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FOR NEW NORMAL CONDITION
IN INDUSTRIAL ERA 4.0**

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Ecotourism suitability in the use zone of Teluk Bumbang Conservation Area

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Abstract. The Teluk Bumbang Marine Tourism Park has the potential for the development of capture fisheries, marine cultivation, and tourism. However, its ecotourism has not been managed optimally. The purpose of this study was to analyze the suitability of the use zone of Teluk Bumbang for marine ecotourism. The study used a survey method with exploration and explanation of the relationship between ecological and socio-economic factors. Primary data were collected through direct observation. Secondary data were collected from the previous studies. The results showed that there were four types of substrates, namely algae (33.10%), hard corals (29.48%) and soft corals (26.92%), and sand substrates (10%). The area suitable for ecotourism is 964.26 ha (15.28% of the total area), however, it is allocated for the core zone of 907.26 ha (14.03% of the total area). So that the area that can be used for diving and snorkeling tourism activities is 57.1 ha (0.95% of the total area). With a coral cover condition of 37.4%, the carrying capacity of the area for marine ecotourism is 21.32 ha with a tolerable number of tourist visits of 101 people/day for diving and snorkeling, while for surfing, sunbathing, swimming, and fishing tours of 689 people/day.

Keywords: Ecotourism; conservation area; use zone

1. Introduction

Marine Tourism Park namely TWP Teluk Bumbang is a conservation area of 6,310 hectares. TWP Teluk Bumbang was reserved for the 2016 anniversary through the Decree of the Governor of West Nusa Tenggara No. 523-505 with an area of 6,310 Ha, as the implementation of Law No. 23/2014 concerning Regional Government, with zoning arrangements including the core zone, utilization zone and rehabilitation zone [1]. Administratively, it includes the Lombok Tengah Regency, Nusa Tenggara Barat Province, directly adjacent to 9 villages, namely Tumpak Village, Prabu Village, Kuta Village,

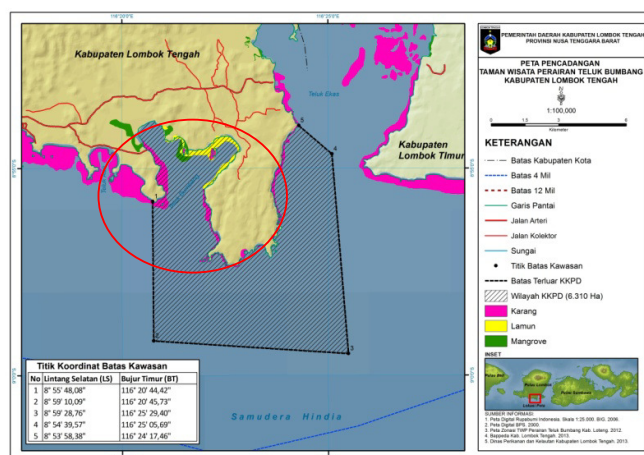
Sukadana Village and Mertak Village, Selong Belanak Village, Sengkol Village, Teruwai Village, and Mekar Sari Village [2].

The waters of the TWP Teluk Bumbang are directly adjacent to the Kuta Mandalika waters as an international destination area [3]. The development of the Mandalika area will have implications for the development of the TWP Teluk Bumbang, considering that these two areas are areas that have beautiful natural scenery, as well as the existence of major coastal ecosystems such as mangroves, seagrass and coral reefs as well as relatively good coral fish, as well as high water transparency and white sand, so this area is very suitable for the development of marine ecotourism [1]. The fundamental problem is that with a relatively large development potential, until now it has not been developed optimally [4]. Through the study of the suitability of ecotourism in the utilization zone, it is hoped that it can be used as a basis for the government in carrying out the management of the TWP Teluk Bumbang area which is oriented towards the development of regional ecosystem services (ecotourism development) based on the carrying capacity of the area so that its management can be carried out effectively.

2. Methodology

2.1. Location and Time

Data collection was carried out in Teluk Bumbang, Central Lombok, NTB Province (Figure 1). This location was chosen because it is a conservation area suitable for tourism development. The research was conducted for 6 months from April - September 2019.



