Identification and Inventory of Coastal and Small Islands Conservation Area in the Lease Islands, Maluku Province

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Abstract

Maluku Province is targeting 1,000,000 ha of coastal and small island conservation areas until 2019. For that reason, this study was conducted to identify and to inventory the conservation area in the Lease Islands region as part of the Cluster VII island of Maluku. The conservation areas in this region were categorized into three namely conservation of coastal and small islands, maritime conservation area and marine waters conservation area. The most suitable conservation area among those three classifications was determined based on score system and value-weighted score for three main criteria, i.e., ecological, social and economic which consist of 20 parameters. The results indicated a potential conservation area on the Island Cluster VII, i.e., on the Lease Islands region with an area of 81,573.48 ha. Conservation of coastal and small islands have the highest score and become the selected category with a score-weighting of 1.15, higher than the other two categories. The type of conservation area is set to become Small Island Park and designated by the name of Small Island Park of the Lease Islands.

Keywords: category, conservation policies, islands cluster, score-weight

Introduction

Until 2020, there is targeted Marine, Coastal and Small Islands Conservation Area of 20,000,000 ha in Indonesia. This target is to answer the mandate of Indonesia Republic Law No. 27 of 2007 as amended by Law No. 1 of 2014. This law defines conservation as the protection, preservation and utilization of Coastal Areas and Small Islands and the ecosystem to ensure the existence, availability and continuity of resources while maintaining and improving the quality of the value and diversity.

Conservation Areas according to the Regulation of the Indonesia Minister of Marine and Fisheries No. 17 of 2008 is part of coastal areas and small islands that have certain characteristics as a whole ecosystems are protected, preserved and/or utilized in a sustainable manner to realize the management of coastal areas and small islands sustainably.

Conservation of coastal areas and small islands is held: 1) to preserve coastal and small island ecosystems, 2) to protect migration of fish and other marine life, 3) to protect the habitat for marine life and 4) to protect the traditional culture.

To support the policy of the Indonesian Government, the Government of Maluku Province took the initiative to develop a Conservation Area of Marine, Coastal and Small Islands on the entire island cluster as the unit of planning area. Maluku Government expects up to 2019 there were 1,000,000 ha of conservation area. In the province there are 12 island clusters, and 8 island clusters already have a conservation area.

In 2015, the Department of Marine and Fisheries Maluku Province collaborated with the Research Center for Small Islands, Coastal and Outermost Islands of Pattimura University, to determine the potential of protected areas at the Islands Cluster VII (including Ambon Island and the Lease Islands) which has not had conservation area. This study aims to identify and inventory the conservation areas of marine, coastal and small islands waters.

Method

This study was conducted on the Lease Islands as a part of the Islands Cluster VII of Maluku. The study was conducted from September to December in 2015.

The method includes 20 parameters according to Supplement 1, Guide to Identification, Inventory and Reservation of Marine, Coastal and Small Islands Conservation Area (LUBIS *et al*. 2014). Twenty of these parameters are clustered in three criteria. First, an ecological criterion includes 10 parameters: 1) biodiversity of mangrove, seagrass and coral reefs, 2) originality, 3) the ecological connectivity, 4) representation, 5) uniqueness (distribution of flora, fauna and ecosystems), 6) productivity (biomass, kg/ha), 7) migration area, 8) habitat of endangered, endemic and protected fishes, 9) spawning ground and 10) nursery ground.

Second, a social criterion includes 6 parameters: 11) community support, 12) conflicts of interest potential, 13) threats potential, 14) the potential of maritime history, 15) local wisdom and 16) customs.

Third, an economic criterion includes 4 parameters: 17) the importance value of fisheries, 18) the potential for recreation and tourism, 19) aesthetics and 20) access to location.

The category of conservation area, such as conservation of coastal and small islands, maritime conservation and marine conservation, was determined by using the scoring system and the value of score-weighted. The type of conservation areas was chosen by using comprehensive study approach.

