

Conflicting Or Synergistic Interaction Between Tourism And Marine Protected Areas In Lembongan Island

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Abstract. Lembongan Island designted as marine protected areas with the Decree of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number 24 concerning the Nusa Penida Marine Protected Area of Klungkung Regency in the Province of Bali in 2014. The conservation area is utilized for marine tourism, sustainable fishery, environmentally-friendly aquaculture, social economics research and development, and other sustainable marine resources utilization. Lembongan Island has coral reefs, mangrove forests, white sand, and beaches are a major attraction for tourists. An increase in the number of tourist visits has a direct or indirect impact on coral reef ecosystems. This study aims to determine the relationship between tourism activities and coral reef ecosystems. the study was conducted on Lembongan Island from 2015 to 2018. The study used the manta tow survey method, line itercept transect, questionnaires, interviews and analyzed using SWOT. Research shows that tourism activities have the effect of reducing the quantity and quality of coral reef ecosystems. Co-management of coral reef management by involving all stakeholders can minimize the decline in the quantity and quality of coral reef ecosystems.

1. Introduction

The coral reef ecosystem of Lembongan Island has a very important value in supporting the joints of community life both directly and indirectly. Utilization of coral reef ecosystems to support community life consists of efforts to: 1) capture fisheries; 2) aquaculture; 3) transportation; and 4) tourism activities.

Community activities on Lembongan Island related to coral reef ecosystems have 2 different phases, namely: 1) before 2000, where community activities were dominated by fishing and seaweed farming activities introduced since the 1980s; and 2) After 2000, community activities were dominated by tourism activities, tourism accommodation and transportation. Management of coral reefs in these two phases has not yet received optimal treatment.

Lembongan Island designted as marine protected areas with the Decree of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number 24 concerning the Nusa Penida Marine Protected Area of Klungkung Regency in the Province of Bali in 2014. The conservation area is utilized for marine tourism, sustainable fishery, environmentally-friendly aquaculture, social economics research and development, and other sustainable marine resources utilization. MPAs are a tool meant to protect and conserve marine biodiversity, along with critically important. No-take zones within MPAs offer habitat protection and allow fish populations to mature and reach adulthood,



thereby enhancing reproduction and spillover of fish into adjoining areas where fishing is allowed. This can result in increased fish catch for consumption and sale [1] and positive association of proximity to MPAs with certain aspects of children's diet [2]. In addition, MPAs can also increase revenue for local communities through tourism activities [3].

The ecosystem services approach extends conservation objectives beyond intrinsic values to cover social, economic, and cultural values of nature [4] [5]. It recognizes the wide range of benefits that protected areas provide [6], and the importance of recognising the multiple and often conflicting interests of social actors in their management [7]. It can also reflect the tension between users at different scales, such as local users (i.e. farmers) and users outside the boundaries (i.e. tourist population) of protected areas [8]. Moreover, it can uncover existing and potential social conflicts between management and use, especially when conservation policies are applied without due consideration of the interests and needs of local communities [9]. Finally, ecosystem services might constitute a boundary concept [10] that facilitates the engagement of different stakeholder groups in the management of the protected area [11] [12].

The activity of utilizing coral reef ecosystems as tourism objects causes coral damage in this area. The annual coral health report by the Coral Triangle Center in 2017, shows the damage to coral reefs due to tourism activities. The placement of pontoon anchors results in coral damage due to being crushed by concrete anchors installed by the manager. Sea walker activities managed by pontoons also damage coral reef clusters because they are leveled as a pathway for this activity. Damage to corals on dived reefs often occurs as a result of skeletal breakage, particularly in branching species [13] [14]. Tissue abrasion can also result from diver contact [15], and a recent study reported a higher incidence of coral disease in areas heavily used for recreational diving [16]. Despite providing economic activity for many developing coastal communities, the potential role of dive impacts in contributing to coral reef damage is a concern at heavily dived locations [17].

