assistance from external organisations given in the form of projects or technical inputs. The MFARMC provides a venue for the coordination of

the proposals and plans of different stakeholders, including both government and community groups, but does not actively coordinate activities of different MPA management units.

The Office of the Governor, through the ENRD, coordinates donor organisations by channelling funds to where they are needed, and also coordinates MPA management units at the municipal level by providing a venue for discussion. Its specific strategy of deploying community organisers is also a way of pooling common concerns at the municipal and barangay levels and making it possible to address them without the municipalities or FAs having to meet. BFAR, although mandated by the Fisheries Code to assist the MFARMCs at provincial scale, is not bound by a more specific law to coordinate the MFARMCs in the province, and therefore performs this activity on a per-need basis in compliance with national reporting requirements. All other coordinating actors are temporary projects that link lower-level management units through a common management objective.

At national scale, the management unit at the highest level, the PAWB, has the highest score as it consolidates all data and concerns from the protected areas, ensures a level of uniformity in management standards, including the distribution of funds within the system, as well as acts as a channel for external assistance; the RED as ex-officio chair of all PAMBs in a region may perform the same functions, but at a regional level. In addition, the RED is tasked to ensure that operations of the different DENR offices and staff at lower levels do not overlap. The PAMB as a multi-sectoral body provides an opportunity for the coordination of plans and priorities of all local government units, the national government, and other stakeholders. The PASu as implementer of the plans necessarily coordinates with these governing bodies, and with external actors on a day-to-day basis.

5.3.2. Learning and diffusion

Table 7 shows the methods that have been cited by key informants and observed in available literature as the means by which each scale has shared its knowledge within and across scales. Apo Island uses the greatest variety of methods and also has the farthest-reaching influence among all scales. This is attributed to its status as the first successful community-based no-take MPA in the country as well as the world. This has resulted in interest from a wide range of actors, such as academic and research institutions, NGOs and donor-assisted projects assisting other communities, and local government units not just within the Philippines but also from other countries. It shows that diffusion of learning is done not only by community members themselves, but even more so by assisting actors who have larger professional networks across scales. An indication of this are the methods mentioned, many of which include publications and presentations, which are a common means of information dissemination among scientists and NGOs.

The higher scales, on the other hand, are generally able to share their learning with systems at scales equal to theirs or higher, which may suggest an intention to replicate or scale up the successful system practiced at those scales. Mandated reporting is a method that allows learning among different levels of management within the scales. Meetings among different management units of the same level are also commonly utilised for learning, although with decreasing frequency and regularity at higher scales.

The methods mentioned below may be categorised into three types, according to decreasing levels of personal interaction and context, but increasing audience size: personal exchange, venue for exchange, and mass media. Conversations that occur between individuals where a personal relationship has previously been established, and

cross-site visits that allow learners to experience the system in its original context, are classified as personal exchange.

Table 7. Methods used for learning and diffusion across scales

	Source of MPA Learning			
Reach of Diffusion	**APO**	**DAUIN**	**NEGROS OR**	**PHILIPPINES (AIPLS)**
APO	Meetings Informal group discussions Personal conversations	-	-	-
OTHER BARANGAYS / ISLANDS	Cross-site visits Conferences Workshops Reports	-	-	-
DAUIN	Personal conversations Cross-site visits	Meetings Mandated reporting	-	-
OTHER MUNICIPALITIES	Cross-site visits Conferences Workshops Reports	Cross-site visits Conferences Personal conversations	-	-
NEGROS OR	Cross-site visits Popular publications	Cross-site visits	Mandated reporting Provincial conferences Meetings	-
OTHER PROVINCES	Cross-site visits Popular publications	-	Mandated reporting Cross-site visits Conferences Workshops	-
PHILIPPINES	Personal conversations Popular publications Video documentaries Conferences	Awards Popular publications	Awards	Mandated reporting Cross-site visits PAMB summits

	Workshops Awards			
OTHER COUNTRIES	Cross-site visits Conferences Workshops Reports Popular publications Video documentaries Technical publications	-	Cross-site visits Reports	Meetings Conferences Workshops

Venues for exchange are opportunities created for people to come together at a single event or venue for the purpose of learning and exchange. In this case, there is decreased context, but the face-to-face interaction still provides a personal impact that contributes to learning. Examples are meetings, mandated reporting, conferences and workshops. Meetings are discussions among members of a particular group, whilst mandated reporting refers to a meeting with the specific purpose of accounting for performance and resource use to other members of the group. Conferences refer to larger meetings for the purpose of exchanges among peers such as scientists, development workers, government officials, resource managers, etc.; the sharing of learning is often in the form of audiovisual presentations, but opportunities are also available for personal interaction. Workshops are also large meetings, organised specifically for the purpose of gathering ideas from participants to develop a strategy, plan or some other output. Participation may be from a wide variety of sectors and disciplines or may be exclusive to a particular group.

Mass media include reports, awards, and popular and technical publications. Reports refer to documents published by the academe, NGOs, donor organisations and donor-assisted projects on the status of an area being studied or assisted; though the topics may

be specialised, these are usually made accessible to the public for the purpose of sharing information and lessons learned. Technical publications are scientific articles in peer-reviewed journals or documents written for a specific technical audience. This would also include papers in conference proceedings and reports on project results and evaluation. Popular publications, on the other hand, include books, magazine articles and newspaper columns, all of which are published for general readership. Awards are incentive schemes that encourage excellence in management, but which also disseminate information on good management practices by showcasing success stories.

