Available online at: www.mbai.org.in doi: 10.6024/jmbai.2014.56.1.01750s-02

Managing Marine Protected Areas in Indonesia

Setyawati
Sub-Directorate of Marine, Coastal, and Small Islands, Directorate of Marine and Fisheries, National Development Planning Agency, Indonesia.

*Correspondence e-mail: setyawati@bappenas.go.id

Received: 24 Oct 2013, Accepted: 30 Jun 2014, Published: 15 Oct 2014

Original Article

Abstract

Indonesia, an archipelagic nation that consists of 17,504 islands and a total marine area of 5.8 million square kilometers, has valuable ocean and coastal resources and services that support development and community livelihood. However, overfishing, pollution, unsustainable fishing practices, and destruction of nursery habitats have threatened the sustainability of marine and coastal ecosystems and resources. Marine protected areas (MPAs) are considered an effective tool to manage resources of marine and coastal areas, including fisheries resources sustainably. With 15.7 million hectares of marine protected areas that have been established until 2012, Indonesia is committed to manage resources of marine and coastal areas in an effective and sustainable way. The Long-Term National Development Plan, the National Medium-Term Development Plans, Law on Fisheries and Law on Management of Coastal and Small Islands areas, and several government regulations provide policies to manage MPAs that adopt the concept of sustainable use. A zoning system has been established to harmonize the multiple objectives of the MPAs. The introduction of sustainable fisheries zone in the zonation systems of MPAs management has accomodated the rights of local communities, especially fishers, to utilize fisheries resources in eco-friendly practices. This paper addresses benefits and conflicts among users of MPAs and discusses the institutional and legal framework for managing MPAs. A tool to evaluate performace of MPA management and a zoning system are also addressed. Since the government of Indonesia is also committed to increase total area of MPAs to 20 million ha by 2020, the strategies to achieve the target are also reviewed.

Keywords: *Marine Protected Areas, ecosystems, management, Indonesia.*

Introduction

Indonesia is an archipelagic nation that consists of 17,504 islands with a total land area of 1.87 million km^2 and a total marine area of 5.8 million km^2. The marine areas include archipelagic waters of 2.95 million km^2, territorial sea of 0.30 million km^2, and Exclusive Economic Zone of 2.55 million km^2. Indonesia has a wealth of biodiversity in coastal ecosystems, which consist of three ecosystems, namely mangroves, coral reefs and seagrass. These three ecosystems are dependent on each other in preserving fishery resources. Besides the ecological role, Indonesia's ocean and coasts also provide valuable resources and services to support economic development, including providing alternative livelihood for coastal communities.

However, economic growth combined with population growth has put pressure on the ocean and coastal resources. Overfishing, pollution from land-based and sea-based

activities, irresponsible fishing practices, and destruction of nursery habitats have threatened the sustainability of marine and coastal ecosystems and resources. Due to pressure from destructive fishing practices, tourism, and global warming; only 5.30 percent of the total coverage of Indonesia's coral reef -around 75,000 km^2 - is in an excellent condition, and 27.18 percent is in good condition (Coremap, 2013). Mangroves are also being depleted and degraded, mainly due to logging and conversion of mangroves to other purposes. It is estimated that between 1982 and 1993, mangroves in Indonesia have been depleted at about 46,000 ha per year, at best scenario, or 160,000 ha per year, at worst scenario (Sukardjo, 2011). Fishery resources are also at the level of fully-exploited and over-exploited status in most of Indonesia's 11 Fisheries Management Areas (FMAs). Only some FMAs are in moderate level.

An increased awareness of these sustainable, protective and productive resources has promoted the need for conservation. Marine protected areas (MPAs) are considered an effective tool to manage resources of marine and coastal areas sustainably. The MPAs support sustainable fisheries management, since the MPAs rebuild the productivity of marine ecosystem in terms of fish stock. However, in managing MPAs effectively, regulations must be in place, and the institutional arrangement must be developed. A zoning system that accomodates multiple users in MPAs should be considered.

This paper is based mainly on a review of secondary literature, including books and reports published by several institutions involved in management of marine protected areas in Indonesia, that includes Ministry of Marine Affairs and Fisheries, National Development Planning Agencies, Ministry of Forestry, and other institutions. This paper also provides an overview on roles and status of existing marine protected areas in Indonesia and their distribution among provinces and within the existing 11 Fisheries Management Areas. Analysis of institutional and legal aspects, including the existing national policies concerning marine protected areas have been reviewed. Potential strategies to cover 20 million ha by 2020 have been suggested.