Results and Discussion

General condition

The identification results show that a conservation area candidate has an area of 81,573.48 ha, of which 70.11% is marine water and 29.89% are land. The area has six border points: 1) 128º29'59,08" E and 3º29'56,24" S, 2) 128º35'18,80" E and 3º28'19,61" S, 3) 128º45'3,97" E and 3º28'48,76" S, 4) 128º52'2,91" E and 3º29'52,48" S, 5) 128º48'2,59" E and 3º44'2,90" S and 6) 128º30'59,10" E and 3º39'11,88" S, covering most of Haruku, Saparua, Molana, Nusalaut islands and adjacent waters (Fig. 1).

Bathymetric mapping results showed that waters depth average near the islands ranging from 50 to 150 m. Deep water in general is in the southern part of the conservation area, directly opposite the Banda Sea, as well as the eastern part of Saparua and Nusalaut islands.

Chlorophyll-a concentration ranged from 0.4 to 1.0 mg/m^3. The concentration of chlorophyll-a was high (1.0 mg/m^3) in the bay waters and around the estuary. The high concentration of chlorophyll-a on the waters of Saparua and Nusalaut islands indicates that these waters contribute to high productivities.
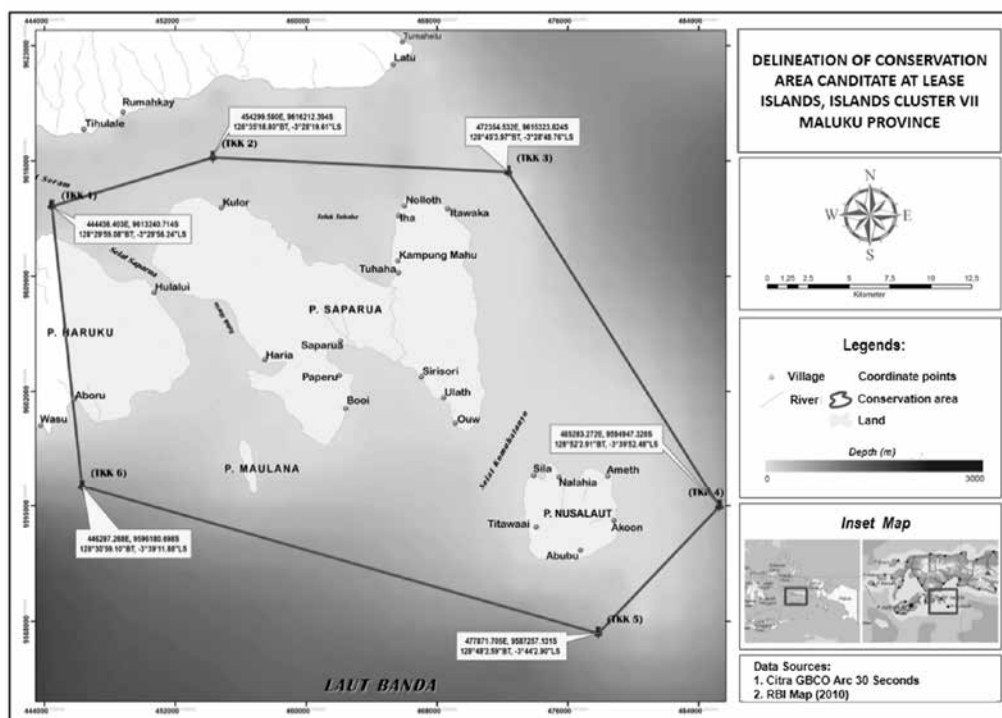

Fig. 1. Delineation of the Lease Islands (the Islands Cluster VII) conservation area.

Criteria and parameters to determine conservation area category

Ecological

Biodiversity: a biodiversity parameter rate was based on the existence of three keystone ecosystem at the coastal area, mangroves, seagrass and coral reef. Among three ecosystems, a biodiversity value was in accordance with the species distribution. Distribution of mangrove species ranged from 4 to 12 species and that of seegrass ranged from 5 to 8 species. Moreover, many species of coral reefs were found in this area. The average value of the entire ecosystem diversity is 3.01. Biodiversity is given a score of 3.