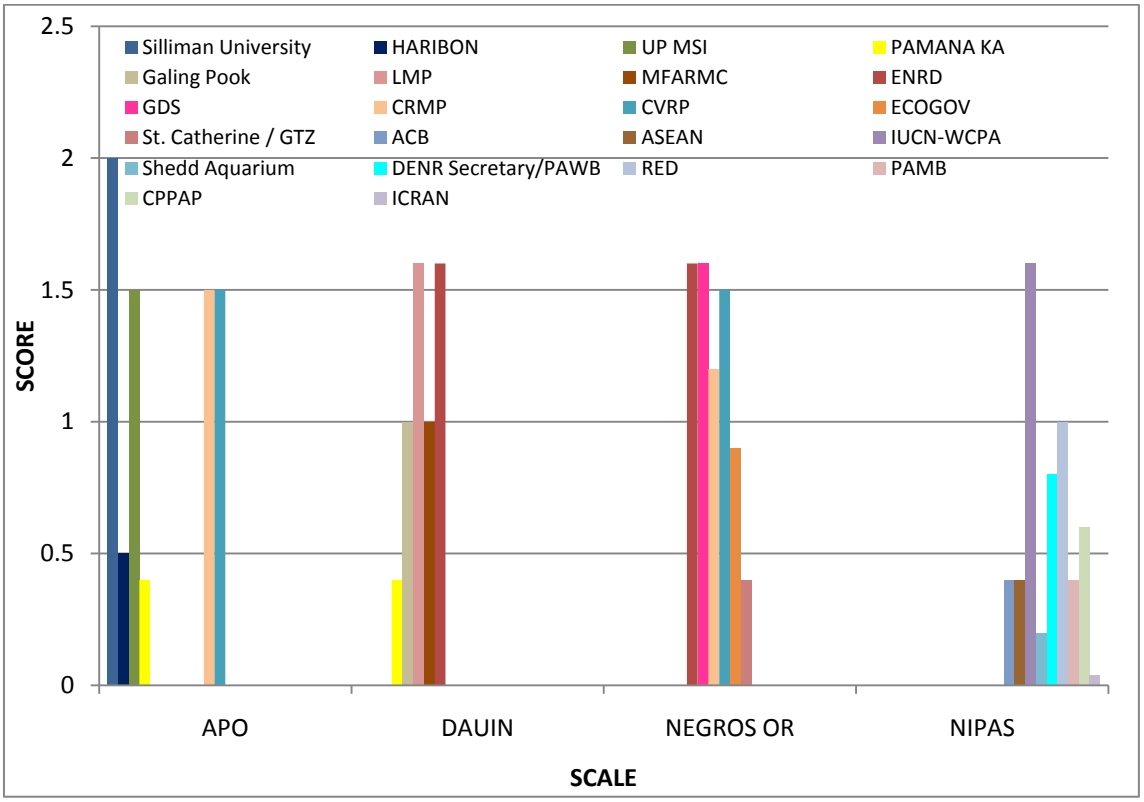


Figure 21. Cross-scale comparison of actors enabling social learning

Figure 21 shows the actors mentioned by key informants specific to each scale and their relative contribution to social learning among MPA communities through the initiation of activities for this purpose. The actors can roughly be grouped into academic institutions, NGOs, donor-assisted projects, and government-affiliated bodies. Actors

mentioned at more than one scale are CVRP, CRMP and PAMANA KA. Because the above learning and diffusion categories have emerged from responses of key informants and from the survey of available literature, investigating which particular methods for information dissemination and diffusion have been used by each assisting actor mentioned at which scales is beyond the scope of this study. However, some observations are made based on the information gathered.

Cross-site visits, workshops, conferences and reports are among the most common methods used by all types of actors at all scales, with the exception of government-affiliated bodies, which do not commonly publish reports for a general audience, and the academe, which produces technical publications more than reports. Awards are used by government-affiliated bodies and networks.

Silliman University (2.0) is an exceptional example of an actor that has enabled diffusion at all scales due to its wide network and use of methods. Because of its nature as an academic institution, it has the capacity to submit material for technical publications and conference presentations, the scope of which ranges from provincial to international. Through these, it has formed research links at both the personal and institutional levels in the international community. It also publishes its own journal. Its academic expertise and long-term presence in the area have made it an obvious choice for international donor-funded projects to partner with as implementer on the ground. This has resulted in social learning through mandated reporting at the international level on one hand, and through the organising of cross-site visits to Apo Island by other assisted communities on the other. The same characteristics may be seen in the UP-MSI (1.5), the only other academic actor mentioned for social learning. The main difference is that Silliman University has a long-term presence in the area, allowing it to also use personal exchange for learning and diffusion through the trust that has been established.

6. DISCUSSION

The scaling-up seen in the case study is not a scaling-up of MPAs in terms of size as much as a replication of the community-managed MPA in different villages all over the country, initiated or co-managed as an aggregation or network of MPAs by higher and higher levels of government. Even though the original concept is derived from the Apo Island community managing their own MPA, community-based management regimes are in reality embedded in a wider political and economic system, and are therefore part of a "multi-level system of nested enterprises" driven by pressures from higher scales (Marshall, 2008, Berkes, 2006).

Distinct properties are identified for the different scales. At island scale, the social-ecological system is isolated compared to systems on the mainland. On one hand, this means that there are fewer threats to it, possibly only from the residents themselves or from visitors, and certainly a smaller chance of being affected by land-based threats. On the other hand, its isolation can mean decreased access to services and also a smaller number of actors that may be able to directly provide services on the ground, as seen in the results. The smaller area being managed, however, means that fewer actors are required in performing management tasks. This may also explain the small number of assisting actors, since the Marine Management Committee and Silliman University are already able to provide all of the services.

At this low scale, the population is smaller and more homogeneous. This facilitates communication about management initiatives and benefits within the community, because of closer ties among neighbours and common cultural norms. White and Savina (1987) note, based on the establishment of the first community-managed marine reserves in three islands in the Bohol Sea, that success was partly due to the small size

of the social-ecological system being managed. The island communities were small enough for information to diffuse by word of mouth, and also because of this, peer pressure was often enough of a sanction to prevent violations. Satake et al. (2007) have also shown that in strongly-knit communities, there is less resource extraction than in weakly connected ones.

In addition, a small population facilitates communication with external assisting actors, as they are more likely to form personal relationships with a greater percentage of the population. This can have implications for the longevity of working relationships formed between the management unit and the assisting actors, such as that formed between Apo Island residents and Silliman University scientists. Because the university had already established a rapport with the residents from a previous study, the residents were open to activities of researchers at a later time even though the proposal of an MPA was initially disagreeable to them.

It is important to note, however, that personal relationships formed are valuable when the same individuals are involved over time. In the case of Apo Island, it was Dr. Angel Alcala who was involved in the previous research on Apo Island's terrestrial fauna who eventually introduced the idea of the community-based MPA. Crucial to the widespread acceptance of the MPA was the approval of the older fishermen, because of their seniority in the community, and who were likely also present during the period of Alcala's earlier research (White, 14 November 2008).

In relation to this, leaders at island scale may also tend to get more support from the community, because community members choose their leader based on their personal knowledge of and respect for the individuals. This facilitates information diffusion and compliance with regulations (White and Savina, 1987, Cabanban and White, 1982,

Alcala, 07 December 2009). On Apo Island, it was acceptance of the MPA by barangay captain and former barangay councilor Liberty Pascobello, who was also one of the few on the island who had studied at university, that aided in the enforcement of the MPA (White, 14 November 2008).

At higher scales, leaders of management units are chosen either by elections or by appointment by a higher authority. Due to the bigger population, community members are less likely to have personal knowledge of individuals applying for the position, and therefore credibility has to be built up by the individuals before widespread compliance may be seen. When leadership is gained by appointment, the appointed individuals may be even less familiar to the community, and the lack of community participation in the decision may engender resentment and mistrust. In this case study, leaders of both the municipal and provincial governments were elected for three consecutive terms by the people; the provincial governor Emilio Macias II is about to end his first term in May 2010 for a potential second round of three consecutive terms. This indicates a level of trust that has been developed over time, especially since these local officials began building their credibility at lower political positions prior to their election as local chief executives.

Trust that translates into continuity of leadership may also increase the probability of MPA initiatives being sustained, given that the leaders are steadfast in their commitment to the objectives of MPA establishment. The sustained action towards the achievement of CVRP objectives in Negros Oriental is attributed by Ablong (27 November 2009) to the continued term of Governor Macias, who made the community organisers and the ENRD a permanent part of the management structure; in the other provinces, a change in leadership occurred, resulting in a change in priorities. In the neighbouring Sumilon Island in Cebu province, an increasing trend in fish biomass over

ten years of protection was reversed within a year when a new mayor with commercial fishing interests took over; efforts by the same actors such as Silliman University and the GDS did not have the same results there as in Negros Oriental (White and Vogt, 2000).

