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Review

An assessment of marine protected areas as a marine management strategy in Southeast Asia: A literature review

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ABSTRACT

The establishment of Marine Protected Areas (MPAs) is seen as a chosen strategy in managing marine resources in Southeast Asia (SEA). The region has some of the most extensive coastline and diverse coral reef ecosystems that remain highly threatened. The need to protect these areas is definite, but establishment of a MPA often involves conflicts with its stakeholders that highly depend on the ecosystem. This paper reviews 32 studies that evaluated the MPA strategy implemented in various SEA countries since the 1980's to the present. The objective of this paper is to determine the effectiveness of the MPA strategy within the context of SEA. Biological, socioeconomic and governance indicators provided by The World Conservation Union (IUCN) were used in this paper as measures of MPA effectiveness. It was found that the MPA strategy may be ideally suited for some areas but may also be inappropriate for others. The three indicators are highly related to each other in determining a MPA success. An integrated study of these three aspects is believed to provide greater knowledge for future implementation of MPAs.

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1. Introduction

Southeast Asia (SEA) countries are blessed with rich natural resources and biodiversity. This is mainly due to their geographic and geological location which allows for a hot and humid climate throughout the year and the formation of unique natural assets. Woodruff (2010) explains that SEA's shallow warm water contributes to 30% of the world's coral reefs being located in the region, and the greatest diversity of reef-associated fauna in the world. The SEA region has come to be known as the *global centre* of biodiversity as far as coral reef fish, molluscs and crustaceans are concerned, a nomination that is attributed to 100,000 km^2 of coral reefs in the region (Burke et al., 2012) (Fig. 1). This region also is home to the most diverse mangrove forests and the second most diverse seagrass beds in the world (Wilkinson et al., 2006). Marine waters

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surrounding the Philippines, Malaysia and Indonesia are within The Coral Triangle Region which is home to 3000 coral reef fish; twice the number of other world fishes all together (Burke et al., 2012).

The richness of the marine ecosystem in this region supports millions of people. For instance, at least 350 million people live within 50 km from the shoreline and depend on the coastal and marine ecosystem not only for food but also for other economic and cultural resources (Clifton et al., 2010). The value of fisheries around the coral reefs of the region was estimated at $2.4 billion a year (Burke et al., 2002). In addition, the potential tourism values of these resources are substantial with some estimates showing that the value of a square kilometre of healthy coral reef in the SEA region is in the range of US$23,100 to US$270,000 a year (Burke et al., 2002).

With these diverse functions and values, the marine ecosystems of the region are consistently under pressure and a great degree of threats (Burke et al., 2002). Wilkinson et al. (2006) observes that 50–80% of its mangrove forests are already destroyed, that its seagrass beds have suffered similar losses, while 48% of coral reefs in the region are under high to very high threat. The consequences of these threats are not limited to biodiversity value losses but extend to the health, safety and economy of the region (Wilkinson et al., 2006).

Realising the potential loss from degraded marine ecosystems, SEA nations are looking at various management strategies to effectively manage their coastal resources. One of these strategies is looking at conserving important habitat, and establishing these areas as a Marine Protected Area (MPA) where activities conducted in these areas are restricted. Most of these areas are closed from any extractive activities through total closure or limited entry. The MPA strategy is currently considered to be the best approach by many governments, and SEA countries are seen to be keen to adopt the strategy (Marine Protected Areas in Southeast Asia, 2002). These countries have committed under the UN Convention on Biological Diversity to the objective of expanding marine protected areas to 10% of the world oceans by the year 2020 (http://www.cbd.int/2010-target/).

Although this strategy is believed to be an effective measure, in the SEA region, only 14% of 332 marine parks are rated as effectively managed (Burke et al., 2002). Therefore, it is crucial that this MPA strategy is continuously evaluated, as suggested by the Management Effectiveness Initiative (MEI) of The World Conservation Union (IUCN), where evaluation studies of MPAs are identified as important for improving the effectiveness of management efforts and to optimize related human and financial resource allocation outcomes (Pomeroy et al., 2005).

