

Space Allocation of RAPs Zoning Plan in Pasaman Barat Regency Based on the Minister Regulation of Marine and Fisheries No. 31/PERMEN-KP/2020

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ABSTRACT

Regional Aquatic Protected Areas (RAPs) of Pasaman Barat Regency is a protected and managed water area covering the waters of Pangka Island, Pigago Island, and Taluo Island. The purpose of the study was to analyze the zoning plan for the Marine Protected Area (MAPs) and analyze the activities that may or may not be carried out in the RAPs in Pasaman Barat Regency. The research method used is the survey method. The results of the analysis of the zoning plan for the conservation area of Pasaman Barat Regency have 6,122.14 Ha, consisting of a core zone of 157.93 Ha, a limited use zone of 5,927.09, and other zones/port zones of 37.12 Ha. All activities are not allowed in the core zone except educational activities (permitted with conditions). Limited use zones for economic activities include small-scale fishing and small fisherman shipping (permitted), regular domestic passenger ship shipping (permitted), and fishing vessel traffic > 10 GT (permitted). Activities for the social and economic community in the limited use zone are allowed with conditions. Other zones/port zones are used for port activities to support tourism. The Pasaman Barat Regency MPA zoning plan is an important document for the West Sumatra Provincial Government as the basis for granting a water business permit in a conservation area.

Keywords: RAPs, Zoning Plan, Space Allocation, Pasaman Barat.



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INTRODUCTION

Marine Protected Areas (MPAs) are water areas that have certain characteristics within an ecosystem that are protected, conserved, and used sustainably. Zoning of water conservation areas is the scope of functional boundaries in water conservation areas determined according to the potential of water resources and socio-economic and cultural by taking into account the carrying capacity and capacity of the waters. A zoning Plan is a plan drawn up by the Head of Regional Apparatus Organization and interested parties to determine the direction of the use of aquatic resources by determining the structure and pattern of space with restrictions on activities that may, may not, and may conditionally. MAPs are one of the main management tools to address the current human-caused biodiversity crisis. With increasing anthropogenic pressure, MAPs are very important for conserving natural resources, biodiversity, and ecosystem properties (Hilborn, 2016; Campbell *et al.*, 2017). MAPs have continued to increase in the last decade to >5% of coastal areas under national jurisdiction and <1% of high seas figures (Spalding *et al.*, 2013) which continues to increase with the establishment of several MAPs, especially in

waters tropical (Devillers *et al.*, 2015). Conservation areas are an important tool for coastal fisheries management and marine biodiversity conservation (Edgar *et al.*, 2014).

Pasaman Barat Regency is one of the coastal Regencies in West Sumatra, which has a land area of 3,887.77 km², a sea area of 800.47 km², a beach length of 112 km, and 12 small islands. Pasaman Barat Regency has an area of 2,756.09 Ha of mangrove ecosystems, 1,257.94 Ha of reef ecosystems, and 75 Ha of seagrass ecosystems (DKP, 2019). Based on the decree of the Governor of West Sumatra No. 523.6/150-2017 concerning Reserves of MAPs the area of the RAPs in Pasaman Barat Regency is 6,122.14 Ha. The MAPs in Pasaman Barat Regency is located in Sungai Beremas sub-district, *Nagari* Air Bangis covering the aquatic of Pangka island, Pigago island, and Talua island. Utilization of the RAPs in Pasaman Barat Regency is capture fisheries, marine tourism, coral reef conservation, turtle conservation, and shipping lanes. With the issuance of the Minister Regulation of Marine and Fisheries No. 31/PERMEN-KP/2020 concerning the MAPs, the West Sumatra Provincial Government is required to prepare a conservation area zoning plan document. This Minister's Regulation emphasizes that the core zone with the sea park category must meet the criteria for an area of at least 10% of the area of coastal ecosystems or the area of habitat for biota conservation targets. The core zone with the category of Sanctuary must meet the criteria for an area of at least 70% of the conservation target biota habitat area. Limited utilization zone for fisheries and marine nature tourism. The utilization of other zones is expanded into rehabilitation zones, marine building and installation zones, harbor/mooring zones, ship traffic zones, religious zones/cultural sites, and zones according to regional characteristics.