The euphoria of the community in developing tourism activities has not been based on sustainable management of coral reefs. Government regulations in the form of Regional Regulations or Village Regulations to date have never been issued in the framework of the management of the Lembongan Island area to accommodate all activities so that they can run continuously. Some research shows that many MPAs fail to achieve environmental objectives due to social factors, stakeholder conflict, and ineffective implementation [18] [19] [20] [21].

The large backlog of MPAs in relation to TPAs is due to several possible reasons, such as (i) unclear marine jurisdiction, (ii) marine conservation policies and programs developed later than terrestrial, (iii) higher costs for marine conservation management, (iv) conflicts in marine conservation, especially the fishery, and (v) the general public's historically weak awareness of the status of the marine environment [22]

The high pressure on coral reef ecosystems in Lembongan Island requires a concerted effort by each stakeholder to preserve the coral reef ecosystem. This effort must be based on a management strategy based on the carrying capacity of coral reef ecosystems. So that the ecosystem management of coral reefs can support every aspect of life that utilizes the potential of coral reefs. This issue requires research on the synergy relationship between tourism activities and the sustainability of marine protected area.

2. Research Methods

The study used the manta tow survey method, line intercept transect, questionnaires, interviews and analyzed using SWOT.

Manta Tow Survey data are analyzed and used a basis general condition of coral reefs mapping. This map will be used as the basis for determining the observation station of coral reefs with Line Intercept Transect. Determination of research stations with randomly conducted with safety and represents the East, North, and West of Lembongan Island.

Line Intercept Transect method carried out to assess the benthic community based on the characteristics of life forms, especially the morphology of the coral reef community, so it can be known diversity of coral species in the area. Observations with Line Intercept Transect done by SCUBA diving at a depth of 3 m and 10 m [22]. Measurements were taken at two depths is assuming the two depths is considered to represent the condition of coral reefs because it usually grows well and a high diversity of coral species were also obtained at these depths.

3. Result and Discussion

3.1. Coral reef condition

Observations with manta tow survey of November 2015 and November 2016 shows the coral reefs condition of Lembongan Island in medium to excellent category. The percentage of live coral cover at a depth of 3 meters ranging from 43.61 - 78.8% and depth of 10 meters between 43.61 - 78.8%.