Continuity is also relevant in leaders of external assisting bodies. In this case, continuity is observed not just over time, but also across scales. Dr. Angel Alcala, for example, was able to try out the novel idea of community-based no-take MPAs on Apo Island due to his positions both as vice-president of the university's research extension programme, which used the community-based approach, and as director of the university's marine laboratory, which saw the need to establish no-take marine reserves in the area. Twenty years later, after receiving international awards for his pioneering work as conservation scientist, he was appointed DENR Secretary. This provided an opportunity to promote the concept of community-based MPA management within the legal and institutional framework on a national scale. Links formed at this scale kept this opportunity open even after his term of service was done (Alcala, 07 December 2009, Lim, 25 November 2009). The trust given to him by donor organisations allowed him to expand the concept to other areas in the Visayas and Mindanao through funded projects in his capacity as director of SUAKCREM. Another example is Dr. Alan White, who was involved in the first projects on Apo Island as a US Peace Corps Volunteer. He eventually became instrumental in carrying over the concept of building community capacities for MPA management to the national scale, as well as to neighbouring Indonesia, as Chief of Party of the CRMP in the Philippines. Individuals such as these serve as cross-scale linkages that transfer knowledge, bring together different actors, and transmit emerging concerns and new ideas across local, national and even global scales.

The higher scales, as seen in this case study, are the scales at which CRM and protected area management are provided as services according to law. Because of this, there is a clearer framework within which assisting actors, such as donor-assisted projects, can work at these scales. The legal mandate given to municipal and provincial governments to provide CRM and fisheries management as basic services also means that through local legislation, funds can be allocated for MPA-related activities, regulations can be made with clear consequences for violations (e.g. fines and criminal prosecution), and any number of implementing units can be created or assigned tasks to assist in MPA management. At higher scales, therefore, the MPA manager is no longer just the community-based group but also other actors as well, functioning at various levels in the system. This results in an increased need for coordination because of a greater number of types of management units as well as tasks.

Distribution or sharing of management tasks is seen in the number of actors that score >2 at higher scales. At the provincial scale especially, several actors score high, but only the ENRD has an exceptionally high score. Looking at the composition of actors at this scale, the other high scorers are actually temporary assisting actors, particularly donor-assisted projects, rather than actors that are a permanent part of the management structure. This may illustrate the importance of capacity-building. At this scale, a greater number of actors provide capacity-building compared to those in other scales; this includes capacity-building not just of primary MPA managers at the barangay level, but also managers at the municipal and provincial levels of government. The recognition of the ENRD early on that its staff lacked technical expertise paved the way for training at the provincial level, which has increased the ENRD's capacity to provide all the services that the donor-assisted projects provided even after the projects terminated. Building the capacity of a local, mandated coordinating body to provide crucial services

may greatly contribute to MPA management at higher scales, as seen in the ENRD's score, which is higher than any other actor at all scales.

The similarity in actors providing knowledge-related services and those providing management-related services highlights the importance of external actors, which provide knowledge and skills that management units generally do not possess, especially during the establishment phase. This also shows how cross-scale learning may take place, with assisting actors taking on the role of cross-scale linkages (Wilson et al., 2006). New ideas from the national or often global agenda are introduced at local scales through the academe or project consultants to test field applicability. This in turn may enhance local knowledge and practices. Donor organisations may be especially instrumental as they are able to simultaneously work at multiple scales over long periods of time (see Table 6).

The common use of mandated reporting for learning within scales shows that information fed by lower levels is used to modify policies or strategies at higher levels. The difference among the scales is the rate at which this learning is translated into action through, for example, revised policies. At the national scale, it may take two to three years before new regulations are issued based on feedback from PAMBs (Lim, 25 November 2009). Meetings among management units as a means of learning also highlight the importance of coordinating bodies at higher levels that convene these meetings, and of multistakeholder bodies that provide an opportunity to different types of management units for knowledge exchange and collaborative problem-solving for issues transcending the individual unit's scale. As seen in this case study, external assisting actors may act as coordinating bodies by organising these meetings.

Diffusion, on the other hand, is seen to occur through links formed by management units at each scale with external actors who are well-connected to many other actors through access to a wide range of diffusion methods. The extent of diffusion to other scales therefore depends not only on the number of actors that the management units are linked to, but more importantly on who these actors are (Gladwell, 2000). This is best illustrated by Silliman University which, through its access to various methods of diffusion, was able to spread the Apo Island experience to actors across all scales. The novelty of the concept of community-based MPAs introduced by Apo Island at that time, however, contributed greatly in the diffusion of the idea by extended networks of actors to a wider audience. This is an example of how innovations at lower scales may revolutionise systems at higher scales during times of reorganisation, such as during the introduction of new legislation or the election of new leaders (Holling, 2001).

As one increases scale, the results of management interventions become more varied. In Dauin, all MPAs except for the more recently established ones are rated functional. In Negros Oriental, only 50% of MPAs are considered functional (Alcala et al., 2008); of the nine protected seascapes in the NIPAS that have been rated, only five have achieved Level 3 or higher (CCEF, 2008). As a consequence, the benefits may also be more difficult to see at higher scales. This variance may be due to two factors: size and legal mandate.

First, increasing scale implies an increasing size of management area and an increasing population size of users. At the island scale, it is the small size of the system that facilitates enforcement of regulations and the development of personal relationships that improve communication and compliance with rules. Conversely, at the provincial and national scales, MPA managers and assisting actors at higher levels are not able to have as much interaction with individual MPA management units at lower levels, in terms of

frequency and duration. At the provincial scale, this gap is addressed by the deployment of community organisers at municipal level; at the national scale, offices are set up at the regional and provincial levels. However, these deployed personnel are responsible for several management units, which limits the extent and depth of interaction with each one.

Second, the provincial government has no legal mandate to legislate regulations for community-based MPAs; the ENRD therefore provides assistance only to those municipalities that request it (Teves, 14 December 2009). It may monitor the status of MPA management and provide incentives for improving the standards, but cannot enforce these unless the municipal government itself passes and enforces its own MPA legislation. On the other hand, although the DENR Secretary has the mandate to create general management policies, site-specific policy-making and implementation are the responsibility of the PAMBs, which have varying management capacities.

It cannot be stressed enough how crucial the passage of the Local Government Code is in shaping the events and evolution of the current management systems in this case study. Weeks et al. (2009) have observed an almost exponential increase in the number and size of MPAs established after the law was passed in 1991. Implications of this landmark legislation are not just on the autonomy of local governments to create conditions for effective implementation of MPAs, as discussed earlier, but also on the presence of management units that possess very local mandates and that are physically closest to the area being managed, following the principle of subsidiarity (Marshall, 2008).

The importance of decentralisation may be seen in the total rating of management units in local government compared to those of actors from national line agencies functioning

at local government scales. Although the national line agencies have regional and provincial offices to facilitate the implementation of their mandates, these mandates are national rather than local. In terms of leadership, the heads of national line agencies at the local level are routinely rotated among offices across the country as a policy; this prevents continuity in leadership as well as the formation of long-term ties with local management units.