A study of the spatial allocation of the zoning plan for the RAPs in Pasaman Barat Regency needs to be prepared and the zoning plan for this area must be adjusted to the Minister Regulation of Marine and Fisheries No. 31/PERMEN-KP/2020. The next stage is the determination of the Water Area Management Plan of Pasaman Barat Regency by the Head of Marine and Fisheries of West Sumatra Province. The purpose of this study is to analyze the allocation of aquatic space RAPs in the Pasaman Barat Regency and analyze the activities that may or may not be carried out RAPs in the Pasaman Barat Regency.

METHODS

The research location is the RAPs in Pasaman Barat Regency measured from the highest tidal coast covering the waters of Pangka island, Pigago island, and Talua island in *Nagari* Air Bangis. The times of research were carried out from April-September 2021. The research method used was the survey method. The types of data collected are 1) Primary data from observations, interviews, public consultations, questionnaires, and field surveys; 2) Secondary data comes from the Geospatial Information Agency (BIG), the Ministry of Marine and Fisheries, the West Sumatra Provincial Government, and the RTRW Pasaman Barat Regency. The base map is derived from the BIG Indonesia Coastal Environmental at a scale of 1: 50,000 and 1: 250,000 in 2021, and the Indonesian Topographical at a scale of 1: 50,000 in 2017.

The stages of preparing the zoning plan for MAPs of RAPs in Pasaman Barat Regency are based on the Minister Regulation of Marine and Fisheries No. 31/PERMEN-KP/2020 concerning Management of Conservation Areas: 1) Establishment of working groups; 2) Field survey; 3) Analysis of data and information; 4) Initial documents; 5) Technical consulting; 6) Public consultation; 7) Final document; 8) Reserved conservation area; 9) Determination of conservation area by Ministerial Decree; 10) Preparation of management and zoning plans; and 11) Determination of the management and zoning plan by the Head of Regional Apparatus Organizations. Map of conservation areas with a minimum level of accuracy of 1:50,000 scale which includes the outer boundaries and zoning of the conservation areas.









The data analysis of the RAPs in Pasaman Barat Regency used spatial and non-spatial analysis and the suitability of the aquatic from the socio-economic, cultural, and biophysical data of the aquatic of the RAPs in Pasaman Barat Regency. Land suitability analysis was carried out through Geographic Information System (GIS) analysis in the form of overlaying water biophysical parameters. The results of the formulation of the zoning plan and directions for the use of which activities in the RAPs in Pasaman Barat Regency are allowed to be carried out by public consultation.

RESULTS

1. The zoning plan RAPs in Pasaman Barat Regency

Based on the Minister Regulation of Marine and Fisheries No. 31/PERMEN-KP/2020 concerning MAPs, GIS analysis, and public consultation on July 16, 2021, the zoning plan RAPs in Pasaman Barat Regency consists of a core zone, a limited utilization zone, and other zones. The total area of the RAPs in Pasaman Barat Regency is 6,122.14 Ha, consisting of a core zone of 157.93 Ha, a limited utilization zone of 5,927.09, and other zones/port zones of 37.12 Ha (Table 1 and Fig 1).

Table 1. Space allocation of the zoning plan RAPs in Pasaman Barat Regency

Zones	Ha	Locations	Utilizations
Core zone	157.93	To the west and north of the aquatic of Pigogo island, to the west of the waters of Pangka island and to the south of the aquatic of Taluo island	<ul style="list-style-type: none">  Coral reef protection  areas Spawning and rearing areas fish  Turtle protection (Taluo Island)
Limited utilization zone	5,927.09	South of Pigago Island, the aquatic between Pangka island and Taluo island environmentally	<ul style="list-style-type: none">  Environmentally friendly fishing  Beach tourism  Snorkeling and diving tours  Fishing excursion
Other zones/port zone/anchoring zone	friendly	Northeast of Pigago island, east of Pangka island and north of Taluo island the mooring	<ul style="list-style-type: none">  Tourist boats
Total	6,122.14		

Source: Analysis results, 2021.