Source: [5]

Figure 1. Location of data collection for ecotourism assessment on the Teluk Bumbang – NTB

2.2. Data Collection

Primary catch data collection (trip) is carried out for 6 months and sample data socio economic. Location socio economic data collection in Mertak village. Collecting data through structured interview techniques using a questionnaire, Focus Group Discussion (FGD), and public consultation.

2.3. Data Analysis

2.3.1. *Dive tourism development.* The suitability of the area for the development of diving tourism is analyzed using the requirements, weighting and scoring presented in Table 1.

Table 1. Suitability matrix for dive tourism

No.	Parameter	Weight	Class of Conformity and Score		
			S1 (Score 3)	S2 (Score 2)	S3 (Score 1)
1.	Live Coral Cover ^a (%)	3	75-100	50 - <75	< 50
2.	Coral Genus ^b	3	> 12	7 – 12	< 7
3.	Genus of Coral Fish ^c	2	> 50	26 – 50	< 26
4.	Water transparency ^d (%)	2	> 80	50 – 80	<50
5.	Current velocity ^e (m/sec)	2	< 0.1	> 0.1 – 0.5	> 0,5
6.	Coral reef depth ^f (m)	1	5 – 15	> 15 – 30 & 3 - < 5	< 3 & > 30

Source: a = [6]; b = [7]; c = [8]; d = [9]; e = [10]; f = [11]

2.3.2. *Snorkeling tourism development.* The suitability of land for the snorkeling tourism area was analyzed using the requirements, weighting and scoring which are presented in Table 2.

Table 2. Suitability matrix for snorkeling tourism

No.	Parameter	Weight	Class of Conformity and Score		
			S1 (SKOR 3)	S2 (SKOR 2)	S3 (SKOR 1)
1.	Live Coral Cover (%)	3	> 67	34 – 67	< 34
2.	Coral Genus	3	> 10	6 – 10	< 6
3.	Water transparency (%)	2	> 80	50 – 80	< 50
4.	Genus of Coral Fish	2	> 50	26 – 50	< 26
5.	Current velocity (m/sec)	2	< 0.1	> 0.1 – 0.5	> 0.5
6.	Coral reef depth (m)	1	1 – 3	> 3 – 5	> 5 & < 1
7.	Flat reef width (m)	1	> 100	20-100	< 20

Source : a = [6]; b = [12]; c = [9]; d = [10]; e = [13]

2.3.3. *Tourism carrying capacity analysis.* The estimation of the carrying capacity of marine tourism follows the provisions of Government Regulation No. 18/1994 concerning the exploitation of natural tourism in the national park use zone and natural tourism park which is 10% of the area of the utilization zone. Based on these considerations, formulations to calculate the carrying capacity of areas for marine tourism activities in conservation areas, namely [5]:

$$DDW = 0.1 \left[K \frac{LpWt}{LtWp} \right]$$

Where :

DDW = Carrying capacity for ecotourism

K = Maximum tourists per unit area

Lp = area or length of area that can be utilized

Lt = Unit area for a certain category

Wt = Time provided by the area for tourist activities per day

Wp = Time spent by visitors for any particular activity

The maximum tourist value (K) per unit area (Lt) for each marine tourism category is presented in Table 3.

Table 3. Potensi maksimum wisatawan per unit area per kategori wisata

Type of Activity	K (people)	Area Unit (Lt)	Information
Diving Tourism	2	1000 m ²	Every 2 people in 100 m x 10 m
Snorkling Tourism	1	300 m ²	Every people in 100 m x 3 m

Source: [12];[11]

3. Results

3.1. Potential Resource

There are 11 types of seagrass in the Teluk Bumbang TWP area, including: *Enhalus acoroides*, *Thalassia hemprichii*, *Cymodocea rotundata*, *Cymodocea serulata*, *Halodule uninervis*, *Halodule pinifolia*, *Syringodium isoetifolium*, *Halophila Ovalis*, *Halophila minor*, *Halophilaum Spinulosa* and *Thalassodendron*. The dominant species on the coast of Central Lombok waters are *Enhalus acoroides*, *Cymodocea* sp., and *Halodule* sp. [14].