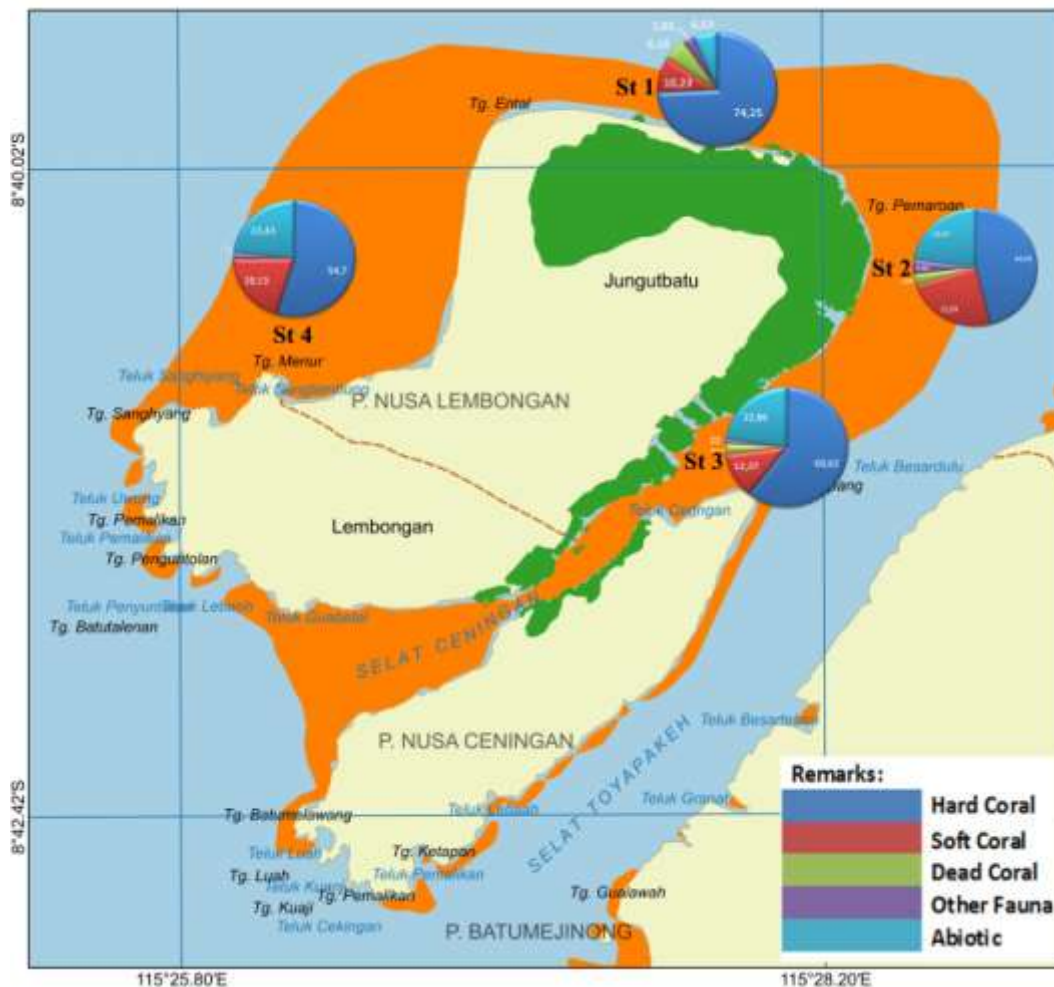


Fig 1. Coral Covering in Lembongan Island

Reef formation in Lembongan Island can be categorized as fringing reefs constituting the ones living along the beach and surrounding an island, in Figure 1. Conclusion research shows the coral reefs condition of Lembongan Island in medium to excellent category. Recruitment of coral attached

to the substrate consists of *Acropora millepora*, *A. palifera*, *A. tenuis*, *Fungia fungites*, *Montipora digitata*, *Pocillipora damicornis*, *Porites sp*, *Seriatophora hystrix*, and *Stylophora pistillata*. The numbers of individual coral in 2015 are 63 individuals and in 2016 are 50 individuals [23]

3.2. *Conflicting in coral reef ecosystem*

Research shows that human activities, especially tourism on Lembongan Island, should be of particular concern in the management of areas based on the carrying capacity of coral reef ecosystems. The high achievement of people's desires in the management of marine tourism, is not accompanied by adequate feasibility studies. This resulted in damage to coral reefs due to tourism activities as shown in Figure 2 which is the documentation of the 2017 Lembongan Marine Association.