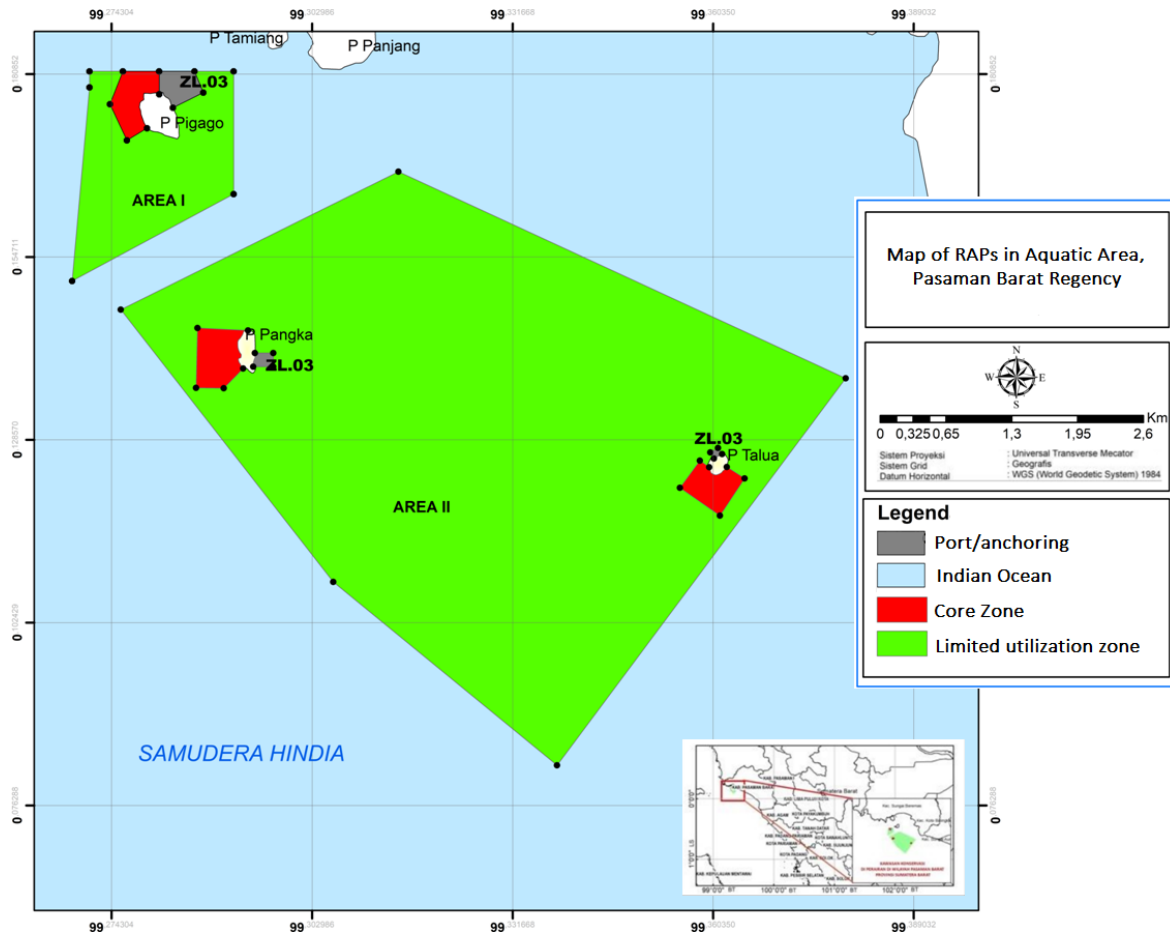


Fig 1. Map of the zoning plan RAPs in Pasaman Barat Regency

The RAPs in Pasaman Barat Regency consist of 2 areas, namely Area I is aquatic around Pigogo Island with a core zone of 50.86 Ha, a limited utilization zone of 513.32 Ha, and other zones/port zones covering 28.94. While Area II is the aquatic around Pangka and Taluo Islands with a core zone of 106.97 Ha, a limited utilization zone of 5,413.77 Ha, and other zones/port zones of 8.18 Ha (Fig 1). Based on the Minister Regulation of Marine and Fisheries No. 31/PERMEN-KP/2020 that conservation areas are divided into the categories of parks, reserves, and MAPs. The zoning of the conservation area is divided into a core zone, a limited utilization zone, and other zones according to the area's designation. The core zone is utilized for the absolute protection of conservation targets. Limited utilization zone for environmentally friendly fisheries and tourism. The other zones are zones outside the core zone and limited utilization zones.

2. Activities that may/cannot/conditionally be carried out in the core zone

The core zone based on the Minister Regulation of Marine and Fisheries No. 31/PERMEN-KP/2020 is a zone for the protection of aquatic resources, spawning areas, nursery areas, foraging areas, biota recovery, protection of aquatic biodiversity, and protection of cultural heritage (KKP, 2020). The core zone is prohibited from fishing to maintain fish stocks (Giakoumi *et al.*, 2017; Sala & Giakoumi, 2017), improve the quality of aquatic habitats (Rodwell *et al.*, 2003), and restore ecosystem function (Cheng *et al.*, 2019).