Table 8. Summary of lessons learned

	Lessons Learned
Size	• Smaller scales mean smaller managed areas and fewer users • Having fewer users facilitates development of trust relationships within the population, with leaders and with assisting actors • Having a smaller managed area requires fewer management units • Larger scales require distribution of management tasks among several management units, resulting in emergent functions such as coordination and monitoring, but less frequent and less personal interactions among units and with users • Having more management units means more variation in management results, and therefore less clear benefits
Continuity	• Personal relationships formed facilitate subsequent initiatives • Leaders elected for consecutive terms more likely lead to sustained initiatives; changes in leadership may lead to changes in priorities • Not only organisations, but also individuals working at multiple scales over time and space function as cross-scale linkages • Continuity results from stakeholder choices based on trust
Learning and diffusion	• Capacity-building by external actors enables cross-scale learning • Capacity-building has a wider, more sustained reach when trained on local coordinating units • Meetings among peers and mandated reporting to higher levels allow exchange of lessons and development of large-scale solutions • Diffusion of learning across scales depends on links with key actors having access to a wide range of diffusion methods
Legal mandate	• Mandates give the power to distribute management tasks, enforce standards, and create and allocate sources of income • Clear mandates enable appropriate assistance • Local mandates correspond with higher stakes for management and clearer management benefits

In contrast, management units that function under the authority given by the Local Government Code are more likely to have a greater stake in the managed area, being

part of the local community and having been given area-specific responsibilities that also translate to local benefits. The higher the scale of management, the less this direct benefit is felt at higher levels due to the decreased specificity of the mandate in relation to the actual unit of area managed. The motivation of a central and local—and therefore potentially influential—group to achieve management objectives may determine whether or not a resource is protected or not (Crona and Bodin, 2006). This would be significant considering that motivation for co-management is usually the benefits derived by the manager rather than conservation itself (Wilson et al., 2006).

Although this case study is on the scaling up of MPAs in the Philippines, some lessons may be derived for scaling up social-ecological systems in general, as shown in Table 8. Three elements are identified as crucial to scaling-up initiatives: 1) the legal and institutional framework, 2) the management capacities of management units, and 3) the leaders in charge of the management units (Table 9).

Table 9. Key elements in scaling up management of social-ecological systems

Legal and institutional framework	• Defines objectives and priorities for management • Determines who may exercise management powers over which components of the social-ecological system • Management powers include defining who may benefit and how, enforcing standards and sanctions, creating communication and learning channels, and allocating resources towards identified priorities and objectives • Enables continuity/permanence of services and actors
Management capacities of management units	• Determined by legal mandate and actual resources available • Capacity-building may enhance resources but mandate determines maximum social-ecological scale unit can function in • Influenced by unit's network of interactions with other stakeholders and benefits gained from management
Leaders of management units	• Critical to providing sustained direction, and compelling cooperation and compliance among users and other units • Sustained direction depends on leader's vision, will to enforce and continuity over space, time or both • Cooperation and compliance depend on leader's legitimacy

In the scaling-up of the management of a social-ecological system, an analysis of these three elements is the first step. From here, the potential capacity of existing management units may be determined, and assessed in terms of capacity-building needs (Figure 22). This allows scale-related advantages and capabilities to be maximised, and unrealistic scaling up by poorly or inappropriately capacitated units to be avoided (Christie and White, 2007a, Cash and Moser, 2000). This will also reveal gaps and mismatches between the actual scales of the social-ecological system and the existing scales of management. The gaps and mismatches in management may then be remedied using the existing legal framework by either creating new institutions and distributing management functions at scales where none exist, or revising the mandates of existing institutions.

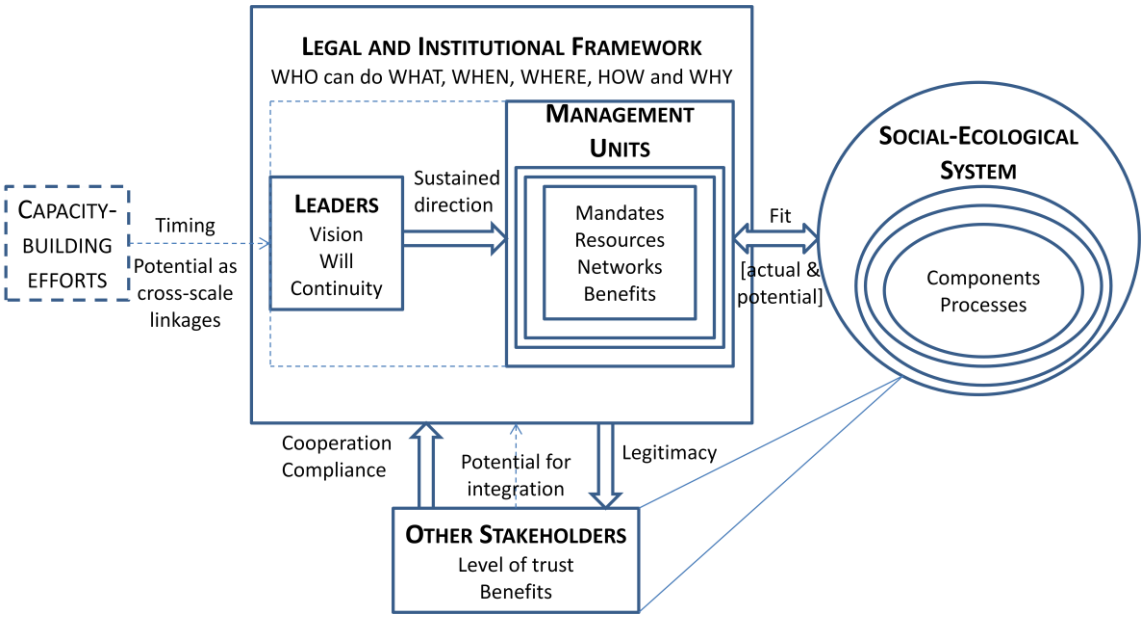


Figure 22. Framework for assessing the potential for scaling up management of social-ecological systems

Based on their management capacities, stakeholders that are *de facto* managers may be organised into new institutions for integration into the legal and institutional framework to fill in gaps or scale mismatches. This was what occurred in the designation of

fisherfolk, organised into fishermen's associations, as co-managers with municipal governments, following from lessons learned from the Apo Island experience. Since municipal governments often do not have the human and financial resources to manage their municipal waters at ground level, where users operate on a day-to-day basis, they maximise the fisherfolk's comparative advantage of being present at this scale, whilst providing the necessary infrastructure and functions that can only be provided by government at a higher scale (Berkes, 2006).

Revising mandates, on the other hand, necessarily corresponds to a need to increase or alter an institution's resources. Another way may be to simply use the existing mandate in creative ways that innovate the methods through which this mandate is fulfilled. In the above example, the coordination of several small-scale management units, the fishermen's associations, was an innovation used to enable the scaling up of management of a larger system. This is more feasible instead of trying to increase the resources of the municipal government to fulfil its mandate of managing its municipal waters, as revised by the Local Government Code, since revenues are often limited.

Capacity-building efforts must be directed towards the appropriate actors, i.e. management units and leaders that already are or have the potential to be cross-scale linkages based on their existing mandates and actual characteristics. This leverages efforts, as learning is spontaneously diffused to other scales and actor types, reducing the need for long-term external assistance at multiple scales. Environmental education of leaders with political will and continuity, for example, is more likely to result in the implementation of environmental policies that cover several scales; technical training of coordinating bodies such as the ENRD results in the training of the units they are coordinating. The timing of the assistance given is also an important factor as seen in the case study at the municipal scale. The election of a leader with the vision and the

will to manage an MPA network at a time when the necessary legal framework was in place, and when the level of awareness of benefits was already high made the system receptive to capacity-building efforts. This is in contrast with the experience of the same municipality 20 years earlier where the same capacity-building programme given to Apo Island was implemented, but had unsuccessful results.

The potential of external assisting actors as cross-scale linkages must likewise be assessed and maximised, as they are able to create links beyond those prescribed by legal mandates, such as with actors that may not be part of the legislated management structure, but are nevertheless stakeholders within the social-ecological system.

