The need for Institutional Networking in Integrated Coastal Management: Interconnectivity among coral reefs, seagrass beds and mangroves

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The Need for Institutional Networking in Integrated Coastal Management: Interconnectivity among Coral Reefs, Seagrass beds and Mangroves

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INTRODUCTION

The Philippines is an archipelagic country where millions of inhabitants are, in one way or another, dependent on the fisheries and ecosystem services provided by coral reefs, seagrass beds and mangroves. However, these valuable resources are being threatened by issues such as coastal development, overfishing, destructive fishing, sedimentation and pollution, which are widespread in the country. Coastal fisheries all over the country have been drastically declining especially over the last few decades because of overfishing and irresponsible coastal development activities, which are further exacerbated by climate change impacts (Muallil et al. 2014). The deteriorating conditions of coastal ecosystems will have serious implications on food security, poverty and the overall well-being of millions of coastal inhabitants in the country.

CONNECTIVITY AMONG MANGROVES; SEAGRASS BEDS AND CORAL REEFS

The interconnectivity among coral reefs, seagrass beds and mangroves are widely acknowledged in the literature (Fig. 1). Some fishes, for example, use one type of habitat as their nursery ground and move to another as they mature. Honda et al. (2013) showed that over 20% of commercially important fish use multiple habitats indicating the importance of seagrass beds, mangroves and coral reefs to the fisheries or to the biology of coastal fishes.

Healthy habitats are known to support higher fisheries productivity and provide more ecological services than degraded habitats. For example, fisheries production for invertebrates (i.e. shrimps and prawns) and fishes (different species in the families Carangidae, Mugilidae, Siganidae, Serranidae and Lutjanidae) was shown to be positively related to mangrove cover/extent (Manson et al. 2005, Aburto-Oropeza et al. 2008, Mamauag et al. 2009). Further, the condition of one habitat (e.g. mangroves) will also affect the productivity of adjacent habitat (e.g. coral reefs). Mumby et al. (2004), for example, showed that fish biomass is generally higher by tens to thousands of percent on coral reefs adjacent to extensive or rich mangroves than those with scarce mangroves. Nagelkerken et al. (2012) further showed that coral reefs adjacent to mangroves had considerably higher fish biomass than isolated coral reefs.

MPAS AND MPA NETWORKS

Establishment of marine protected areas (MPAs) has been one of the commonly applied approaches for integrated coastal management in the Philippines. In fact, the number of MPAs in the country increased from less than a hundred in 1990 to about five hundred in 2000 to more than 1800 in 2014 (Cabral et al. 2014). MPA works by protecting critical habitats (i.e. coral reefs, mangroves and seagrass beds) where marine organisms live and spawn and where larvae recruit and settle. More efforts are now geared toward establishing MPA networks, which are simply "a collection of individual MPAs operating cooperatively and synergistically, at various spatial scales, and with range of protection levels to fulfill ecological aims more effectively and comprehensively than individual sites could alone"(IUCN/WCPA 2008). A network can be ecological or social. Ecological network is based on biophysical connectivity (e.g. current circulation, bathymetry, geomorphology, adult home range, sources and sinks for larval dispersal) among sites that enhance ecological functions. On the other hand, social network is based on interaction among management bodies to link institutions through exchange of information, experiences and good practices and also sharing of resources. A network that is formed based on ecological and social considerations is considered ideal in terms of effectiveness and efficiency of conservation activities.