Based on the calculation of the area of the ecosystem/habitat conservation target (coral reefs) in the core zone the total ecosystem/habitat in the entire RAPs in Pasaman Barat Regency is 45.46%. The area of the core zone of RAPs in Pasaman Barat Regency has met the minimum requirements of 10%. The location of the core zone is divided into 2 areas, namely the core zone area I located on Pigago island which is located in the west and north of the island. The core zone of Area II is located west of Pangka island and south of Talua island. Administratively, the core zone is included in *Nagari* Air Bangis, Sungai Bremas sub-district. Results research by Suparno (2021) shows that the zoning plan for RAPs is divided into 3 zones, namely the core zone with an area of 249.31 Ha or 2.12% of the total conservation area. The sustainable fisheries zone is 11,460,32 ha or 97.31% of the total conservation area and the utilization zone is 67.00 ha or 0.57% of the total conservation area. The research of Krueck *et al* (2017) stated that the ideal protected coastal area is 20-30% of the total area of coastal waters. The core zone area in the MAPs is a minimum of 20-30% to maintain the sustainability of the biota stock that is the target of utilization.

Table 2. Activities that may/shouldn't be/conditionally carried out in the core zone

No	Space utilization	Utilization		
		Allowed	Allowed with conditions	Not allowed
1	People's sailing and small fishermen			√
2	Domestic regular passenger ship cruises			√
3	cruise			√
4	Traffic fishing vessels > 10 GT			√
5	Research		√	
6	Education			√
7	Fish catching			√
8	Fishing by fishermen living around conservation areas			√
9	Fish farming			√
10	Fish farming by small fish farmers			√
11	Aquatic tourism activities			√
12	Provision of aquatic nature tourism infrastructure			√
13	Establishment and/or placement of marine structures			√
14	Installation placement at sea			√
15	Utilization of sea water other than energy			√
16	Commercial photo, film and video production			√
17	Landing, take off, and seaplane			√

Source: Analysis results, 2021.