Another aspect that needs to be assessed is the financial sustainability of multi-level management systems. The legal framework needs to provide for ways to source or generate funding to sustain operations, such as the Internal Revenue Allotment of the Local Government Code, and user fees in municipal ordinances. One option being explored in the Philippines, which could eventually be integrated into the legal framework, are public-private sector partnerships (Campos and Aliño, 2008).

Two crucial variables, fit and legitimacy, however, depend on factors that may not be so easily achieved. The assessment of fit depends on the accuracy of knowledge on the actual spatial and temporal extent of the social-ecological system's components and processes. To improve this, management functions that contribute to knowledge-sharing and memory-building, and policies that provide incentives to do the same must be integrated into management systems at each scale (Folke et al., 2005, Folke et al., 2002). At the minimum, management units must be in place at every scale for gathering data on the social-ecological system, and cross-scale mechanisms created for these data to be usable at other scales. Corollary to this, the management system needs to be

flexible enough to adapt based on new information, otherwise data-gathering will be a fruitless exercise.

Legitimacy, on the other hand, depends on the level of trust of all actors in a particular individual or institution. One way this is established is if stakeholders are assured that leaders have no vested interests (Alcala, 07 December 2009). Legitimacy in this context means the individual's or institution's rightful occupation of a management position through broadly-accepted formal or informal processes. This may be improved by integrating processes into the legal framework that ensure broad participation in the choosing of leaders at relevant scales. Appointment as a method for choosing leaders, for example, is less likely to increase the level of trust of stakeholders. Legitimacy must therefore also be accorded by stakeholders to the legal framework and processes that give the leaders their authority, and the management units their corresponding mandates (Walker et al., 2009, Carlsson and Berkes, 2005).

Figure 23 illustrates the necessary functional relationships among management units to enable scaling up. Each management unit independently performs its functions of data collection, policy formulation and financing of management operations appropriate to the scale of the social-ecological system that it manages. Clear benefits arise directly from the specific social-ecological system where it implements its interventions. However, each unit also shares data, information and knowledge on the area and scale that it manages to other management units at higher, lower and the same scales on a regular and frequent basis.

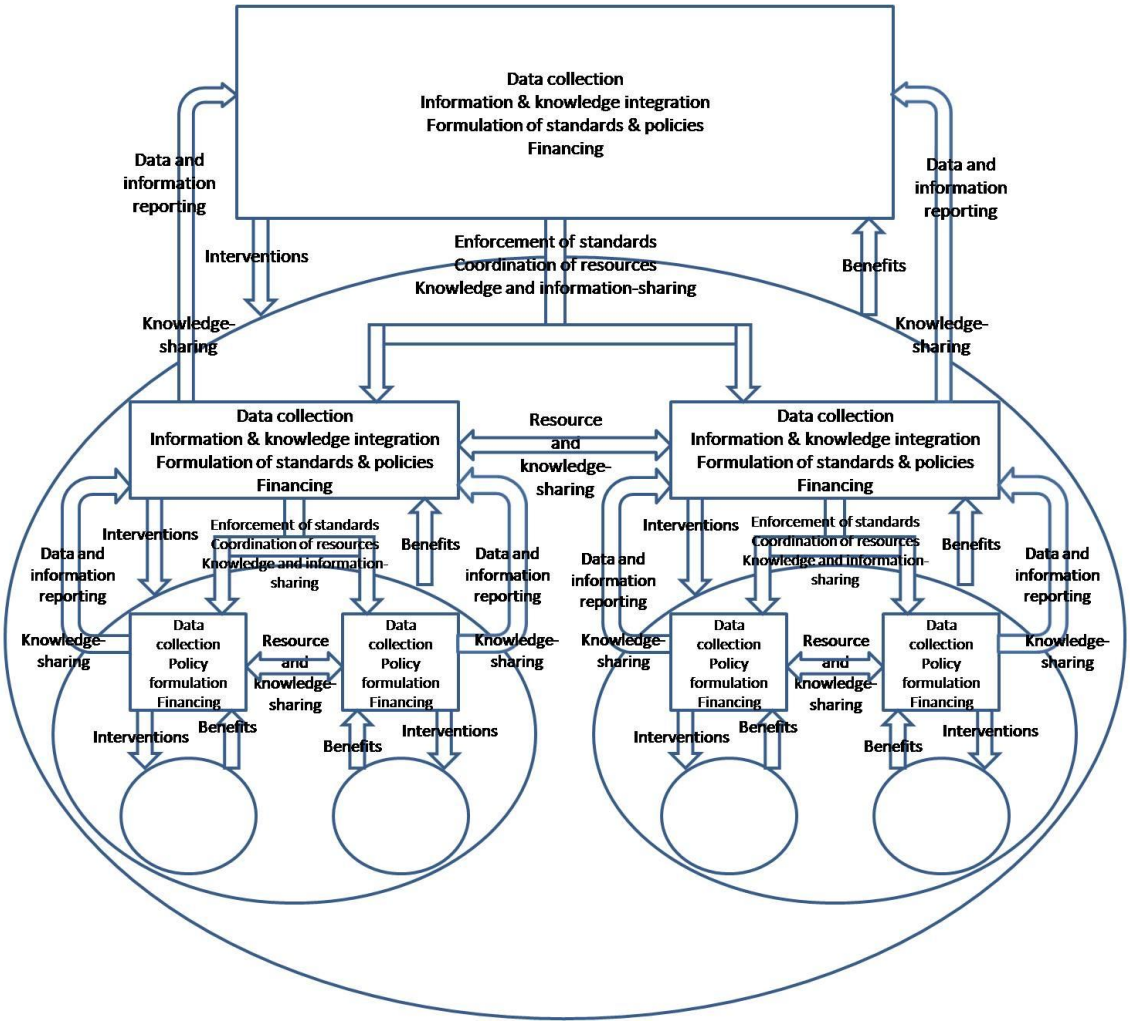


Figure 23. Functional relationships in scaling up management of social-ecological systems

Boxes represent management units; circles represent corresponding scales of social-ecological systems. Arrows indicate inputs or action directed towards other units/systems.

Management units at higher scales, acting as cross-scale linkages, have the additional function of integrating their own information and knowledge with inputs from lower and higher scales for use by management units that otherwise may have no opportunities to interact. Integrated data is also used for formulating standards for lower scales, and for formulating policies as needed to achieve their own management objectives. Cross-scale units have the function of enforcing standards on units at lower scales through capacity-building and the implementation of incentives and sanctions. These standards, however, only apply to aspects of lower-scale management that are relevant to higher-scale system components and processes, thus ensuring that lower-

scale management units have the autonomy to formulate policies appropriate to their social-ecological context. Cross-scale units also coordinate lower-scale units and units of different scales through activities that result in the exchange, pooling and distribution of resources such as funds, knowledge and information, and efforts spent in completing management tasks. It must be noted that these management functions may be performed not just by a single unit, but also by different management units working at the same scale—including assisting actors—according to their existing capacities.

The following table summarises the recommendations given on the scaling-up of management of social-ecological systems.