Marine Protected Areas

Defining Marine Protected Areas

There are many definitions of MPA. One of the internationally recognised definitions of MPA by IUCN is:

"Any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment" (Kelleher 1999).

Based on Government of Indonesia's regulations, the definition of marine protected areas is any area in marine, coastal and small islands which has been protected, managed by a zoning system, to support sustainable fisheries and environment management. The marine protected areas are established under ministerial decrees.

In other words, there are two important aspects in the definition of MPA. First, the area must be devoted for protecting environment, biodiversity, and cultural resources. Second, the area must be managed legally or through other means (Worboys *et al.*, 2005). Marine reserves, marine parks, and locally managed marine areas are included under marine protected areas.

Benefits and challenges

The MPAs provide goods and services that are ecologically, economically, and socially valuable for society. For ecological aspect, an MPA conserves marine biodiversity, especially threatened species and associated ecosystems. It also improves the health of marine ecosystem that results in improved ecosystem good and services. For example, coastal ecosystems, such as mangroves and coral reefs which are in a good condition serve as habitats for wildlife, provide coastal protection, nutrient cycling, water purification, and mitigation of climate change.

The MPAs also contribute to sustainable fisheries. Research has shown that an MPA can support fish stocks by protecting spawning grounds and nursery habitats for juvenile fish. Furthermore, when fish are mature, an MPA provides spillover effect into surrounding areas, such as fishing grounds or recreational fishing areas.That is why a marine protected area with 'no-take' zone is important in reversing the declining trend of fish populations and productivity. Pisco (2002) argues that in marine reserves, animals, including fish increase in their biomass, abundance, number of species, and body size. The average biomass is more than four times larger in reserves than in unprotected areas nearby. The density triples, and the number of species is 1.7 times higher in marine reserves than in unprotected areas. In addition, the average body size of animals is 1.8 times larger in reserves than in fished areas.

Tourism in a MPA is a major source of income for local communities in many countries. Local communities can get economic benefit through their involvement in tourism business or MPA management. Besides, tourism can provide financial support for sustaining MPAs.

MPAs are also important for enhancement of knowledge through education and training. They become locations where people can observe, do research, and also deliver knowledge to children about marine biodiversity. MPAs also have an important role in educating communities as well as visitors about the history and culture of the areas they protect.

However, since different entities such as local communities, conservationists, governments, services industries, visitors, and boat and fishing industries want to obtain benefits from the MPA, it can result in conflicts of use between tourism and conservation or between fishing and conservation. As mentioned before, tourism becomes a financial resource for managing marine parks and gives revenue for the local governments and employment for local communities. Unfortunately, growing tourist demand to access the marine protected area can reverse purposes of the area because it can reduce natural value and deteriorates the environment. The presence of man-made facilities, such as hotels, restaurants and other recreational infrastructure may give negative impacts on the marine protected areas' environment. In order to avoid this unintended consequence and to make ecotourism a tool for conservation, strengthening of cooperation between public authorities and private operators, improving capacity of marine park managers, and developing understanding of biodiversity conservation for visitors are needed.

Conflicts also happen within local communities, particularly local fishers who fish in the area. The designation of a MPA can directly impose costs on fishers by closing off access to fishing grounds. Carter (2003) argues that this conflict can be eliminated if the fishers' loss, because of relocating to another fishing grounds, has little effects or no costs, or if they are given compensation of ''spillover'' effects from the MPA to the remaining fishing grounds. Introducing sustainable fisheries zone into a zoning system in MPAs may also eliminate the conflicts.

Current status

Until 2012, Indonesia established 15.7 million hectares of marine protected area (Table 1) consisting of 42 national MPAs and 66 district MPAs. A gap analysis of critical conservation areas in 2010 identified that Indonesia's MPAs protect 747,190 ha or 22.7 percent of coral reefs, 758,472 ha or 22 percent of mangroves, and 304,866 ha or 17 percent of seagrass beds (Yulianto *et al.*, 2013).

The existing MPAs in Indonesia are distributed among 31 out of 33 provinces, with larger area of MPAs in the eastern part of Indonesia. Southeast Sulawesi, West Papua, Riau Islands, and East Kalimantan are provinces that have MPAs covering more than one million hectares. DI Yogyakarta and South Sumatra are provinces with no MPAs.

