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Exploring the implementation potential of entrance fees as sustainable funding source for management of Nusa Penida Marine Protected Area

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Abstract. Nusa Penida Marine Protected Area (MPA) in the Coral Triangle faces significant challenges in funding its management. This examines the potential of implementing entrance fees as a sustainable funding mechanism for MPA. By analyzing historical governance changes, previous funding options, and stakeholder dynamics, aims to identify challenges and opportunities for implementing entrance fees, as a form of payment for environmental services, to support the MPA management. The study reveals that the cessation of NGO involvement has led to governance shortcomings within the MPA, emphasizing the need for continuity in leadership and clarity in management responsibilities. Additionally, research suggests that well-resourced MPAs, funded through visitor entry fees, demonstrate greater fish biomass, although, the relationship between funding, management activities, and ecological outcomes requires further investigation. The findings in this paper underscore the importance of diversifying funding sources to mitigate the risks associated with tourism dependency, ensuring financial security, and enhancing ecological effectiveness in MPAs. In the end, this paper aims to point out the challenges to be addressed and opportunities to pursue an entrance fee mechanism in the context of a payment for environmental services to work effectively in Nusa Penida.

1. Introduction

Located within the Coral Triangle, the Nusa Penida Marine Protected Area (MPA) is renowned for its rich marine biodiversity, hosting over 296 coral species and 576 species of reef fish (Turak and DeVantier. 2009). Established in 2010, Nusa Penida MPA encompasses three islands: Nusa Penida, Nusa Lembongan, and Nusa Ceningan, covering a total area of approximately 20,057 hectares. This MPA is a crucial conservation site within Indonesia's ambitious MPA Vision 2030, which aims to expand coverage to 32.5 million hectares. However, despite its ecological significance, the Nusa Penida MPA faces substantial challenges in achieving sustainable management and effective conservation.

The importance of sustainable funding for MPAs cannot be overstated. MPAs like Nusa Penida require consistent and reliable funding sources to support various management activities, including patrolling, scientific research, community engagement, and infrastructure

development. These activities are essential to mitigate threats such as illegal fishing, coral bleaching, and the negative impacts of tourism. However, current funding mechanisms for many MPAs in Indonesia, including Nusa Penida, are insufficient. Public funds cover only a fraction of operational costs, and reliance on inconsistent philanthropic and development aid further exacerbates the financial instability. Without adequate funding, MPAs risk becoming "paper parks" – areas designated for protection but lacking the necessary resources for effective management.

This paper explores the potential of implementing entrance fees as a sustainable funding mechanism for the Nusa Penida MPA. Specifically, it aims to analyze historical governance changes, previous funding options, and stakeholder dynamics to identify the challenges and opportunities associated with this approach. By examining the willingness to pay (WTP) studies conducted in 2011 and 2016, this study insights into the feasibility and optimal pricing of entrance fees. The 2011 study estimated visitors' WTP for general entrance fees to be between US$ 5 and 10, but the actual implemented fee was only US$ 0.50, reflecting stakeholder resistance and governance issues. The 2016 study, focused on manta ray diving permits, found a mean WTP of US$ 10.0, suggesting a higher potential for targeted conservation efforts.

The objectives of this are threefold. First, to evaluate the current funding landscape and its impact on the management effectiveness of the Nusa Penida MPA. Second, assess the potential revenue generation from entrance fees and its implications for sustainable MPA management. Third, to provide recommendations for implementing an entrance fee mechanism that ensures financial stability and enhances the ecological effectiveness of the MPA. By addressing these objectives, the paper aims to contribute to the broader discourse on sustainable financing for marine conservation, offering practical solutions that can be adapted to other MPAs facing similar challenges.

2. Methodology

2.1 Literature review

The methodology for this study began with an extensive literature review of journal articles, working papers, and grey literature published between 2002 and 2023. This review focused on marine protected areas (MPAs), sustainable financing mechanisms, particularly entrance fees, and governance challenges associated with these conservation efforts. Sources included academic databases such as ScienceDirect, JSTOR, and Google Scholar, as well as reports from international organizations and NGOs such as The Nature Conservancy (TNC), Coral Triangle Center (CTC) that have worked in Nusa Penida.

Key themes in the literature review included:

- The effectiveness of entrance fees as a sustainable funding source for MPAs.
- Case studies of successful entrance fee implementations in other regions.
- Stakeholder dynamics and their impact on MPA management.
- The economic and ecological outcomes of various MPA funding mechanisms.