Table 10. Summary of key recommendations for scaling up management of social-ecological systems

	Key Recommendations
Legal and institutional framework	• Use broadly participatory processes for choosing leaders • Integrate data collection and sharing mechanisms at each scale • Incorporate financing mechanisms at multiple scales • Develop flexible, context-specific policies that allow application of learning • Grant legal mandates to *de facto* managers and stakeholders with appropriate management resources • Grant legal mandates for enforcing standards to units with mandates and/or resources for coordination • Ensure that management objectives translate to clear benefits or incentives for each management unit, e.g. by making mandates as local as possible • Designate mandates based on existing scale-related strengths
Management capacities of management units	• Ensure frequent interaction among management units and with users that encourage learning and trust • Build resources of institutions that already have appropriate mandates, especially as cross-scale linkages, to set standards • Take advantage of good timing for capacity-building • If no capacities exist to match the appropriate social-ecological scale, network already-functioning smaller-scale units and create mechanisms for coordination
Leaders of management units	• Build management and leadership capacities of individuals who already have vision, will, and especially continuity

In the Philippines, meeting the Philippine Marine Sanctuary Strategy target of protecting 10% of Philippine reefs by 2020 will require MPAs in more than double the area that is being protected now. At present, several MPA networking initiatives are being done at national and inter-municipal scales, resulting primarily in social learning networks that set the stage for scaling up (Pietri et al., 2009, Christie and White, 2007b, Campos and Aliño, 2008). The challenge is in protecting areas that are ecologically relevant, rather than just administratively convenient, by defining management boundaries that match ecosystem boundaries and biogeographic zones (Christie et al., 2009a, Weeks et al., 2009, Aliño et al., 2002).

The legal framework clearly provides the highest mandate for MPA establishment to the municipality as the lowest-level management unit under the principle of subsidiarity. However, there is great variety in the amount and quality of resources and leadership among municipalities. Capacity-building is therefore needed to standardise these variables. Furthermore, the scales of social-ecological systems rarely match municipal water boundaries. Since the municipality has the highest authority, management functions at higher scales may be limited to coordination. These higher levels, however, may be a strategic position for capacity-building that can set management standards for municipalities.

Existing institutions that approximate the extent of marine ecosystems (e.g. bays, seas or straits) and that have potential as cross-scale linkages are provincial governments, regional development councils, and regional offices of the DENR and BFAR. Regional-level bodies, as a scale-related advantage, already have mandates and mechanisms for gathering data from lower scales. Another option is the creation of inter-unit or multistakeholder councils with membership from municipal governments covering the extent of the ecosystem. In the current legal framework, these bodies do not have the

legal mandate to enforce standards on municipalities, therefore the legitimacy of these actors must be well-established, and the benefits for compliance and cooperation by municipalities clearly seen.

Sanctions are critical to inducing compliance, but may only be effective if agreements and institutions at higher scales are part of the legal framework (Sorensen and Thomsen, 2009). Incentives rather than sanctions may therefore be more important in agreements at these scales, especially because the political affiliation of lower-level management units in relation to that of higher-level ones often determines the will to enforce in Philippine local governments (Ablong, 27 November 2009, Diaz Jr., 08 December 2009). If benefits of adhering to standards are seen to be greater than benefits of loyalty to political parties, leaders of management units may be compelled to cooperate. Given this political context, having multistakeholder or inter-LGU management units at higher scales may reduce political partisanship at other scales, since there is better representation, compared to having one political leader associated with a particular political party. One disadvantage, however, of having corporate management is the constant need to reconcile varied viewpoints and priorities, reducing the ability to respond quickly to urgent situations and learning opportunities.

Again, taking advantage of scale-specific and site-specific strengths may be the best option. Where leaders with vision, will, and broad support already exist, higher-level government units may prove to be most effective in coordination; where political leadership is weak or divided, the creation of multistakeholder bodies may be needed. Different types of coordinating functions may also be distributed among different types of cross-scale actors based on their strengths or existing niches.

7. CONCLUSION

This study compared the management rationales, structures and functions of community-based MPA management systems in the Philippines at the island, municipal, provincial and national scales. From the findings of the case study, a general framework was developed on the primary elements that must be considered in the scaling-up of the management of social-ecological systems. It is meant as a tool for assessing the potential of management systems for scaling up. Key to scaling up are 1) the legal and institutional framework, 2) the management capacities of management units, and 3) the characteristics of leaders of these units. The framework is based on the principle of working with existing structures, capitalising on their strengths, and mitigating the negative impacts of unexpected or uncontrollable human variables. However, it needs to be validated against other successful scaling-up initiatives to evaluate its applicability to other social-ecological systems and settings.

The study proposed a methodology for quantitatively comparing the importance of actors and their roles at different scales in the establishment and management of MPA networks in the Philippine context. Given the limited methodology of semi-structured key informant interviews, the responses depended on recall and personal biases rather than provided a comprehensive inventory of actors and their roles in MPA management. Information from available literature likewise tended to yield the same results, favouring those actors that had better access to mass media. Furthermore, binding documents did not turn out to be a guarantee of sustainability of service delivery (> 10 yrs), as the will to enforce played a very large role in the agreements being implemented or not. Future studies may further validate and refine this methodology by conducting multi-sectoral surveys based on pre-defined criteria and actor lists compiled from key

informant interviews and available literature. The temporal context of actors' roles must be considered as well. This will reveal the importance of drivers and pressures (e.g. social trends, political power dynamics, economic situation) at the same or other scales that may influence the impact of actor contributions, as well as the motivations for and likelihood of sustainability of scaling-up initiatives.

As a global-scale initiative, the Land-Ocean Interactions in the Coastal Zone (LOICZ) project may contribute to the scaling-up of management of social-ecological systems by supporting projects that determine the extent of social-ecological systems at different scales and, based on the findings, assess and strengthen the technical capacity of potential management units that match these scales. Context-specific information may be derived using the Driver-Pressure-Impact-Response framework. LOICZ itself has the management capacities of a coordinating unit and acts as a cross-scale linkage for learning. Learning initiatives may be maximised by organising activities that also aim to develop trust among multicultural stakeholders, and that target actors already working at multiple scales. It has the potential to extend its coordinating functions to match scientific expertise with necessary resources elsewhere in the system, in a resource-sharing scheme. Eventually, it may build its legitimacy to develop global management standards. To accomplish this, however, links must be actively forged with actors that have extensive networks in each country, especially at lower scales.

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9. ANNEXES

9.1. List of Key Informants

Table 11. Key informants interviewed and their relevant roles

SCALE	KEY INFORMANT	RELEVANT ROLES
Island	Mario Pascobello	• Current HUTASAKAB president • Current head of AIPLS Bantay Dagat • Former barangay captain • Former MMC Chair
	Diosdado Suan	• Treasurer of first MMC • Former barangay councilor
Municipality	Rodrigo Alanano	• Current mayor • Former municipal councilor
	Amado Diaz Jr.	• Current MFARMC chairman • Current barangay captain of Masaplod Norte • Former FA president
Province	William Ablong	• Founding RMD chief (now ENRD) • Former CRMP site coordinator • Former CVRP site manager
	Mercy Teves	• Current ENRD chief
Country	Mundita Lim	• Current PAWB director
	Hilconida Calumpong	• AIPLS PAMB member • Current SU IEMS director
Multiple-scale	Angel Alcala	• Current SUAKCREM director • Former director of the Silliman University Marine Laboratory (now SU IEMS) • Former vice-president of Silliman University Research, Extension and Development Office • Former DENR Secretary
	Alan White	• CCEF founder and president • Former CRMP Chief of Party • Former MCDP consultant

NB Positions current as of December 2009

9.2. General Interview Questions

Why did you set up an MPA / a network of MPAs? [motivation / objectives]

What was the problem and how was it manifested? Who first recognised the problem and looked for a solution?