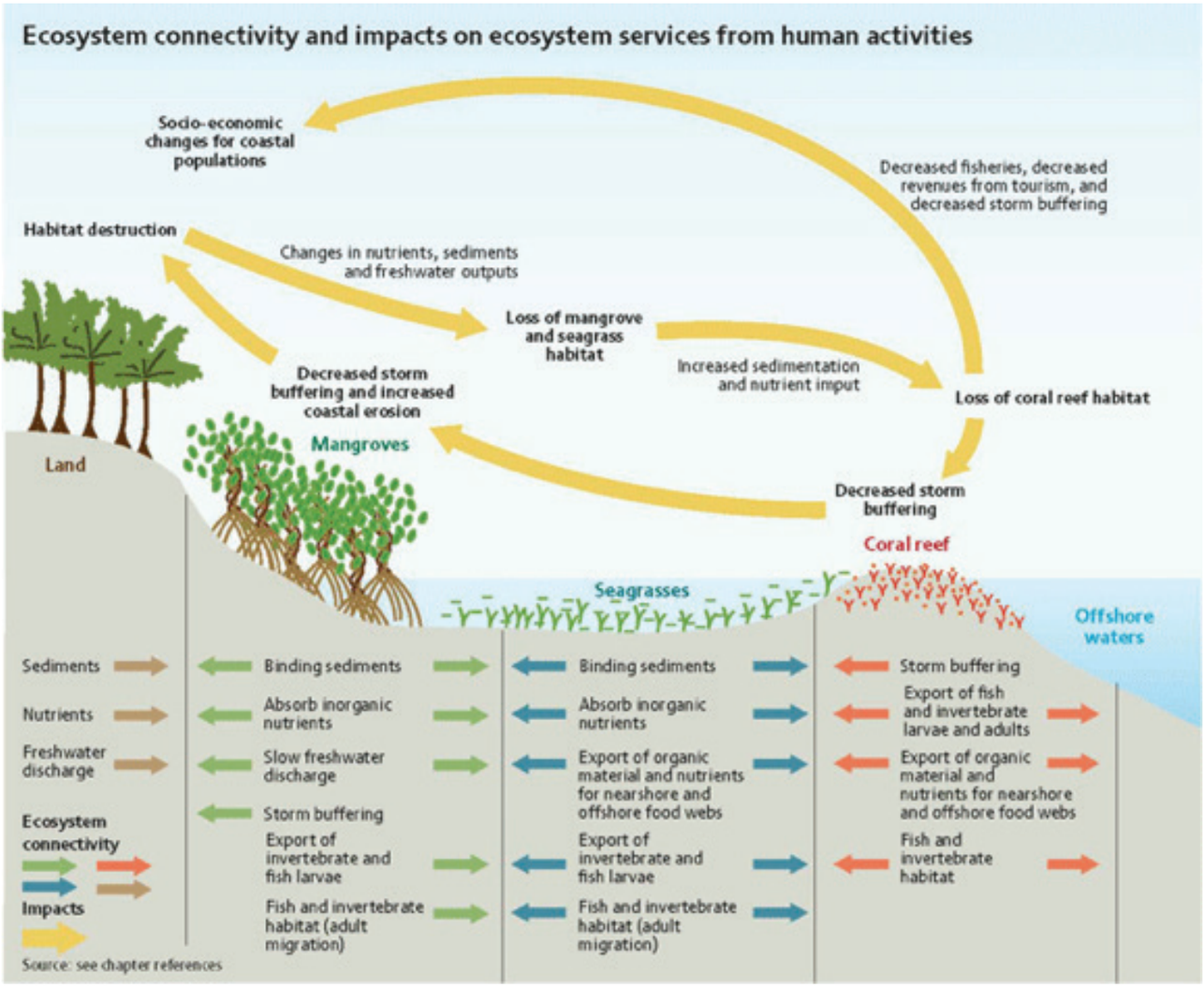

Figure 16. The interconnectivity among mangroves, seagrass beds and coral reefs (Silvestri & Kershaw, 2010).

Establishment of MPA networks has legal bases particularly those stipulated in R.A. 8550 (Fisheries Code) and R.A. 7160 (Local Government Code). R.A. 8550 recommends for an integrated management of continuous fishery areas to facilitate management as a single resource system (Section 16). Similarly, R.A. 7160, article 61 discusses inter-local government loans, grants, subsidies and other cooperative undertakings. The following are some of the main reasons why is it important to scale up to MPA network:

1. It protects larger areas of threatened and critical marine habitats.
2. It ensures that species in a given area will have enough habitat space to reside and reproduce, thus dispersing larvae into surrounding MPAs (e.g. giant clams, groupers and lobsters)
3. It increases survival rate of settling larvae due to larger areas of undisturbed habitats, thus ensuring increase of fish stock.
4. It sustains fisheries production that benefits both fisheries and conservation.
5. It can create information base that helps in making logical choices for MPA expansion and improving MPA management.
6. It provides an opportunity for stakeholders or communities to collaborate and share experiences to enhance efforts in managing and protecting their respective MPAs.
7. It can assist in financial leveraging to achieve economies of scale including marketing such as eco-labeling

For an MPA network to be effective, it is crucial that each constituent MPAs is already effective in their own right. It is also important to determine whether the MPAs in the network are interconnected, both ecologically and socially, with one another. It is crucial to determine the capacity of management bodies within the network to work effectively together. Some tips on how to make inter-LGU collaboration for coastal resource management activities more effective and some benefits to the LGUs working together are provided in **Box 1**.

Finally, scaling up from MPAs to MPA network involves coordination, expansion and replication. Coordination or integration is a joint initiative of various stakeholders from planning to management. Expansion can be spatial, functional and temporal. Spatial expansions happen at local jurisdictions to entire bays, gulfs and coasts. Designing and management of MPA networks encompass larger areas and hence require functional expansion as well. Functional expansion involves restructuring of the organizational structure, wherein members have clear roles and responsibilities (e.g. in the enforcement or designing of the MPAs). The temporal element of expansion involves prioritization of activities and scheduling. At some point, managers and stakeholders must ask questions relevant to their priorities such as: Where should the members put the next MPA? Should they emphasize more on awareness campaigns or focus largely on enforcement, or both at the same time during initial stages of establishment? After working in one area, the management approaches will be replicated in other areas.

Box 1. Tips on effective inter-LGU collaboration on coastal resource management activities and benefits to the LGUs working together.

Inter-LGU collaboration for coastal and fisheries resource management is especially effective when collaborating LGUs:

- *collectively sign a MOA that formally establishes the alliance/collaboration*
- *establish an organizational structure with clearly defined working protocols*
- *identify specific activities, targets, and accountabilities for collective and individual-member LGU actions*
- *set and monitors commonly agreed standards of performance among members and promotes their compliance through incentives*
- *mainstream sharing of good practices through regular fora, standardization workshops, and inter-linked information system*

Inter-LGU collaboration enhances benefits from:

- *Law enforcement as various other stakeholder groups at different levels are engaged to support cluster activities.*
- *Information, education, communication and advocacy as support groups at different levels, share knowledge and links IEC to capability-building and decision-support*
- *Financing CRM activities due to economics of scale and implementation of a functional finacial management system involving diverse and sustainable financing sources*
- *Monitoring and evaluation of areas under joint protection to measure the biophysical, socio-cultural and economic impacts of conservation and track of governance improvement over time*

THE MPA SUPPORT NETWORK (MSN) AND MPA NETWORK IN THE PHILIPPINES

Currently, there are already more than 40 formally established MPA networks in the country, formed by alliances ranging from MPAs within a single municipality, to more than 21 municipalities, and spatial scales ranging from baywide, to corridor, to seascape, to regional levels (Horigue et al. 2012). Table 1 shows some of the milestones in the development of MPA networks in the Philippines. One of the main highlights was the creation of the Marine Protected Area Support Network (MSN) in 2005. MSN is a multi-sectoral organization formed by memorandum of agreement (MOA) among various government agencies, NGOs, and academic institutions. The signatories to the original MOA include DENR-PAWB, DA-BFAR, DILG-BLDG, DOST-PCAMRD, UP-Marine Science Institute (UP-MSI), Conservation International-Philippines (CI-P), World Wildlife Fund-Philippines (WWF-P), and Coastal Conservation and Education Foundation, Inc. (CCEF). UP-MSI has been serving as the network coordinator.

The main purpose of MSN is to facilitate coordination among various agencies and institutions for them to integrate management efforts and share experiences and best practices with one another, and to increase the effectiveness and efficiency of conservation activities in the Philippines. Part of MSN's support includes providing venues for multi-stakeholder sharing forums such as the MPA Awards and Recognition, a biannual recognition awards to communities with outstanding MPA management performance, which helps motivate and empower coastal resource management practitioners to further improve their conservation strategies. Further information about MSN is available at its official website, http://www.mpasupportnetwork.org/about-msn/.