The coastal waters of Central Lombok with a coastline of 85 km, had an area of 325.79 Ha of mangrove forest in 1999 and decreased to 202.68 Ha in 2006, concentrated in TWP Teluk Bumbang (Pujut distric) & Teluk Awang (Praya Timur distric) [15]. Types of mangroves found in Central Lombok waters include *Rhizophora mucronata*, *Rhizophora apiculata*, *Rhizophora Stylosa*, *Avicennia affinalis*, *Avicennia alba*, *Sonneratia griffithii*, *Sonneratia alba*. Rarely found mangroves: *Bruguiera gymorhiza*, *Bruguiera sexangula*, *Ceriops decandra*, *Ceriops tagal*, *Excoecaria* sp., *Xylocarpus mollucensis*, *Xylocarpus granatum*, *Aegiceras corniculatum*, *Aegiceras annulata* and *Lumnitzera recemosa*.

The waters of Central Lombok are dominantly covered by three types of substrates, namely algae (33.10%), hard corals (29.48%) and soft corals with 26.92%. Other types of substrates such as sand are about 10%. The genera of hard corals found in Central Lombok waters are quite diverse. There are 27 genera of hard corals found in all observation locations. The highest number of hard coral genera was found in Merta location, namely 17 genera. The lowest number of hard coral genera was found in Bugulang, namely 6 genera. The hard coral genera that dominate the waters are corals from the genus *Acropora* (27%), *Porites* (25%), and *Montipora* (13%), while the other genera range from less than 10% respectively [1].

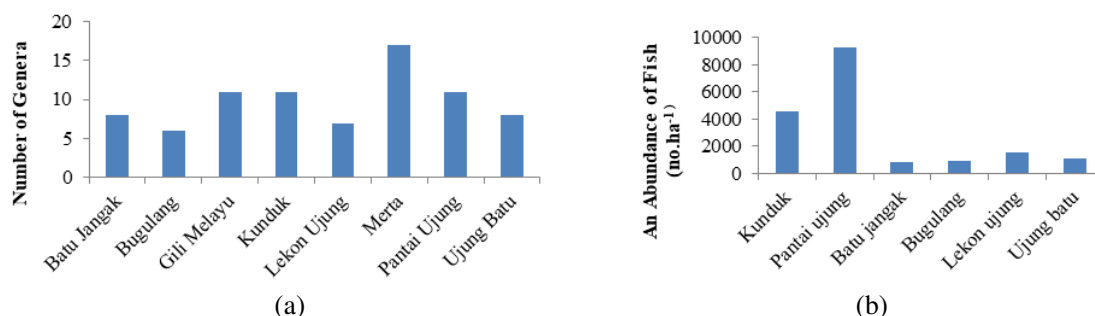


Figure 2. Composition of hard coral genera (a) and reef fish abundance (b) at Teluk Bumbang

Coral fish is a community that follows coral reef habitats, most of the reef fish are ornamental fish and consumption fish that have high economic value. The potential of reef fish in Central Lombok Regency is quite good with the number of species (species) ranging from 142 to 508 species. The highest abundance of fish is Ujung Beach (9,313,33no.ha-1) and Kunduk (4,573.33 no.ha-1), while other locations have low abundance <1,000 no.ha-1 [1].

3.2. Zoning of Areas

There is the zoning of the TWP Teluk Bumbang area [16]:

1. Core Zone

The core zone is a water conservation area that has good habitat conditions with the following criteria:

- a. Is a fish nursery area
- b. Having diversity of aquatic biota and their ecosystems
- c. Represent the existence of habitats and associated biota
- d. Representing important ecosystems
- e. Has sufficient area to ensure the survival of various types of biota to support fisheries and tourism activities and ensure the natural bio-ecological processes.

The core zone in the TWP Teluk Bumbang is at the end of the Batu Jangak area to Lekon Ujung with an area of 907.26 ha or 14.38% of the total area [14]. The ecological potential of the core zone of the TWP Teluk Bumbang (Batu Jangak - Lekon Ujung) is in the medium category with a low category of utilization. Ecological conditions used as an indicator for site selection such as the percentage of medium hard coral cover, the number of moderate coral species, the number of moderate coral genera, abundance and biomass of low category coral reef fish. The level of utilization can be seen from the indicators of tourism utilization activities, namely snorkling and surfing activities.