Few evaluation studies have already been conducted across the SEA region to identify the strengths and weaknesses of the MPA strategy. Some studies have looked at the impact of the strategy in terms of biological aspects such as changes in number of fish or coral cover (Najib and Ahmad, 2002; Russ et al., 2004). Some studies have focused on governance aspects including management frameworks and enforcement effectiveness (Alder et al., 1994; Mills et al., 2010). Many more have focused on socioeconomic aspects, particularly economic valuation (Mohd Salleh et al., 2011; Seenprachawong, 2003). The significant attention given to the socioeconomic aspects may be a reflection of the close relationship between the marine ecosystem and its people. It may also imply the interest of SEA countries in the economic benefits of the strategy.

This paper reviews 32 studies that evaluated more than 35 MPAs across SEA to understand issues that relate to the success or failure of the strategy (Appendix 1). Studies are reviewed systematically by using the IUCN's guidelines for MPA evaluation which separate indicators into three primary categories: biophysical, socioeconomic, and governance (Pomeroy et al., 2007). Below, the evaluation studies are reviewed with recommendations made for future research.

2. Background of previous evaluation studies

All 32 studies that are discussed in this paper are available online. The search was performed between October 2012 and April

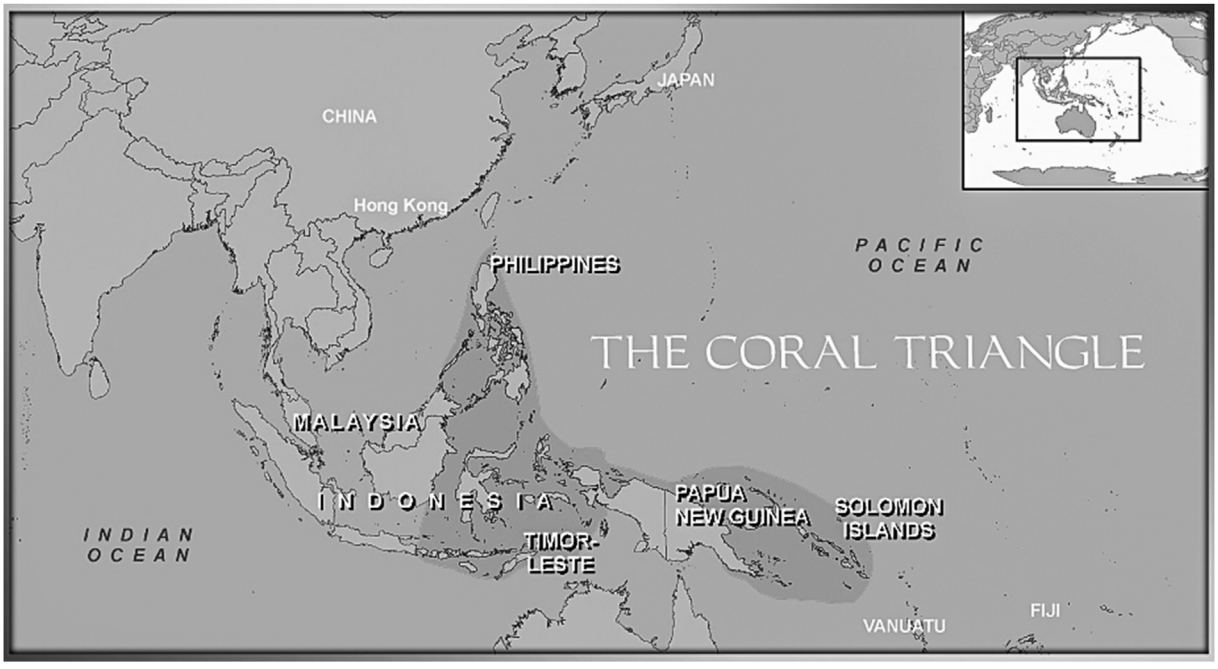

Fig. 1. The map of Southeast Asia and the Coral Triangle region. Source: Maritime Institute of Malaysia (http://www.mima.gov.my/v2/mobile.php?m=posts&c=shw_details&id=317&slug=latest-post).