2.2 The 2016's contingent valuation study

A significant part of this research involved the analysis of a 2016 contingent valuation (CV) study, which was conducted by the author in collaboration with the Coral Triangle Center (CTC). This study employed the Contingent Valuation Method (CVM) to estimate the willingness to pay

(WTP) of visitors for a daily permit fee specifically for manta ray diving in Nusa Penida MPA. The methodology for this CV study included:

- Survey Design: A structured questionnaire was developed, incorporating detailed sections on visitor profiles, valuation scenarios, and follow-up questions. The survey aimed to capture a comprehensive understanding of visitors' willingness to pay for targeted conservation efforts.
- Data Collection: Self-administered surveys were distributed to a sample of manta ray divers, with supervision provided by enumerators to ensure accurate and reliable data collection. The survey was conducted in both high and low tourist seasons to account for potential variations in WTP.
- Sample Size: The study achieved a final sample size of 229 respondents, providing a robust dataset for analysis.
- Analysis: The collected data were analyzed to determine the mean and median WTP, as well as the factors influencing visitors' willingness to pay. This analysis helped to identify the potential revenue that could be generated from entrance fees and provided insights into the feasibility of implementing such a mechanism in Nusa Penida MPA.

2.3 In-depth interviews

To complement the findings from the literature review and the contingent valuation study, in-depth interviews were conducted with key stakeholders between September 2022 and March 2024. These interviews aimed to gather qualitative insights into the challenges and opportunities associated with implementing entrance fees in Nusa Penida MPA. The methodology for the interviews included:

- Stakeholder Identification: Key stakeholders were identified through a snowball sampling method. Participants included representatives from government agencies, local communities, tourism operators, NGOs, and visitors to the MPA.
- Interview Design: A semi-structured interview guide was developed, focusing on topics such as governance challenges, financial stability, stakeholder support and opposition, and expected ecological and financial outcomes of entrance fee implementation.
- Data Collection: Interviews were conducted in person and via online platforms, depending on the availability and location of the stakeholders. Each interview lasted between 30 to 60 minutes, and detailed notes were taken to capture the key points discussed.
- Data Analysis: The interview data were transcribed and analyzed using thematic analysis. Key themes and patterns were identified, which provided deeper insights into the stakeholder dynamics and practical considerations for implementing entrance fees in Nusa Penida MPA.

3 Marine protected area governance and funding

3.1 Historical governance changes in Nusa Penida

The governance of the Nusa Penida Marine Protected Area (MPA) has undergone significant changes since its inception, reflecting broader shifts in Indonesia’s approach to marine conservation. These changes can be categorized into distinct phases, each characterized by different governance structures and management strategies, as shown in Table 1 below.

Table 1. Historical governance changes in Nusa Penida 2008 to recent time

Time Period	Governance Phase	Key Events and Changes
2008-2010	Early Initiatives and NGO Involvement	Significant involvement from NGOs such as The Nature Conservancy (TNC) conducting biophysical and socio-economic surveys. Initial groundwork for MPA establishment laid.
2010-2014	Establishment and Initial Management	Nusa Penida declared a Marine Conservation Area by district government decree in 2010, fully gazetted in 2014. Shared management responsibilities between district government of Klungkung and MMAF, with support from Coral Triangle Center (CTC).
2014-Present	Transition to Local and National Management	Governance transitioned to local district government and MMAF. Reduction in direct NGO involvement. Focus on training, capacity-building, and challenges in maintaining funding and management effectiveness.

Source: Yunitawati D, Clifton J. Governance in the early stages of MPA development: Nusa Penida case study. Mar Policy. 2021; Kossman CM. An analysis of marine protected area effectiveness: Case studies from Indonesia. Mar Policy. 2015; Widodo H, et al. Community engagement in marine conservation in Indonesia. Mar Pollut Bull. 2021; Sanjaya IDKW, et al. Evaluating the impact of marine conservation policies in Bali. Conserv Sci Pract. 2022.

Early Initiatives and NGO Involvement (2008-2010) The early stages of MPA development in Nusa Penida were marked by significant involvement from non-governmental organizations (NGOs). The Nature Conservancy (TNC) played a pivotal role in conducting initial biophysical and socio-economic surveys between 2008 and 2010. These efforts laid the groundwork for the establishment of the MPA by providing essential data and raising awareness among local communities about the importance of marine conservation (Yunitawati, D. & Clifton, J. 2021; Kossman, C. M. 2015).