3. Activities that may/cannot/conditionally be carried out in the limited utilization zone

Based on Minister Regulation of Marine and Fisheries Regulation No. 31/PERMEN-KP/2020 that the limited utilization zone has social, economic, and cultural functions for the community. The limited utilization zone is used for capturing fisheries sub-zones, aquaculture sub-zones, and cultural tourism sub-zones (KKP, 2020). Activities in the limited utilization zone include small-scale fishing and small fisherman shipping (permitted), regular domestic passenger ship cruises (permitted), cruises for tourist passenger ships/cruise ships (permitted with conditions), fishing vessel traffic >10 GT (permitted), research activities (permitted with conditions), education activities (permitted with conditions), fishing (permitted with conditions), fishing by fishermen living around

conservation areas (permitted with conditions), fish farming (permitted with conditions), and fish farming by small fish cultivator (allowed with conditions). The limited utilization zone is used for marine nature tourism activities (permitted with conditions), construction and/or placement of marine structures (permitted with conditions), placement of installations at sea (permitted with conditions), utilization of seawater other than energy (permitted with conditions), manufacture commercial photos, films, and videos (conditionally permitted), and landing, take off, and taxiing seaplanes (conditionally permitted) (Table 3).

Table 3. Activities that may/cannot/conditionally carried out in the limited utilization zone

No	Space utilization	Utilization		
		Allowed	Allowed with conditions	Not allowed
1	People's sailing and small fishermen	√		
2	Domestic regular passenger ship cruises	√		
3	cruise		√	
4	Traffic fishing vessels > 10 GT	√		
5	Research		√	
6	Education		√	
7	Fish catching		√	
8	Fishing by fishermen living around conservation areas		√	
9	Fish farming		√	
10	Fish farming by small fish farmers		√	
11	Aquatic tourism activities		√	
12	Provision of aquatic nature tourism infrastructure		√	
13	Establishment and/or placement of marine structures		√	
14	Installation placement at sea		√	
15	Utilization of sea water other than energy		√	
16	Commercial photo, film and video production		√	
17	Landing, take off, and seaplane		√	

Source: Analysis results, 2021.

4. Activities that may/cannot/conditionally be carried out in the other zone/port zone

Based on Minister Regulation of Marine and Fisheries Regulation No. 31/PERMEN-KP/2020 that other zones have the function of rehabilitation zones, marine building and installation zones, port/mooring zones, ship traffic zones, religious zones/cultural sites, and zones according to the characteristics of the area (KKP, 2020). Activities in other zones include small-scale fishing and small fishing vessels (permitted), regular domestic passenger ship cruises (permitted), cruise passenger ships/cruise ships (permitted with conditions), fishing vessel traffic > 10 GT (permitted), research (permitted with conditions), education (permitted with conditions), fishing (not allowed), fishing by fishermen living around conservation areas (not allowed), fish farming (not allowed), and fish cultivation by small fish cultivators (not allowed). Other zones are used for marine nature tourism activities (not allowed), erection and/or placement of marine structures (permitted with conditions), placement of installations at sea (permitted with conditions), utilization of seawater other than energy (not allowed), making photos, films, and commercial videos (conditionally allowed), and landing, take off, and taxiing seaplanes (not allowed) (Table 4).

Table 4. Activities that may/cannot/conditionally be carried out in the other zone/port zone

No	Space utilization	Utilization		
		Allowed	Allowed with conditions	Not allowed
1	People's sailing and small fishermen	√		
2	Domestic regular passenger ship cruises	√		
3	cruise		√	
4	Traffic fishing vessels > 10 GT	√		
5	Research			
6	Education		√	
7	Fish catching			√
8	Fishing by fishermen living around conservation areas			√
9	Fish farming			√
10	Fish farming by small fish farmers			√
11	Aquatic tourism activities			√
12	Provision of aquatic nature tourism infrastructure			√
13	Establishment and/or placement of marine structures		√	
14	Installation placement at sea		√	
15	Utilization of sea water other than energy			√
16	Commercial photo, film and video production		√	
17	Landing, take off, and seaplane			√

Source: Analysis results, 2021.