The MPAs are also distributed within the existing 11 Fisheries Management Areas (Wilayah Pengelolaan Perikanan-WPP), with the largest area of MPAs located in WPP Indian Ocean and Southern Java. This WPP covers 4.2 million ha or 24.5 percent of the total area of Indonesia's MPAs (Yulianto *et al.*, 2013).

Legal and instititional framework for Marine Protected Area

Legal framework

The policy and regulatory framework for marine and coastal resources in Indonesia is well developed. In addition, aspects of sustainable use and environmental protection are increasingly addressed in policies. Prioritiy policies are expressed in long-term and medium national development plan.

Table 1. Marine Protected Areas in Indonesia

No	Category	Total number	Area (ha)
A	**Initiated by Ministry of Forestry**	**32**	**4,694,947.55**
1	Marine National Park	7	4,043,541.30
2	Marine Tourism park	14	491,248.00
3	Wildlife Conservation	5	5,678.25
4	Marine Conservation	6	154,480.00
B	**Initiated by Ministry of Marine Affairs and Fisheries and Local Governments**	**76**	**11,089,181.97**
1	Marine National Park	1	3,521,130.01
2	Marine Conservation	3	445,630.00
3	Marine Tourism park	6	1,541,040.20
4	Local Marine Protected Area	66	5,581,381.76
	Total	108	15,784,129.52

Source : Ministry of Marine Affairs and Fisheries, 2013

The current Long-Term National Development Plan (2004-2024) and the National Medium-Term Development Plans (2010-2014) have mainstreamed the principles of sustainable development in national development policies and programs. Particularly for marine, coastal and fisheries sector, Indonesia's policies have been set up to meet the goal of improvement in fisheries production to support food security, utilization of marine and coastal resources in an optimal way, and conservation for marine and coastal ecosystems. With respect to conservation, coastal and fisheries management, Indonesia's Law No. 31 year 2004 on Fisheries and its amendment (Law No. 45 year 2009), Law No. 27 year 2007 on Management of Coastal and Small Islands areas, and Government Regulation No. 60 year 2007 on Fisheries Resource Conservation also adopt the concept of sustainable use.

© Marine Biological Association of India

Ensuring availability of regulations, improving understanding of the regulations, and law enforcement are crucial for effective management. The laws and regulations on coastal resource management and marine protected area are explained in Table 2.

Act No. 31 of 2004 on Fisheries as amended by Act No. 45 of 2009 states that fish resources conservation are needed to guarantee the existence, stock and continuity of fishery resources, including their ecosystems, species and genetics. The government can establish a site as a conservation area, in the form of aquatic nature reserve, national water park, water recreation park, and/or fishery reserve.

Act No. 27 of 2007 on the Management of Coastal Region and Small Islands regulates the planning, management, supervision, and control in coastal regions and small islands.

Government Regulation No. 60 of 2007 on Fishery Resources Conservation regulates three conservation activities: ecosystem conservation, conservation of fish species, and conservation of fish genetics. Ecosystem conservation consists of the ocean, seagrass beds, coral reefs, mangroves, estuaries, coastal swamps, rivers, lakes, reservoirs, ponds, and artificial aquatic ecosystems. Conservation of fish species is intended to protect endangered fish species, maintain fish species diversity, preserve the balance and stability of ecosystems, and utilize fishery resources sustainably. Conservation of fish genetics requires maintenance, breeding, research and preservation of gametes.This regulation is followed by Decree of the Minister of Marine Affairs and Fisheries No. 30 of 2010 that regulates plans for management and zonation of MPAs, and Decree of the Minister of Marine Affairs and Fisheries No. 17 of 2008 that regulates protected areas in coastal and small islands areas.

Act No. 32 of 2004 on Regional Government as last amended by Act No. 12/2008 regulates local governments' authority to manage marine resources in their territory. The authority consists of exploration, exploitation, conservation and management of ocean resources. Provincial governments manage territory of 12 nautical miles from shoreline towards the sea and/or towards the waters within the archipelago, while regency/municipal governments manage 1/3 (one third) of provincial authority.

Institutional framework

Responsibilities to manage marine protected areas in Indonesia are divided horizontally and vertically (Table 3). In the horizontal dimension, the responsibilities are divided among sectors or ministries, while in vertical dimension the responsibilities are shared among three levels of government (central, provincial, and district). With more than one authorized institution carrying out management,overlapping authority can cause conflict and decreased effectiveness.