Originality: 75.96% of mangrove, 76.51% of seagrass and 75.74% of coral reefs were original ecosystems. Originality is given a score of 3.

Ecological Connectivity: the status of ecosystem components connected to 73.15%. Ecological Connectivity is given a score of 2.

Represent: assessment of these parameters is based on the number of ecosystem types and the main habitats in an area. At a regional level, there are 11 types include: mangroves, seagrass beds, coral reefs, lagoons, muddy, sandy beaches, rocky beaches, steep coast, *pasi*, shallow waters and deep sea. There are 9 types (81.82%) at Haruku, 10 types (90.91%) at Saparua and 10 types (90.91%) at Nusalaut. The average value of the representation is 87.88%. Represent is given a score of 3.

Uniqueness: some uniqueness were found in this area, such as local wisdom (*sasi*) and community knowledge about the location of fishing ground of red snapper group (this knowledge is called *pasi*). These wisdom and knowledge are found only in the Moluccas, particularly in the Lease Islands, thus Uniqueness is given a score of 2.

Productivity: productivity was assessed by abundance of reef fish. It is found that the productivity was 949 kg/ha at Haruku, 2,151.5 kg/ha at Saparua and 2,411.5 kg/ha at Nusalaut, which indicates very high productivity in this region. Productivity is given a score of 3.

Migration Area: the waters around the candidate of conservation area is a migration area of 7 species of whale, 5 species of dolphins and 4 species of sea turtles. The presence of three groups of mega fauna illustrates the highly migratory species richness around the area. Migration Area is given a score of 3.

Habitat of Endangered and Protected Species: an endangered species is found in Dugong dugon and protected species are found in whales, dugongs, turtles, top shell and green turban. Habitat of Endangered and Protected Species is given a score of 3.

Spawning Ground: a location of spawning ground was found only at the Leinitu waters, Nusalaut Island by using participatory mapping. Spawning Ground is given a score of 1.

Nursery Ground: 491.67 ha of mangrove area and 91.98 ha of seagrass beds were an area of nursery ground of marine fauna in the surrounding area. Nursery Ground is given a score of 3.

Social

Community Support: among 80 respondents in three islands, 88.75% agreed to support conservation area development. The result shows the status of more than 75% of people support the development of a conservation area, so Community Support is given a score of 3.

Conflicts of Interest Potential: conflict of space utilization, fishing gear conflicts and political conflicts were assessed. All the components are generally considered low, an average of 92.50% of respondents said that the potential for conflict is low. Conflicts of Interest Potential is given a score of 3.

Potential of Threats: results of field assessment show only one of the six factors identified as potential of threats (the use of fishing gear and techniques damages the environment). The status of the potential of threat is low, thus Potential of Threats is given a score of 3.

Potential of Maritime History: three potential of maritime history, such as a route colonial cruise, a historical tourism and an international live aboard since 1949, were identified. Potential of Maritime History is given a score of 3.

Local Wisdom: three types of local wisdom, such as *sasi laut*, *amula laut* and local knowledge of *pasi* as a potential fishing ground, were identified in this area, which can support conservation. Local Wisdom is given a score of 3.

Customs: assessment is done to find the existence of institutions and customs as well as the effectiveness of potentially support on conservation area development. About 14 local agencies are considered effective. Local institutional governance systems still work effectively, thus Customs is given a score of 3.

Economic

Importance Value of Fisheries: the assessment was based on the value of Location Quotient (LQ) of the value of fishery production. The calculation of the value of LQ was 1.07 which shows fisheries potentially are very important economically. Importance Value of Fisheries is given a score of 3.

Recreation and Tourism Potential: recreation and tourism potential of the conservation areas candidate includes beaches, mangrove ecotourism, seagrass ecotourism, coral reef ecotourism and maritime history. Recreation and Tourism Potential is given a score of 3.