CONCLUSIONS

The zoning plan RAPs in Pasaman Barat Regency is divided into 3 zones, namely the core zone, limited utilization zone, and other zone/port zone. 1) The core zone is used for fish habitat and fish population protection, education, and research; 2) The utilization zone is used for capturing fisheries, aquaculture, and tourism; and 3) Other zone/port zone are used for port activities to support tourism. Activities that are allowed in the core zone, limited utilization zone, and other zones are activities that support sustainability and pay attention to the carrying capacity and capacity of MAPs. Activities that are not allowed in the core zone, limited utilization zone, and other zones are activities that damage aquatic ecosystems and activities that do not pay attention to the carrying capacity and capacity of MAPs.

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Keywords: -



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RESULTS

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Limited utilization zone	5,927.09	South of Pigago Island, the aquatic between Pangka island and Taluo island environmentally	<ul style="list-style-type: none"> ☞ Environmentally friendly fishing ☞ Beach tourism ☞ Snorkeling and diving tours ☞ Fishing excursion
Other zones/port zone/anchoring zone	friendly	Northeast of Pigago island, east of Pangka island and north of Taluo island the mooring	<ul style="list-style-type: none"> ☞ Tourist boats
Total	6,122.14		

Source: Analysis results, 2021.

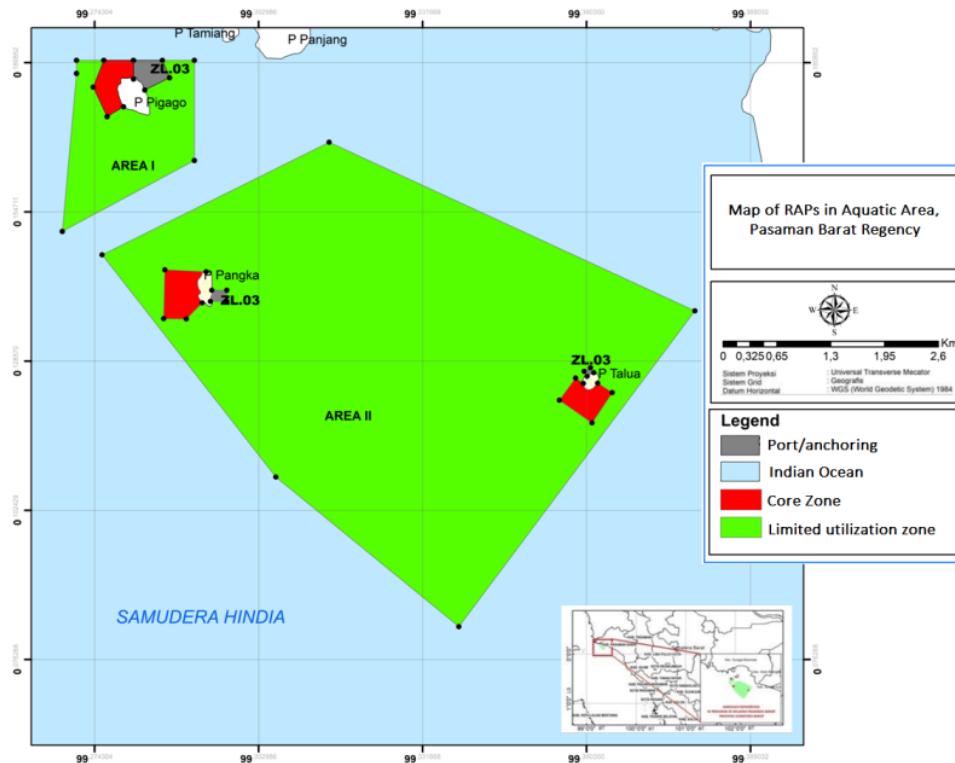


Fig 1. Map of the zoning plan RAPs in Pasaman Barat Regency

The RAPs in Pasaman Barat Regency consist of 2 areas, namely Area I is aquatic around Pigogo Island with a core zone of 50.86 Ha, a limited utilization zone of 513.32 Ha, and other zones/port zones covering 28.94. While Area II is the aquatic around Pangka and Taluo Islands with a core zone of 106.97 Ha, a limited utilization zone of 5,413.77 Ha, and other zones/port zones of 8.18 Ha (Fig 1). Based on the Minister Regulation of Marine and Fisheries No. 31/PERMEN-KP/2020 that conservation areas are divided into the categories of parks, reserves, and MAPs. The zoning of the conservation area is divided into a core zone, a limited utilization zone, and other zones according to the area's designation. The core zone is utilized for the absolute protection of conservation targets. Limited utilization zone for environmentally friendly fisheries and tourism. The other zones are zones outside the core zone and limited utilization zones.