Where did the idea for community-managed MPAs / MPA networks come from? What was the social and ecological context at that time that made the MPA the most feasible solution (events, trends, etc.)?

Who were the main actors and what did they do that was crucial to successful establishment and management (within and outside of area)?

How does the MPA management system currently function? [who does what]

How was information about MPAs communicated to initiate change at higher scales?

Who have been the main actors (individuals and institutions) that you would say have been crucial in transferring the technology across scales? Why?

What methods were most useful, and what were least useful?

What factors were/are the most difficult to scale up?

What positive and negative ecological and sociological impacts have you observed as a result of having this MPA / management system?

How do you usually share your learning and with whom? What has been the result? [proof]

Do you find that the current management system is enough to address all coastal-related issues? Are there challenges that it is not able to address? What may be needed to address these issues?

How did the experience of Apo Island contribute to your decision and methods of setting up an MPA?

How and through whom did you get knowledge about the methods used in Apo Island?

Which elements from the Apo Island experience did you adopt, adapt and reject? Why? What problems did you encounter that they did not encounter in Apo Island (e.g. conflicts, enforcement)?

9.3. CCEF MPA Rating System

Table 12. MPA rating system

LEVEL 1	Initiated	Passing	MPA establishment activities are in progress (6 pts, 1 year since establishment)
LEVEL 2	Established	Fair	MPA is legalized and management activities have started (16 pts, 1 - 2 years since establishment)
LEVEL 3	Enforced	Good	MPA regulations are implemented and management activities are maintained for 2 years or more (24 pts, only applies for 2 years old and up)
LEVEL 4	Sustained	Very Good	MPA is well-enforced over the years; participation and support from the LGU and community is consistent (30 pts, only applies for 3 years old and older)
LEVEL 5	Institutionalized	Excellent	Management and enforcement is consistently maintained and is assured by additional legal support (40 pts, applies for 4 years and older)

Source: http://www.coast.ph/resource-center/mpa-database/

9.4. Actor Ratings

APO	Awareness of Environmental Problem	T-Awareness	Successful Alternative Income	T-Income	Community Participation in Decision-Making	T-Community Participation	Continuing Advice	T-Advice	Fair and Effective Enforcement	T-Enforcement	Management Inputs	T-Inputs	Capacity Development of MPA Managers	T-Capacity	Social Learning among MPA Communities	T-Social Learning	Coordination of management units	T-Coordination
BFAR	0	0	0	0	0	0	1	0.1	0	0	1	0	0	0	0	0	0	0
CRMP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0.3	0	0
CVRP	1	0	1	0	1	0	1	0	0	0	1	0	1	0	5	0.3	0	0
Dauin	0	0	1	0	2	0.1	0	0	2	0.1	2	0.1	0	0	0	0	0	0
DENR	1	0	3	0.1	2	0.1	1	0	0	0	0	0	1	0	0	0	0	0
HARIBON	0	0	2	0.1	0	0	0	0	0	0	2	0.1	0	0	5	0.1	0	0
MCDP	5	0.2	4	0.2	5	0.2	5	0.2	2	0.2	5	0.2	5	0.2	0	0	0	0
MMC	0	0	3	0.4	5	0.4	0	0	3	0.5	5	0.5	0	0	0	0	0	0
PAMANA KA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.1	0	0
PNP	0	0	0	0	0	0	0	0	3	0.1	0	0	0	0	0	0	0	0
Silliman University	5	0.3	2	0.2	5	0.2	5	0.4	2	0.4	2	0.4	5	0.4	5	0.4	2	0.4
Bantay Dagat	0	0	0	0	0	0	0	0	4	0.5	0	0	0	0	0	0	0	0
Barangay	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UP MSI	1	0	0	0	0	0	1	0	0	0	0	0	1	0	5	0.3	0	0
ENRD	1	0	1	0	1	0	1	0	2	0.5	0	0	1	0	0	0	0	0

DAUIN	Awareness of Environmental Problem	T-Awareness	Successful Alternative Income	T-Income	Community Participation in Decision-Making	T-Community Participation	Continuing Advice	T-Advice	Fair and Effective Enforcement	T-Enforcement	Management Inputs	T-Inputs	Capacity Development of MPA Managers	T-Capacity	Social Learning among MPA Communities	T-Social Learning	Coordination of management units	T-Coordination
Bantay Dagat	0	0	0	0	0	0	0	0	4	0.5	0	0	0	0	0	0	0	0
Barangay	0	0	1	0	2	0.5	0	0	2	0.5	1	0	0	0	0	0	0	0
BFAR	1	0	1	0	1	0	1	0	2	0.1	2	0.1	1	0	0	0	0	0
CCEF	1	0	0	0	0	0	4	0.3	2	0.1	2	0.1	3	0.1	0	0	0	0
CEMRINO	0	0	0	0	0	0	0	0	0	0	2	0.2	0	0	0	0	0	0
CRMP	0	0	0	0	4	0.2	1	0	2	0.3	2	0.1	5	0.3	1	0	0	0
CVRP	1	0	4	0.2	2	0.2	0	0	0	0	2	0.2	0	0	0	0	0	0
DENR	1	0	0	0	0	0	1	0	0	0	2	0.5	0	0	0	0	0	0
ENRD	1	0	1	0	5	0.5	0	0	1	0	2	0.5	0	0	4	0.4	0	0
FA	0	0	3	0.5	2	0.3	0	0	3	0.5	5	0.5	0	0				
Galing Pook	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0.5	0	0
GDS	0	0	0	0	0	0	0	0	0	0	3	0.3	0	0	0	0	0	0
LMP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.4	0	0
MFARMC	0	0	0	0	1	0.5	4	0.5	2	0.3	2	0.5	0	0	2	0.5	4	0.5
Municipal Council	0	0	5	0.1	0	0	0	0	2	0.1	2	0.1	0	0	0	0	0	0
Office of the Mayor	0	0	2	0.5	4	0.3	5	0.3	2	0.3	4	0.3	2	0.1	0	0	4	0.5
PAMANA KA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.1	0	0
PNP	0	0	0	0	0	0	0	0	4	0.5	0	0	0	0	0	0	0	0
Silliman University	4	0.2	0	0	4	0.2	1	0.4	0	0	2	0.4	1	0	0	0	0	0
SYMCOR	0	0	0	0	3	0.3	1	0	0	0	3	0.3	0	0	0	0	0	0