Aesthetics: coral reefs in the waters, white sand of beaches and cleanliness of the marine environment in this region have a high aesthetic value, thus Aesthetics is given a score of 3.

Access to Location: assessment of the access was done by calculating the average value of access to three main islands, Haruku, Saparua and Nusalaut through sea transportation. The value of access was 89.58%, 92.19% and 67.86% in Haruku, Saparua and Nusalaut, respectively. These results indicate that the status of access is very easy, thus Access to Location is given a score of 3.

Determination of category and type of conservation area

Categories of the conservation areas are determined through an assessment of scores and weights in three general categories, conservation of coastal and small islands (CCSI), maritime conservation area (MCA) and marine waters conservation area (MWCA). The results show the highest value is the value of CCSI, 1.15 (Table 1). These results illustrate that the conservation area candidate of the Lease Islands should be developed with CCSI category.

Table 1. The results of the determination of Conservation Areas Criteria.

No	Criteria and Parameters	Score (S)	CCSI*		MCA*		MWCA*	
			Weight (W)	WxS	Weight (W)	WxS	Weight (W)	WxS
	Ecological							
1	Biodiversity	3	4	12	2	6	4	12
2	Originality	3	4	12	1	3	4	12
3	Ecological connectivity	2	4	8	1	2	4	8
4	Represent	3	4	12	1	3	3	9
5	Uniqueness	2	4	8	1	2	4	8
6	Productivity	3	3	9	1	3	3	9
7	Migration area	3	3	9	2	6	3	9
8	Habitat (endangered and protected species)	3	3	9	1	3	4	12
9	Spawning ground	1	4	4	1	1	3	3
10	Nursery ground	3	3	9	1	3	3	9
	Social							
1	Community support	3	2	6	4	12	2	6
2	Conflict interest potential	3	2	6	4	12	2	6
3	Threats potential	3	2	6	3	9	4	12
4	Maritime history potential	3	2	6	4	12	1	3
5	Local wisdom	3	2	6	2	6	1	3
6	Custom	3	2	6	4	12	1	3
	Economic							
1	Importance value of fisheries	3	2	6	3	9	2	6
2	Recreation and tourism potential	3	2	6	4	12	2	6
3	Aesthetics	3	2	6	4	12	2	6
4	Access to location	3	2	6	4	12	2	6
	Total	56	56	152	48	140	54	148
	Total score		1.15		1.13		1.14	
	Status of the area		Selected		Not selected		Not selected	

*CCSI: conservation of coastal and small islands, MCA: maritime conservation area and MWCA: marine waters conservation area.

CCSI consists of four types, Coastal Asylum, Small Island Asylum, Coastal Park and Small Island Park. In accordance with three criteria, Coastal Asylum has a value of 22, Small Island Asylum with a value of 27, the Coastal Park with a value of 30 and Small Island Park with a value of 35. These results suggest that Small Island Park is suitable for the conservation area candidate. High value on the type of Small Island Park is also based on the importance of conservation in the region that has been utilized by the community, with the support of the potential of small islands and the surrounding waters.

In general, the effectiveness of a protected area depends on a complex set of interactions between biological, economic and institutional factors. While MPAs might provide protection for critical habitats and cultural heritage sites, their impact is less certain as a tool to enhance fishery management (SANCHIRICO *et al*. 2002).

Protected areas are essential for the conservation of biodiversity and are one of the pillars of virtually all conservation strategies (AGOSTINI *et al*. 2015). In this context, the management of coastal/marine protected areas represents one of the main mechanisms for the protection of areas with significant ecological importance, functioning as an essential tool for ensuring the conservation of nature and the promotion of sustainable development (ESTIMA *et al*. 2014).

Conclusion

Conservation area candidate of coastal and small islands at the Lease Islands has the highest score and becomes the selected category with a score-weighting of 1.15, higher than the other two categories. The type of conservation area is set to a Small Island Park, and designated by the name of Small Island Park of the Lease Islands.

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