2. Activities that may/cannot/conditionally be carried out in the core zone

The core zone based on the Minister Regulation of Marine and Fisheries No. 31/PERMEN-KP/2020 is a zone for the protection of aquatic resources, spawning areas, nursery areas, foraging areas, biota recovery, protection of aquatic biodiversity, and protection of cultural heritage (KKP, 2020). The core zone is prohibited from fishing to maintain fish stocks (Giakoumi *et al.*, 2017; Sala & Giakoumi, 2017), improve the quality of aquatic habitats (Rodwell *et al.*, 2003), and restore ecosystem function (Cheng *et al.*, 2019).

Based on the calculation of the area of the ecosystem/habitat conservation target (coral reefs) in the core zone the total ecosystem/habitat in the entire RAPs in Pasaman Barat Regency is 45.46%. The area of the core zone of RAPs in Pasaman Barat Regency has met the minimum requirements of 10%. The location of the core zone is divided into 2 areas, namely the core zone area I located on Pigago island which is located in the west and north of the island. The core zone of Area II is located west of Pangka island and south of Talua island. Administratively, the core zone is included in *Nagari* Air Bangis, Sungai Bremas sub-district. Results research by Suparno (2021) shows that the zoning plan for RAPs is divided into 3 zones, namely the core zone with an area of 249.31 Ha or 2.12% of the total conservation area. The sustainable fisheries zone is 11,460,32 ha or 97.31% of the total conservation area and the utilization zone is 67.00 ha or 0.57% of the total conservation area. The research of Krueck *et al* (2017) stated that the ideal protected coastal area is 20-30% of the total area of coastal waters. The core zone area in the MAPs is a minimum of 20-30% to maintain the sustainability of the biota stock that is the target of utilization.

Table 2. Activities that may/shouldn't be/conditionally carried out in the core zone

No	Space utilization	Utilization		
		Allowed	Allowed with conditions	Not allowed
1	People's sailing and small fishermen			√
2	Domestic regular passenger ship cruises			√
3	cruise			√
4	Traffic fishing vessels > 10 GT			√
5	Research		√	
6	Education			√
7	Fish catching			√
8	Fishing by fishermen living around conservation areas			√
9	Fish farming			√
10	Fish farming by small fish farmers			√
11	Aquatic tourism activities			√
12	Provision of aquatic nature tourism infrastructure			√
13	Establishment and/or placement of marine structures			√
14	Installation placement at sea			√
15	Utilization of sea water other than energy			√
16	Commercial photo, film and video production			√
17	Landing, take off, and seaplane			√

Source: Analysis results, 2021.

3. Activities that may/cannot/conditionally be carried out in the limited utilization zone

Based on Minister Regulation of Marine and Fisheries Regulation No. 31/PERMEN-KP/2020 that the limited utilization zone has social, economic, and cultural functions for the community. The limited utilization zone is used for capturing fisheries sub-zones, aquaculture sub-zones, and cultural tourism sub-zones (KKP, 2020). Activities in the limited utilization zone include small-scale fishing and small fisherman shipping (permitted), regular domestic passenger ship cruises (permitted), cruises for tourist passenger ships/cruise ships (permitted with conditions), fishing vessel traffic >10 GT (permitted), research activities (permitted with conditions), education activities (permitted with conditions), fishing (permitted with conditions), fishing by fishermen living around

conservation areas (permitted with conditions), fish farming (permitted with conditions), and fish farming by small fish cultivator (allowed with conditions). The limited utilization zone is used for marine nature tourism activities (permitted with conditions), construction and/or placement of marine structures (permitted with conditions), placement of installations at sea (permitted with conditions), utilization of seawater other than energy (permitted with conditions), manufacture commercial photos, films, and videos (conditionally permitted), and landing, take off, and taxiing seaplanes (conditionally permitted) (Table 3).