Table 24. Milestones in the establishment of MPAs and MPA Networks in the Philippines.

Year	Milestones
1997	International Year of the Reef National Workshop on MPAs (PCAMRD-PhilReefs) Best Managed Reef Awards
2000–2003	Annual MPA Workshops (DA-BAR/ AFMA MFR Project)
2001	National Biodiversity Priority Setting Workshops
2002	Best Managed Reef Awards (PCAMRD-PhilReefs)
June 2003	Philippine Marine Sanctuary Strategy (PHILMARSAST)
2004	Formulation of the Archipelagic Development Strategy
2004–2006	Drafting of the National Coral Reef Strategy
2005	MPA Support Network (MSN) formalized with MOA
2007	Coastal Zone Philippines 2
2007, 2009	1st and 2nd MPA Awards and Recognition Event, respectively
2011–2014	3rd and 4th MPA Awards and Recognition Event, respectively MPA management effectiveness benchmarking and tracking

Table 25. The ACT NOW strategies framework

STRATEGIES	OBJECTIVES			
	Governance		Ecological	
Accelerate improvement	Levels/ Scale up river basin and coordinated interLGU cooperation, governance for social enterprises	Economies of scales showing reduced costs	Recovery rate	Costs or value
			Biomass and Diversity enhanced	Reducing mortality and habitat degradation
Connectivity functions facilitated	Scaled up inter-LGU alliances	Reducing transactional costs	Nursery, spawning etc.	Health of inter-connected habitats
Thresholds maintained; capacity/threat	Functionality and governance history	Standards and incentives	Right sizing to ABC	Minimize over-capacity
	Internal and external; EAFM	Enforcing against IUU	Carrying capacity	Reduce Threats
	Multiple use governance	Conflict resolution	Resiliency building	Right sizing costs
Network design	Inter-LGU alliance features and scale		States and change at varying design	
Organizational development	Sustainable development trajectory		Ecological sustainability	
Win-Win/win-lose options	Tradeoffs; who, what, when and where?		Ecological structure and function	

ACT NOW

The urgent need to act on the coastal management issues has been unfolding before us — it is a complex reality that lives beyond our imaginative constructs. Our first Mangrove Summit should allow us to find and seize opportunities to apply our understanding of mangroves and other coastal ecosystems, and the interconnectivity among them. We hope this leads to deeper appreciation and better implementation of sustainable resource management strategies.

			SAMPLE RESEARCH QUESTIONS
	Social-economic		
	Governance costs through safety nets : insurance, CCT ++	Benefits thru income and diverse livelihood	Show faster rate of improvement; How outcomes can be improved; How impacts can be sustained and mechanism
	Larger stock and flows facilitated	Cooperative coordinated and complementary	Source or Sink functionality and flow; Directionality optimized
	Equitable sustained use	Good mix of sustained use fisheries	Carrying capacity measures and gap filling processes
	Acceptable change	Incentives for good practice	Limits to acceptable change
	Social resiliency		Assessing integrated impacts
	Intermediate outcomes and beneficial impacts		Many small few large; complexity
	Social economic resilience		Governance arrangement design; SAP objectives and goals
	Inclusiveness; Well-being [HEI]		Combined with SSS-GSIS and RUSLE / DASLE (Decision Assisted Sea-Land Enhanced)

Our suggested frameworks for management strategies are embodied in the acronym ACT NOW and detailed in **Table 25**. Coastal resource management requires the collaboration of stakeholders, government and non-government institutions, and the academic and research communities, which can collectively act as stewards of coastal resources. As a guiding principle, we offer the acronym STEWARDS, which stands for **S**cience and **T**echnology **E**nhances **W**ise **A**daptation of **R**esiliency **D**eveloping **S**ystems. ACT NOW, STEWARDS should enable practitioners to accelerate the achievement of management goals, enhance the connectivity and functionality of MPA networks, reduce various threats, and improve management effectiveness through better network design, organizational development and social equity.

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