At the national level, the Ministry of Marine Affairs and Fisheries that was established in 2000 is responsible to manage coastal resources in Indonesia, including marine protected areas. However, the responsibility to manage MPAs is also shared among other ministries, particularly Ministry of Forestry. Although each agency has defined duties, there is still overlap between their responsibilities. Harmonizing duties between the Ministry of Forestry and Ministry of Marine Affairs and Fisheries needs to be developed. As an initial effort, Ministry of Forestry handed over 8 marine conservation areas and marine tourism parks to Ministry of Marine Affairs and Fisheries in 2009. As of 2012, Ministry of Forestry manages 32 National MPAs while Ministry of Marine Affairs and Fisheries manages 10 National MPAs.

Since the enactment of the Regional Government Act No. 22/1999 and its amendment Act No. 32/2004, local

Table 2. Laws and regulations concerning Marine Protected Areas in Indonesia

No	Subject	Laws/Regulations	
1	Planning	Act No. 25/2004	National development planning system
		Act No. 17/2007	Long term national development plan
		Presidential Regulation No. 5/2010	Medium term national development plan
		Act No. 26/2007	Spatial Planning
2	Decentralization	Act No. 32/2004	Regional government
		Act No. 33/2004	Financial balance between central and regional government
3	Coastal Resource management and Marine protected area	Act No. 5/1990	Conservation on biological resource and their ecosystem
		Act No. 41/1999	Forestry
		Act No. 31/2004	Fisheries(amended by Act No. 45 of 2009)
		Act No. 27/2007	Coastal and small islands management
		Govt Regulation No. 60/ 2007	Fisheryresources conservation
4	International context	Act No. 17/1985	Ratification of United nations convention on the law of the sea
		Act No. 5/1994	Ratification of United nations convention on biological diversity

Table 3. Governmental organizations for marine protected areas in Indonesia

Government Organizations	Responsibilities related to MPA
Ministry of Marine Affairs and Fisheries	Marine, coastal and fisheries resource management, including aquaculture, fish capture, control and monitoring, research, conservation, and coastal community empowerment
Ministry of Forestry	Manage and control forestry, including mangroves, water ecosystems and national parks, including marine national park
Ministry of Home Affairs	Manage home affairs and regional autonomy, coordinate and supervise regional policies, develop good relationship between central and regional governments
Ministry of Tourism and Creative Economic	Develop national policy for tourism, including eco-tourism

governments have the power to manage their coastal resources. Decentralization has mandated local governments to manage the protected areas in their territories. Since then, there has been improvement in local governments' initiatives to enhance the extension of protected areas. Until 2012, as many as 66 district level-MPAs have been declared. The central government manages National MPAs, and provides policy and technical guidance to regions. Full involvement of provincial and district governments to manage local level MPAs is important for effective management of MPAs. This has to be followed by strengthening capacity of local human resources on managing MPAs.

National strategy for MPA

Effective management tool

There are several issues when managing MPAs. Lack of infrastructure and equipment, inadequate human resource capacity, inadequate management plans as well as finance are problems faced in managing MPAs. In order to manage the MPAs effectively, recently Indonesia has promoted a tool to evaluate the MPAs management. There are five levels of management, namely, red (initiation level), yellow (establishment level), green (minimum management level), blue (optimal management level) and gold (sustainable management). Red level requires a conservation area to be initiated and evaluated with provisioning, while yellow level requires an established conservation area containing a management institution, and zonation and management plans. In order to obtain green level, a conservation area has to have a low level of management containing a management institution, zonation and management plans, institutional and human resource improvement, infrastructure, and equipment. A conservation area with blue level is a conservation area with optimum management, and a conservation area with gold level has sustainable funding and good impacts on the prosperity of locals (Ruchimat *et al.*, 2012).

Most of Indonesia's MPAs are still in red and yellow level. None of them fullfils the gold level. In order to improve the level of MPAs, several efforts are needed. These include completing zonation and management plan, increasing human resource capacity and institution, supporting MPAs infrastructure and equipment, harmonizing rehabiltation, conserving and utilizing marine tourism and sustainable fisheries, and promoting cooperation and network. An MPA manager may use this tool to carry out self-evaluation on the performance of the MPA, and plan for improving the performance.