The designation of the Core Zone of the TWP Teluk Bumbang is an area that is only intended for absolute protection of habitat and fish populations, as well as research and education.

- a. Absolute protection of fish habitats and populations includes: protection of ecological processes that support the survival of a species or fish resource and its ecosystem; guarding, supervising and preventing activities that may result in changes to the integrity of the area's potential and changes in the function of the area.
- b. Research activities that are allowed are basic research using naturalistic methods for the purpose of collecting basic data on biological and ecological conditions; applied research uses survey methods for the purpose of monitoring biological and ecological conditions.
- c. Educational activities are intended for activities without taking material directly from nature.

2. Sustainable Fishing Zone

The Sustainable Fisheries Zone is part of a marine conservation area which due to its location, condition and potential is able to support the interests of the conservation of the core and utilization zones. The criteria for the Sustainable Fisheries Zone include:

- a. Has conservation value, but can tolerate the use of environmentally friendly cultivation and fishing using environmentally friendly tools and methods;
- b. Has the characteristics of an ecosystem that allows for a variety of environmentally friendly uses and supports sustainable fisheries;
- c. Has relatively good water conditions to support multifunctional activities without damaging the original ecosystem;

- d. Has sufficient area to guarantee environmentally friendly cultivation of fisheries, sustainable capture fisheries, and community socio-economic and cultural activities; and
- e. Has diversity of species and representation of economic value marine biota.

The sustainable fisheries zone covering an area of 4,543.2 ha (72.00% of the total area) is located on the outer boundary of the Teluk Bumbang TWP. The sustainable fisheries zone is the zone with the largest area among the other zones. The ecological potential in the sustainable fisheries zone is in the high category with a high level of utilization. The ecological conditions can be seen from the indicators or parameters used for site selection such as the percentage of medium hard coral cover, medium fish abundance and biomass, moderate coral resistance and recruitment, medium hard coral species and medium reef fish. The level of utilization can be seen from indicators or parameters of utilization activities. tourism, namely diving, snorkeling, surfing, sunbathing and fishing areas.

Designation of sustainable fisheries zones in aquatic conservation areas is designated for the protection of habitat and fish populations, fishing using environmentally friendly tools and methods, environmentally friendly cultivation, tourism and recreation, research and development, and education.

The sustainable fisheries zone covers the entire area which is not included in the core zone, the use zone and the protection zone. With the consideration of the utilization of fishery potential by the community around the area. This sustainable fishery zone is based on the consideration that the waters are a place for the community around the Teluk Bumbang TWP area to carry out fishing activities. The forms of use allowed in this zone are cultivation fisheries management (Teluk Bumbang), sustainable capture fisheries and community socio-cultural activities (Bau Nyale festival), so that with these considerations it can be assumed that the sustainable fisheries zone has sufficient area to support fisheries management efforts. environmentally friendly cultivation, sustainable capture fisheries activities, and can support the socio-cultural activities of the surrounding community.

3. Use Zone

The Use Zone is a part of a water conservation area where the location, condition and natural potential are prioritized for the benefit of marine tourism and/or environmental conditions/services as well as for research and education activities. The utilization zone has the following criteria:

- a. Having natural tourism attraction in the form of aquatic biota along with beautiful and unique aquatic ecosystems;
- b. Has a sufficient area to ensure the preservation of the types and attractions of marine tourism and recreation;
- c. Has the character of the object of research and education that supports conservation interests;
- d. Has relatively good water conditions for various utilization activities without damaging the original ecosystem;

The utilization zone of the TWP Teluk Bumbang marine conservation area with a total area of 571,055 ha (9.05% of the total area). The ecological potential in the use zone is included in the medium category with high category utilization rates. Ecological conditions can be seen from the indicators or parameters used for site selection such as the percentage of medium hard coral cover, high abundance and biomass of fish, high recruitment, high resistant coral species. The level of utilization can be seen from indicators or parameters of tourism utilization activities, namely diving, snorkeling, sunbathing, and surfing and fishing areas.

Allocation of Use Zones in marine conservation areas is for the protection and preservation of habitat and fish populations, tourism and recreation, research and development, education. The Use

Zone is also designated for the protection and preservation of habitat and fish populations; tourism and recreation; research and development; education; local wisdom/customs and shipping lanes.