NEGROS OR	Awareness of Environmental Problem	T-Awareness	Successful Alternative Income	T-Income	Community Participation in Decision-Making	T-Community Participation	Continuing Advice	T-Advice	Fair and Effective Enforcement	T-Enforcement	Management Inputs	T-Inputs	Capacity Development of MPA Managers	T-Capacity	Social Learning among MPA Communities	T-Social Learning	Coordination of management units	T-Coordination
Bantay Dagat	0	0	0	0	0	0	0	0	4	0.2	0	0	0	0	0	0	0	0
BFAR	0	0	1	0	1	0	1	0	1	0	2	0.1	1	0	0	0	2	0.4
CEMRINO	3	0.2	0	0	2	0.2	4	0.2	0	0	3	0.2	0	0	0	0	0	0
Coast Guard	0	0	0	0	0	0	0	0	4	0.5	0	0	0	0	0	0	0	0
CRMP	4	0.3	3	0.3	4	0.3	2	0.3	2	0.3	3	0.3	5	0.3	4	0.3	2	0.3
CVRP	5	0.3	5	0.3	5	0.3	4	0.3	0	0	2	0.3	4	0.3	5	0.3	2	0.3
DENR	0	0	0	0	0	0	0	0	0	0	2	0.1	0	0	0	0	0	0
ECOGOV	2	0.3	0	0	2	0.3	4	0.3	2	0.3	2	0.3	4	0.3	3	0.3	3	0.3
ENRD	3	0.5	3	0.5	5	0.5	4	0.4	2	0.5	3	0.4	4	0.4	4	0.4	4	0.5
FA/Barangay	0	0	3	0.1	2	0.2	0	0	3	0.2	3	0.2	0	0	0	0	0	0
GDS	4	0.3	0	0	2	0.3	4	0.3	0	0	3	0.3	5	0.3	4	0.4	2	0.2
MFARMC	0	0	0	0	1	0.5	1	0.5	1	0.2	1	0.2	0	0	0	0	1	0.5
Municipality	0	0	3	0.1	2	0.2	2	0.2	2	0.2	3	0.2	2	0.2	0	0	0	0
PNP	0	0	0	0	0	0	0	0	4	0.5	0	0	0	0	0	0	0	0
Provincial Attorney's Office	0	0	0	0	0	0	0	0	3	0.5	0	0	0	0	0	0	0	0
Silliman University	1	0.1	0	0	0	0	3	0.4	3	0.4	3	0.4	3	0.4	0	0	0	0
St. Catherine/GTZ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.1	0	0
SYMCOR	0	0	0	0	3	0.3	4	0.3	0	0	3	0.3	0	0	0	0	0	0

NIPAS	Awareness of Environmental Problem	T-Awareness	Successful Alternative Income	T-Income	Community Participation in Decision-Making	T-Community Participation	Continuing Advice	T-Advice	Fair and Effective Enforcement	T-Enforcement	Management Inputs	T-Inputs	Capacity Development of MPA Managers	T-Capacity	Social Learning among MPA Communities	T-Social Learning	Coordination of management units	T-Coordination
ACB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.1	0	0
ASEAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.1	0	0
IUCN	1	0	0	0	0	0	4	0.4	0	0	0	0	1	0	4	0.4	0	0
NORDECO	0	0	0	0	0	0	4	0.3	0	0	0	0	3	0.2	0	0	0	0
Shedd Aquarium	0	0	2	0.1	0	0	0	0	0	0	0	0	0	0	2	0.1	0	0
ICRAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.1	0	0
DENR Secretary/PAWB	1	0	0	0	2	0.5	2	0.5	1	0	1	0	0	0	4	0.2	4	0.5
PAWCZMS	0	0	0	0	0	0	3	0.5	0	0	0	0	0	0	0	0	0	0
RED	1	0	0	0	2	0.5	4	0.5	0	0	0	0	0	0	0	0	4	0.5
PENRO	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PAMB	2	0.5	4	0.5	2	0.5	4	0.5	2	0.5	3	0.5	3	0.5	4	0.1	2	0.5
President	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PASu	3	0.5	4	0.5	2	0.5	0	0	4	0.5	4	0.5	0	0	0	0	2	0.5
Bantay Dagat	0	0	0	0	0	0	0	0	4	0.5	0	0	0	0	0	0	0	0
Congress	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CPPAP	4	0.3	3	0.3	4	0.3	0	0	2	0.3	3	0.3	4	0.3	2	0.3	2	0.3
NIPAP	4	0.3	0	0	2	0.3	0	0	0	0	3	0.3	4	0.3	0	0	0	0
HARIBON	4	0.4	0	0	2	0.4	5	0.4	0	0	0	0	4	0.4	0	0	0	0

9.5. List of Acronyms

ACB	ASEAN Centre for Biodiversity
AIPLS	Apo Island Protected Landscape and Seascape
ANOSIM	Analysis of Similarities
ASEAN	Association of Southeast Asian Nations
BFAR	Bureau of Fisheries and Aquatic Resources
CB-CRM	Community-Based Coastal Resource Management
CBD	Convention on Biological Diversity
CCEF	Coastal Conservation and Education Foundation
CEMRINO	Centre for the Establishment of Marine Reserves in Negros Oriental
CPPAP	Conservation of Priority Protected Areas Project
CRM	coastal resource management
CRMP	Coastal Resource Management Project
CVRP	Central Visayas Regional Project
DANIDA	Danish International Development Agency
DAO	Department Administrative Order
DED	German Development Service (also see GDS)
DENR	Department of Environment and Natural Resources
ECOGOV	Philippine Environmental Governance Project
ENRD	Environment and Natural Resources Division
EU	European Union
FA	fishermen's association
GDS	German Development Service (also see DED)
GTZ	German Agency for Technical Cooperation
HUTASAKAB	Hugpong Tagadumala sa Sangtuaryo sa Kadagatan sa Bohol
ICRAN	International Coral Reef Action Network
IPAF	Integrated Protected Areas Fund
IRA	internal revenue allotment
IRR	implementing rules and regulations
IUCN	International Union for Conservation of Nature
LGU	local government unit
LMP	League of Municipalities of the Philippines
LOICZ	Land-Ocean Interactions in the Coastal Zone
M & E	monitoring and evaluation

MCDP	Marine Conservation and Development Program
MCP	Marine Conservation Program
MDS	Multidimensional Scaling
MFARMC	Municipal Fisheries and Aquatic Resources Management Council
MMC	Marine Management Committee
MPA	marine protected area
MSN	MPA Support Network
NGO	non-government organisation
NIPAP	National Integrated Protected Areas Project
NIPAS	National Integrated Protected Areas System
NORDECO	Nordic Agency for Development and Ecology
PAMANA KA SA PILIPINAS	Pambansang Alyansa ng Maliliit na Mangingisda at Komunidad na Nangangalaga ng Karagatan at Sanktwaryo sa Pilipinas
PAMB	Protected Area Management Board
PASu	Protected Area Superintendent
PAWB	Protected Areas and Wildlife Bureau
PAWCZMS	Protected Areas, Wildlife and Coastal Zone Management Service
PENRO	Provincial Environment and Natural Resources Office
PhilReefs	Coral Reef Information Network
PCRMC	Provincial Coastal Resource Management Committee
PNP	Philippine National Police
PO	people's organisation
PRMC	Provincial Resource Management Committee
RA	Republic Act
RED	Regional Executive Director
RMD	Resource Management Division
SCFHPI	Saint Catherine Family Helper Project Inc.
SUAKCREM	Silliman University Angelo King Center for Research and Environmental Management
SU IEMS	Silliman University Institute of Environmental and Marine Sciences
SYMCOR	Synergetic Management of Coastal Resources
TAF	The Asia Foundation
UBCHEA	United Board for Christian Higher Education in Asia
UP-MSI	University of the Philippines Marine Science Institute
USAID	United States Agency for International Development

9.6. Glossary of Local Terms

20% economic development fund	the portion of a local government unit's internal revenue allotment that is to be spent on development projects (see p. 16)
Bantay Dagat	fish warden organisation
barangay	smallest political unit (village level)
Sangguniang Bayan	municipal council
Sangguniang Panlalawigan	Provincial Board