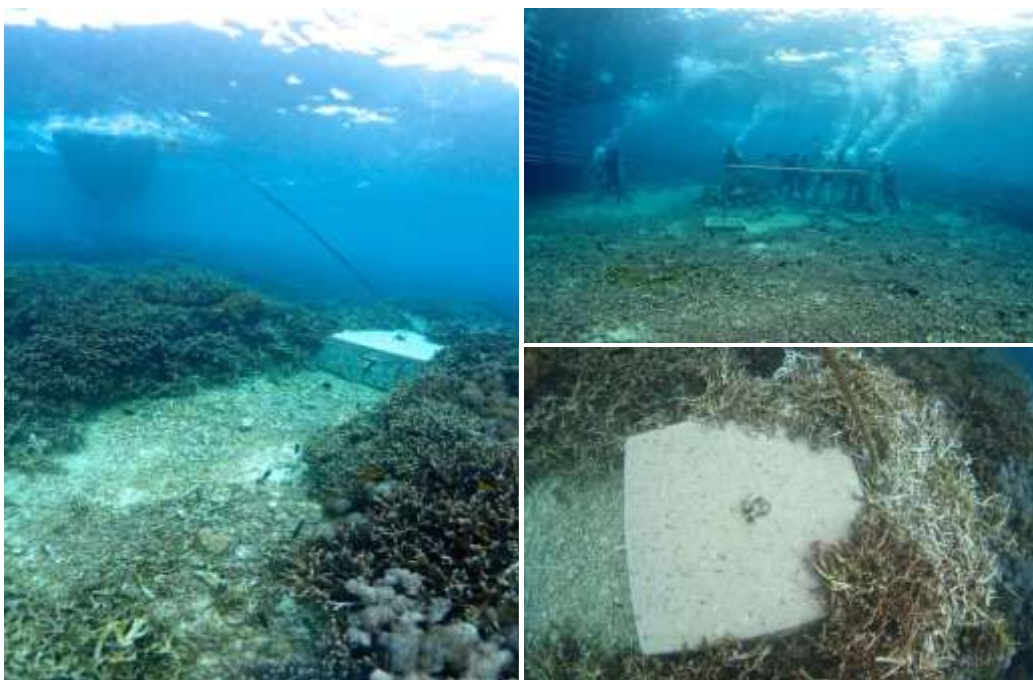


Fig 2. Coral Reef Damage by Tourism Activity.
(Source CTC/Mongabay Indonesia, 2017)

The problem that arises is the conflict with the use of space for activities, so there are some pontoons operating on a stretch of coral reef. This results in damage to the expanse of coral reefs due to ballast for the pontoon anchor to shift due to the current. Human activities that are too close to coral ecosystems also cause damage to coral ecosystems both directly, such as being trampled by corals, broken corals by fins, and littered garbage.

3.3. *Synergistic Interaction between tourism and marine protected areas*

The SWOT analysis produces four alternative strategies, which are: 1) Strength Opportunity (SO), 2) Strengths Threats (ST), 3) Weaknesses Opportunity (WO) and 4) Weaknesses Threats (WT).

Strength Opportunity is a strategy to use the strength that is owned as a potential to get the maximum opportunity. Strengths possessed: 1) Carrying capacity of the coral reef environment; 2) Community participation and local wisdom in area management; 3) Customary villages as pillars of community social life; 4) The role of the government in managing the area; and 5) Supporting facilities, facilities and infrastructure. This power can be used to improve the community's economy and sustainable management of coral reef areas.

Alternative strategies that can be done are 1) Management of the Lembongan Island coral reef area by co-management; 2) Enhancing training on coral reef management to the community; and 3) environmentally friendly tourism activities. Co-management of the area will provide opportunities for the community to manage economic business units. An eco-friendly tourism business can be an alternative that can be developed by considering: supporting facilities, facilities and infrastructure

Strengths Threats Strategy is a strategy of using strength in overcoming threats. Identified threats in the coral reef area of Lembongan Island are: 1) Excessive use of coral reef areas; 2) Tourism activities that are not environmentally friendly; 3) Unhealthy investment activities; and 4) Seizure of coastal areas between stakeholders. Alternative strategies to overcome threats are: 1) Arranging the sustainable use of coral reefs; and 2) Law enforcement / rules regarding water conservation areas.

Zoning revision is one alternative in the utilization arrangement to accommodate the improvement of the community's economy. The zoning map as a joint commitment is expected to be the basis of legal certainty for the community to carry out activities in the coral reef area. Law enforcement must be done in efforts to utilize coral reef areas. This requires the active participation of all stakeholders in monitoring and supervision, so violations can be prevented as early as possible. Assessment reveals good regional support for these MPA initiatives and strong evidence of capacity- and knowledge-building through meaningful stakeholder engagement; however, significant challenges, such as increasing capacity to combat food and income insecurity, remain to ensure and sustain achievements in the region [24]

Weaknesses Opportunity is a strategy to take advantage of opportunities by minimizing existing weaknesses. Weaknesses identified in the management of coral reefs on Lembongan Island are: 1) Application of zoning maps that have not been optimal; 2) Community perception and understanding of coral reefs; 3) Community euphoria in developing economic activities; 4) overlapping management tasks and authorities; and 5) Law enforcement that has not been maximized.