Based on the assessment conducted, the TWP Teluk Bumbang is suitable for the development of:

- a. Permitted protection and preservation of habitat and fish populations includes protection of ecological processes that support the survival of a species or living natural resource and its ecosystem; safeguarding and preventing activities that may result in changes to the integrity of the area's potential and changes in the function of the area; management of types of fish resources and their habitats in order to produce a balance between population and habitat carrying capacity; protection of the flow of migration of aquatic biota; ecosystem restoration and rehabilitation.
 - b. Tourism activities include: beach recreation, diving because of its underwater beauty; Snorkeling is an activity to enjoy underwater scenery, such as stretches of coral reefs, seagrass beds, ornamental fish and coral reef fish as well as various other marine life such as the *Mollusca* group (shellfish and snails), *Coelenterata* (jellyfish) and *Echinodermata* (starfish). *sea urchins*, *sea cucumbers* and *sea lilies*). Snorkeling activities can be done in relatively shallow waters so that the underwater scenery can be enjoyed clearly. Snorkeling activities are generally carried out in certain areas with beautiful and safe categories for visitors. Other recreation is the glass bottom boat recreation; special interest tourism; tourist boats; surface water sports such as swimming, surfing, rowing/kayak and other types of water sports; research tours to gain knowledge related to certain fields of science such as observing the life of aquatic biota (turtles, fish and others), life formations of coral reefs, mangroves, birds and others; as well as cultural tourism, tracking and making photos, videos and films.
 - c. Permitted research and development activities include basic research for use and conservation purposes, applied research for use and conservation purposes, and development for conservation purposes.
 - d. Educational activities include maintenance and enhancement of biodiversity; protection of local community resources; economic development based on marine ecotourism; maintenance of ecological processes and life support systems; promotion of sustainable use of resources; promotion of governance efforts for environmental protection of Marine Tourism Parks.
4. Other Zones

Another zone for the conservation area of the TWP Teluk Bumbang waters is a sub-zone for rehabilitation. The rehabilitation zone is another zone designated for the rehabilitation of coral reef ecosystems and seagrass beds, with a total area of 281,426 ha (4.46% of the total area), located in Mertak Bugulang [14]. The ecological potential in the rehabilitation zone is included in the medium category with high category utilization rates. The ecological conditions can be seen from the indicators or parameters used for site selection such as the number of genera and species of hard corals high in Mertak and low in Bugulang, abundance and biomass of moderate fish, moderate recruitment. The high level of utilization can be seen from the indicators or parameters of tourism utilization activities, namely diving, snorkeling, and boat crossing.

Other Zones in the marine conservation area in the TWP Teluk Bumbang are designated for rehabilitation activities. The Rehabilitation Zone is designated for the protection of habitats, fish populations, coral reefs and seagrass beds; tourism and recreation; research and development; education; and restoration or rehabilitation activities, local wisdom/customs, and shipping lanes.

4. Discussion

Diving tourism is a form of exploiting underwater natural resources and the dynamics of sea water for visitor satisfaction. The attraction of diving tourism activities is the coral reefs that are still good and

the presence of various types of fish around the coral reefs. The suitability of waters for marine tourism is based on consideration of suitability parameters [12] such as: water transparency, types of coral reefs (number of species), types of reef fish (number of species), current velocity, water depth, and bottom substrate.

The results of the analysis show that for the development of diving and snorkeling tourism, it is obtained a space area with 3 (three) suitability classes covering the appropriate class covering an area of 27.57 hectares, according to conditionally measuring 18.67 hectares and not suitable for 10.76 hectares. Space with the conditionally appropriate category is allocated for the rehabilitation zone due to coral damage due to the use of the area using bombs, so that coral cover becomes relatively small (<30%). Of the six suitability parameters, only 2 ecological parameters meet the suitability requirements, namely brightness and water depth, while coral reef cover, coral genus and life form types do not meet the requirements. The conditionally appropriate category can be upgraded to be appropriate if rehabilitation efforts are made so that the level can be raised to be suitable for the purpose of diving and snorkeling tourism.