Table 3. Activities that may/cannot/conditionally carried out in the limited utilization zone

No	Space utilization	Utilization		
		Allowed	Allowed with conditions	Not allowed
1	People's sailing and small fishermen	√		
2	Domestic regular passenger ship cruises	√		
3	cruise		√	
4	Traffic fishing vessels > 10 GT	√		
5	Research		√	
6	Education		√	
7	Fish catching		√	
8	Fishing by fishermen living around conservation areas		√	
9	Fish farming		√	
10	Fish farming by small fish farmers		√	
11	Aquatic tourism activities		√	
12	Provision of aquatic nature tourism infrastructure		√	
13	Establishment and/or placement of marine structures		√	
14	Installation placement at sea		√	
15	Utilization of sea water other than energy		√	
16	Commercial photo, film and video production		√	
17	Landing, take off, and seaplane		√	

Source: Analysis results, 2021.

4. Activities that may/cannot/conditionally be carried out in the other zone/port zone

Based on Minister Regulation of Marine and Fisheries Regulation No. 31/PERMEN-KP/2020 that other zones have the function of rehabilitation zones, marine building and installation zones, port/mooring zones, ship traffic zones, religious zones/cultural sites, and zones according to the characteristics of the area (KKP, 2020). Activities in other zones include small-scale fishing and small fishing vessels (permitted), regular domestic passenger ship cruises (permitted), cruise passenger ships/cruise ships (permitted with conditions), fishing vessel traffic > 10 GT (permitted), research (permitted with conditions), education (permitted with conditions), fishing (not allowed), fishing by fishermen living around conservation areas (not allowed), fish farming (not allowed), and fish cultivation by small fish cultivators (not allowed). Other zones are used for marine nature tourism activities (not allowed), erection and/or placement of marine structures (permitted with conditions), placement of installations at sea (permitted with conditions), utilization of seawater other than energy (not allowed), making photos, films, and commercial videos (conditionally allowed), and landing, take off, and taxiing seaplanes (not allowed) (Table 4).

Table 4. Activities that may/cannot/conditionally be carried out in the other zone/port zone

No	Space utilization	Utilization		
		Allowed	Allowed with conditions	Not allowed
1	People's sailing and small fishermen	√		
2	Domestic regular passenger ship cruises	√		
3	cruise		√	
4	Traffic fishing vessels > 10 GT	√		
5	Research			
6	Education		√	
7	Fish catching			√
8	Fishing by fishermen living around conservation areas			√
9	Fish farming			√
10	Fish farming by small fish farmers			√
11	Aquatic tourism activities			√
12	Provision of aquatic nature tourism infrastructure			√
13	Establishment and/or placement of marine structures		√	
14	Installation placement at sea		√	
15	Utilization of sea water other than energy			√
16	Commercial photo, film and video production		√	
17	Landing, take off, and seaplane			√

Source: Analysis results, 2021.

CONCLUSIONS

The zoning plan RAPs in Pasaman Barat Regency is divided into 3 zones, namely the core zone, limited utilization zone, and other zone/port zone. 1) The core zone is used for fish habitat and fish population protection, education, and research; 2) The utilization zone is used for capturing fisheries, aquaculture, and tourism; and 3) Other zone/port zone are used for port activities to support tourism. Activities that are allowed in the core zone, limited utilization zone, and other zones are activities that support sustainability and pay attention to the carrying capacity and capacity of MAPs. Activities that are not allowed in the core zone, limited utilization zone, and other zones are activities that damage aquatic ecosystems and activities that do not pay attention to the carrying capacity and capacity of MAPs.

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