Zoning plan

In a multiple use MPA, some areas have high conservation value, and some areas permit some activities, such as recreational fishing and tourism, but prohibit exploitative uses. In order to identify which area is highly protected or not highly protected, a zoning plan should be established. Based on Government regulations, MPAs are managed and regulated by using a zoning system. There are four zones - core zone, sustainable fisheries zone, usage zone, and miscellaneous zone. Every MPA has to have a core zone with minimum 2 percent of the total area of the MPA. The core zone protects habitat for spawning and nursery, protects fish population, unique coastal ecosystems or traditional culture sites, and allows research and education. The usage zone is mainly for ecotourism, while the miscellaneous zone is for specific purposes, such as for rehabilitation.The sustainable fisheries zone allows environment-friendly fisheries and aquaculture activities, as well as marine tourism. By having sustainable fisheries, the conflict between fishers and MPAs can be reduced or even eliminated. By having this zone, the paradigm of marine protected areas in Indonesia has been shifted from prohibiting livelihood activities to mutually beneficial framework (Ruchimat *et al.*, 2012).

Fig. 1 is an example of a zoning plan for a district level MPA in Nusua Penida Bali Province, namely Marine Tourism Park of Pulo Pasi Gusung that covers an area of 20,057 ha.

It must be mentioned that effectiveness of zoning plan is influenced by the level of local communities' participation in formulating the zoning plan. Conflicts in managing MPAs often happen because of not involving local communities and related stakeholders.

Toward 20 million hectares of MPA

The government of Indonesia is commited to increase total area of MPAs to 20 million ha by 2020. In order to achieve 20 million ha or approximately 6.5 percent of Indonesia's territorial waters, the government of Indonesia has to declare additional 4 million ha in the next seven years. A number of studies have been conducted to define potential areas