Alternative strategies that can be done are: 1) Improving the marine protected area sustainability and management system according to developments; and 2) Increased research in coral reef areas. Improvement of institutional and management systems is emphasized on the management tools and management capacity. The rapid development of development in Lembongan Island requires managers who are reliable in managing existing management tools. Ongoing research will be a good basis for improving the institutional and management system of Lembongan Island. Improving governance based on research databases is expected to be able to predict and anticipate problems from weaknesses. Scientific knowledge was acknowledged by workshop participants as standing out amongst the main aims of the protected areas, as contributions to research and scientific knowledge are a key stated purpose of National Parks [25]

Weaknesses Threats Strategy is a strategy based on efforts to minimize weaknesses and avoid challenges. Alternative strategies that can be done are: 1) Making clear and non-overlapping legal policies; and 2) Increasing the community's understanding of coral reefs.

Legal policy making will guarantee: 1) Sustainability of the carrying capacity of coral reef ecosystems optimally; 2) Legal certainty for people who wish to exploit the potential of coral reef ecosystems; and 3) Opening opportunities for all stakeholders to play an active role in the management of coral reef ecosystems. Local legal policy making is an alternative to increasing people's understanding of coral reefs. Incorporating management points on coral reef ecosystems in Awig-Awig and / or Perarem Desa will strengthen the basis of local wisdom.

Based on nine alternative policy priorities, there are 7 coral reef management policy strategies for Lembongan Island, including: 1) Making and enforcing coral reef management; 2) Improve the institutional system and management of the MPA; 3) Co-management of coral reef areas; 4) Regulating sustainable use of coral reef areas; 5) Increasing community understanding of coral reefs; 6) Increased research in coral reef areas; and 7) Training in management of coral reef areas to the community. The further development of the underwater marine technology facilitates opportunities to increase information and communication on the marine environment its problems and values. This will in turn increase the public awareness of marine and maritime issues, as well as the possibility of NGOs

to influence and put pressure on countries' policies and practices for marine and maritime management [26] [27]

The recommended coordination rules in the institutional co-management of the Lembongan Island coral reef ecosystem are: 1) Lokal peoples have the authority to: i) utilize coral reef ecosystems to improve the people's economy; ii) supervise and manage the coral reef ecosystem of Lembongan Island; 2) Nusa Penida MPA, has the authority: i) management of the Lembongan Island coral reef ecosystem as part of the Nusa Penida MPA; ii) the composer of the Nusa Penida MPA management program in a sustainable and sustainable way; and 3) Local Government, has authority: regulates administration, spatial planning, and law enforcement relating to the exploration, conservation, and management of the marine health of Lembongan Island. Conservation plans should make greater recognition of those ecosystem services considered critically relevant by different users, as well as the diversity of conflicting perceptions. Proper consideration of multiple ecosystem service perceptions (i.e. needs by local populations and their expectations) can be an important step towards the co-management of protected areas [28] In addition, higher efforts should be made to assess the connection between protected areas and human well-being [29]. Under an adaptive co-management approach could be an effective way to connect scientific priorities with conservation and socio-economic needs [30]

4. Conclusion

Based on the research the synergy relationship between tourism activities and the sustainability of marine protected area in Lembongan Island, the synergy relationship between tourism activities and the sustainability of marine protected area need to be improved. We suggested that the concept of co-management consists of: 1) Prepare customary law. Including the points - the use and management of coral reef ecosystems based on the carrying capacity of the environment into *perarem* or *awig - awig* will strengthen the basis of area management. This is based on the high level of community compliance with customary law on Lembongan Island; 2) Preparing legal instruments for the utilization of natural resources. Regional regulations on the use of natural resources, especially those related to coral reef ecosystems, are the legal basis for stakeholders. The parties referred to in this matter are: lokal people, the government, and outsiders who want to invest in the Lembongan Island area. The application of strict sanctions is the key to the success of legal instruments in preserving natural resources; 3) Increase the capacity of stakeholders. A high level of community participation, although a low level of perception requires efforts to increase the capacity of the people of Lembongan Island. The same understanding and perception regarding the carrying capacity and co-management management must be developed for the preservation of coral reef ecosystem resources. This can help to increase synergy between tourism activities and marine protected area, and achievement of a prosperous local society

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