The location is suitable for diving activities in the waters of TWP Teluk Bumbang with good coral conditions, namely live coral cover of around 37%, however recovery is necessary so that the coral cover is getting better, making it suitable for diving locations. This condition is in accordance with what was stated by [6], that one of the reasons for tourists to do diving tourism is the interest in the uniqueness of the underwater in particular, such as geological formations and underwater life.

There are eight observation points of the TWP Teluk Bumbang [1] which were analyzed for their suitability as a diving tourism location, there are four points with suitable status, two points with conditionally compliant status, and two points with unsuitable status. Observation points with suitable status are dominated by coral reef naturalness, coral cover and water quality. The brightness of the waters is very supportive for diving activities, reaching 87% [1]. Fish species found around coral reefs consist of indicator fish such as the Chaetodontidae family, target fish species such as the Siganidae family, and major fish species such as the Pomacentridae family. Flow velocity 13 - 40 cm/sec. The water depth at the location ranges from 5-20 m although there are several locations that have a depth of more than 20 m based on the existing bathimetric maps. Such water conditions are very suitable for the development of marine tourism.

Besides the brightness of the waters, the speed of the currents also greatly determines diving tourism activities and for the ecology of coral reefs. The movement of currents affects the community structure and distribution of coral species in an area [17]. Overall, the condition of the coral reefs in the exposed area was relatively low. Strong currents correlate with increased displacement of coral fragments which can disrupt the coral recovery process. Besides that, the current speed is a factor related to the safety of divers. One indicator of the health of a waters is the presence of coral reefs with a relatively high percentage of coral cover. The category for measuring the percentage of coral cover that is often used refers to the concept of [18] with the category 0 - 24.9%, it is classified as bad, 25 - 49.9% is moderate, 50 - 74.9% is good, and 75 - 100% is very good.

Parameters related to coral reef objects have the highest weight because these factors are the main attraction of diving tourism activities, while other requirements play a role in supporting the health of the coral reef ecosystem. The results of the suitability of diving tours are very useful for determining dive destinations, so that tour guides and tourists can plan their tours appropriately [19].

4.1. Supporting Capacity for Ecotourism Development Area

The ecological carrying capacity in this study is the maximum number of visitors the area can tolerate for a certain time without causing degradation of tourism resources [20]. TWP Teluk Bumbang is a

conservation area, so tourism activities are not mass tourism, visitor space is very limited so that the determination of the carrying capacity of the area considers environmental sustainability aspects.

The results of the analysis show that the suitable area for diving tourism is 964.26 ha. However, it is allocated for the core zone covering an area of 907.26 ha, so the area that can be done for the development of diving tourism is 57.1 hectares. Referring to Government Regulation No. 18/1994 on ecotourism exploitation in national park use zones and natural tourism parks, the area permitted to be managed is 10% of the area of the utilization zone, so the area that can be used for diving tourism is 5.7 hectares. [12] suggests that diving tourism must consider the condition of the coral community, because the percent of coral cover describes the condition and carrying capacity of the coral. If the condition of the coral community has a coral cover of 37%, then the area of diving that can be utilized is 37% of the area of coral reef. Thus, the carrying capacity of the coral for diving tourism in the TWP Teluk Bumbang is 2.11 hectares, so that the number of diving tourist visits that can be tolerated based on the calculation of the area carrying capacity approach is 42 people/day. For snorkeling tourism, the land suitable for its development is 54.89 (in the rehabilitation zone). With a coral cover of less than 27%, the area of coral reef snorkeling that can be utilized is 1.48 ha, so the number of visits that can be supported by coral reefs is 60 people/day. Some of the values used in the area's carrying capacity study are adjusted to the conditions and perceptions of tourism actors at the research location, for example the average time needed for diving and snorkeling tourism activities.