© Marine Biological Association of India

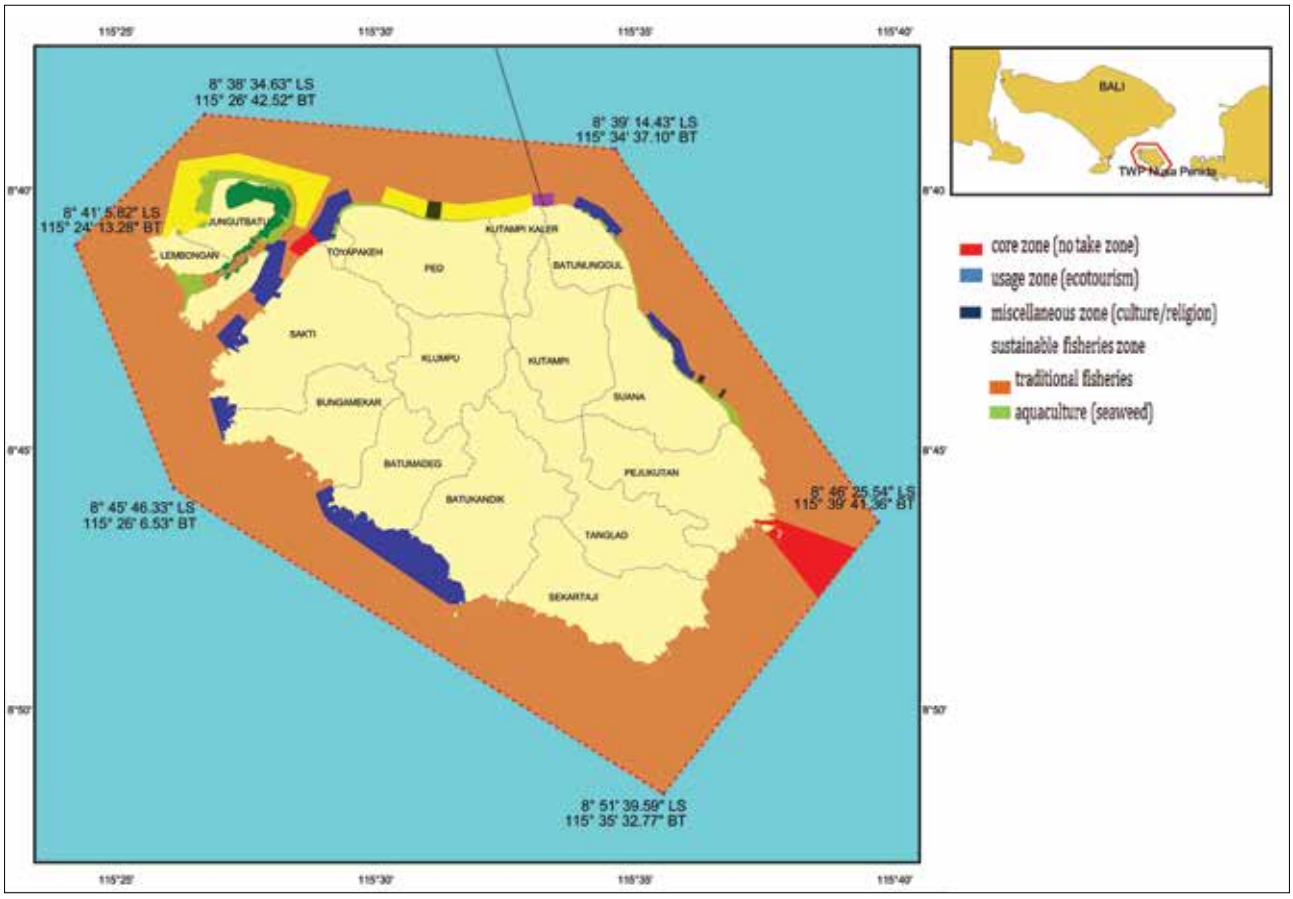

Fig 1. Zoning plan for district level MPAs in Nusa Penida, Bali (Source: Pokja KKP Nusa Penida, 2012)

to achieve the government's target. The studies include Indonesia Protected Area Plan Atlas in 1984, scientific design of resilient MA networks in Lesser Sunda Ecoregion, results from MPA's related project such as community-based marine protected areas from Coral Reef Rehabilitation and Management Project. Potential strategies towards this has been identified. The first step is to integrate community-based MPAs (village level) into national MPAs. The second step is to develop new MPAs in several priority areas. By 2013, more than 300 community-based MPAs would have been established (Yulianto *et al.*, 2013). These efforts require coordination between communities, local government and central government.

Conclusion

It is clear that marine protected areas provide benefits from economic, ecological and social aspects. In a multiple use MPA, conflicts between fishers, tourism and protected areas are the concerns. A well designed-zoning plan is required to meet the needs of all participants. The long term and effective management of MPAs demands improved coordination among institutions directly involved in marine conservation management as well as full commitment of local governments.

References

Carter, D.W. 2003.Protected areas in marine resource management: Another look at the economics and research issues. *Ocean & Coast. Manag.*, 46: 439-456.

COREMAP II (Coral Reef Rehabilitation and Management Program). 2013. Coral reef condition in Indonesia. Jakarta: LIPI. Retrieved from http://www.coremap.or.id/Kondisi-TK/Government Regulation Nomor 60 Year 2007 on Fishery Resources Conservation.

Huffard, C. L., M.V. Erdmann, T. R. P. Gunawan (Eds.). 2012. Geographic priorities for marine biodiversity conservation in Indonesia. Jakarta: Ministry of Marine Affairs and Fisheries and Marine Protected Areas Governance Program.

Kelleher, G. 1999. Guidelines for marine protected areas. Gland, Switzerland and Cambridge, UK: IUCN.

Partnership for the Interdisciplinary Study of Coastal Oceans (PISCO).2002. *The Science of marine reserves.* www.piscoweb.org.

Pokja KKP Nusa Penida. 2012 Rencana Pengelolaan kawasan (management plan for Nusa Penida conservation area), Klungkung. Presidential Regulation Nomor 5 Year 2010 on Medium Term National Development Plan 2010-2014. Jakarta.

Ruchimat, T., R. Basuki and Suraji. 2012. Recognizing the potential of Indonesia's marine, coastal, and small islands protected areas: Profiles of 76 marine, coastal, and small islands protected areas. Jakarta:Ministry of Marine Affairs and Fisheries of the Republic of Indonesia, Marine Protected Areas Governance and USAID.

Yulianto, I., Y. Herdiana, M. H. Halim, P. Ningtias, A. Hermansyah and S. Campbell. 2013. Spatial analysis to achieve 20 million hectares of marine protected areas for Indonesia by 2020. Bogor: Wildlife Conservation Society and Marine Protected Areas Governance.

Worboys, G. L, M. Lockwood and T. D. Lacy 2005. Protected area management: Principles and practice. South Melbourne: Oxford University Press.