Table 5. Value of ecotourism supporting capacity in the TWP Teluk Bumbang

No.	Type of Marine Ecotourism Category	Area Carrying Capacity Value (person/day)	Current utilization (person/day)	Information
1	Diving	42	20 - 25	Under carrying capacity
2	Snorkeling	59	20 - 25	Under carrying capacity

Based on current utilization conditions, marine tourism activities during peak season are still below the ecological carrying capacity, namely the average number of visitors is 22 people per day so that the quantity can still be increased. [7] stated that the carrying capacity of diving tourism activities can still be increased depending on the knowledge of divers in interacting with coral reefs. The higher the diving knowledge and experience a diver has, the lower the level of damage to coral reefs and if followed by good management can increase the carrying capacity of diving tourism. [21] recommend efforts to manage diving tourism in minimizing coral reef damage, including: (1) limiting the number of divers per location per year, (2) needing a guide for all dives, (3) transfer of skills for beginner divers to start from damage-prone coral reef areas to sandy areas, (4) diverting diving pressure from natural coral reef areas to artificial reefs, and (5) developing environmental education for divers through skills courses on procedures and orders carried out together during activities in underwater.

4.2. Social Analysis

The study of the social carrying capacity for the development of coral fisheries in this study is the total labor (person) or Working People Day/year that can be absorbed actually from the development of coral fisheries which is influenced by the number of effective working hours per day, actual labor requirements per trip, number of trips. per month or per year. It is assumed that there is a maximum number of workers who are absorbed by the coral fishery activities in the conservation area, so that the fishing community will feel the economic benefits in managing the conservation area [22].

The results showed 77.33% (116 people) of fishermen thought that the management of the conservation area with zoning arrangements in it would have a positive impact in the future, because

the zoning system (especially the allocation of the core zone) will provide space for fish spawning sites, so that it will impact on greater catch yields in the future. The greater the number of catches will have an impact on the greater the absorption of labor so that the welfare of the community will increase [23]. Meanwhile 26.67% (34 people) of fishermen disagreed with the determination of the core zone in the management of the TWP Teluk Bumbang conservation area. They think that the closure of some of the catchment areas has resulted in reduced fishing yields, especially fishermen, especially archers, therefore it is the duty of the local government to conduct socialization and guidance to communities around the conservation area, so that conflicts between fishermen and fishermen and government conflicts can be resolved.

The study of social carrying capacity in the development of ecotourism in the TWP Teluk Bumbang area was analyzed by taking into account the presence of labor and workload. The population in question is a group of productive age or is referred to as a workforce. Thus, the social support capacity in the development of ecotourism is the number of business units and manpower that can be involved in the utilization of the conservation area as a tourist destination. With the development of the tourism sector, it will have a positive effect on opportunities and jobs for local communities. One of the positive impacts of tourism development is not only real labor absorption, but the impact of other derivative income can be felt by the community such as handicraft businesses, guides, and so on.

The number of workers in ecotourism development is influenced by the number of tourist visits. The labor required for 1 tourist is the assumption of 3 people, namely for those who accompany when diving, boat transportation to the location and the rest is the use of labor services in various activities. So that if 1 tourist can take advantage of a workforce of 3 Working People Day. With a carrying capacity of 101 tourists per day, the number of workers that can be absorbed is 303 Working People Day in one visit. So that the number of workers absorbed in a year is 36,360 Working People Day per year. Therefore, the alternative development of ecotourism can be used as a potential source of livelihood for the community

5. Conclusion

Activities that are recommended to be carried out in the waters of Teluk Bumbang include:

1. Activities to protect habitats, fish populations and coral reefs related to the protection of ecological processes that support the survival of biota and their ecosystems, safeguarding, preventing and/or limiting activities that may result in changes to the integrity and function of the area.
2. Tourism activities that can be carried out include beach recreation, diving, snorkeling and enjoying the underwater beauty using a glass boat, special interest tourism such as tourism boats, water sports such as swimming, canoeing/rowing, research tours and knowledge such as observing the life of aquatic biota (turtles, fish and others), coral reef life formations, mangrove tracking, bird watching with a tolerable number of tourist visits based on the calculation of the area's carrying capacity approach is 42 people/day for diving, while the number of tourists who snorkel is 60 people/day.
3. Research activities in the form of basic research for the benefit of rehabilitation and conservation; applied research for the benefit of rehabilitation and conservation; and development for conservation purposes, while educational activities are related to the development of biological, ecological, socio-economic and cultural insights as well as tourism business management.
4. Activities to restore and rehabilitate coral reefs, seagrass beds and other ecosystems, using environmentally friendly methods.
5. Local wisdom activities of the Teluk Bumbang TWP community such as the smell festival or other local wisdom activities.

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