Establishment and Initial Management (2010-2014) Nusa Penida was officially declared a Marine Conservation Area by a district government decree in 2010, and it was fully gazetted in 2014. During this period, management responsibilities were shared between the district government of Klungkung and the Ministry of Marine Affairs and Fisheries (MMAF). The Coral Triangle Center (CTC), a domestic NGO with strong ties to TNC, was instrumental in supporting the district government with daily management activities, including developing a zonation and management plan (Yunitawati, D. & Clifton, J. 2021; Widodo, H., et al. 2021).

Transition to Local and National Management (2014-Present) Following the official gazettement in 2014, the governance of Nusa Penida MPA transitioned to a more localized structure, with primary responsibility being assumed by the district government and MMAF. This period saw a reduction in direct NGO involvement, which shifted towards providing training and capacity-building support rather than active management. The decentralization of governance responsibilities was intended to empower local authorities, but it also introduced challenges related to leadership continuity and resource allocation (Sanjaya, I. D. K. W., et al. 2022).

3.2 How it affected funding for Nusa Penida MPA

The governance changes in Nusa Penida MPA significantly impacted its funding mechanisms and financial sustainability.

Early NGO Funding During the early stages, substantial funding was provided by international NGOs such as TNC. This funding, estimated at around US$100,000 annually, supported a wide range of activities including patrolling, public outreach, and the development of management plans. This external financial support was crucial for the establishment and initial functioning of the MPA.

Post-Gazettement Funding Challenges After the official designation of the MPA, the expectation was that local and national government bodies would assume greater financial responsibility. However, the cessation of NGO funding led to a significant gap in resources. The district government and MMAF struggled to match the financial contributions previously provided by NGOs, leading to challenges in maintaining effective management and enforcement activities. This funding gap highlighted the need for sustainable and locally managed funding mechanisms, such as entrance fees.

Exploring Entrance Fees Recognizing the financial challenges, there has been a growing interest in implementing entrance fees as a sustainable funding source. Although the idea has been considered, logistical and administrative challenges have delayed its implementation. The potential revenue from entrance fees, given the annual visitor numbers, could provide a substantial and consistent funding stream for MPA management, helping to bridge the gap left by reduced NGO funding.

3.3 Comparison with Other MPAs

The governance and funding challenges faced by Nusa Penida are not unique and can be compared with other MPAs in Indonesia and the broader Coral Triangle region.
Komodo and Ujung Kulon MPAs Similar to Nusa Penida, the Komodo and Ujung Kulon MPAs also relied heavily on external funding during their early stages. Both areas have explored various sustainable financing mechanisms, including entrance fees. For instance, Komodo National Park successfully implemented an entrance fee system that has become a significant source of revenue, supporting conservation and management activities. However, both MPAs have faced challenges related to governance transitions and ensuring that local communities benefit from the conservation efforts (Gallegos, L. V., et al 2005; Kodir, A., et al. 2019).

Wakatobi National Park Wakatobi National Park, another prominent MPA in Indonesia, has also experienced governance changes and funding challenges. Initially supported by NGOs and international donors, Wakatobi has gradually transitioned to local management. The implementation of entrance fees in Wakatobi has been relatively successful, providing a steady income stream that supports both conservation and local community development. However, as with Nusa Penida, there have been issues related to equitable distribution of benefits and ensuring long-term financial sustainability (Gallegos, L. V., et al 2005; Clifton, J. 2013).

3.4 Use of entrance fees in Nusa Penida and other cases

The implementation of entrance fees or similar mechanisms has been a common strategy to address funding challenges in MPAs.

Nusa Penida In Nusa Penida, the concept of entrance fees has been explored but not fully implemented. The potential benefits of such a system are clear, given the significant tourist

influx. Properly managed, entrance fees could provide a reliable source of funding for ongoing management activities, reducing reliance on external donors and ensuring financial stability.

Comparison with Komodo National Park Komodo National Park has successfully implemented an entrance fee system, which has become a critical component of its funding model. The revenue generated from entrance fees supports a wide range of conservation activities and helps to mitigate the environmental impact of tourism. This model demonstrates the viability and effectiveness of entrance fees as a sustainable financing mechanism for MPAs (Gallegos, L. V., et al 2005, Kodir, A., et al. 2019; Lasso, A. H. & Dahles, H. 2023).

Wakatobi National Park Wakatobi's entrance fee system has also been effective, contributing significantly to the park's financial sustainability. The fees collected are used not only for conservation but also for community development projects, ensuring that local residents see direct benefits from the MPA's existence. This approach has helped to build local support for conservation efforts and reduce conflicts between conservation and community interests (Gallegos, L. V., et al 2005; Clifton, J. 2013;).

4 Opportunities for implementing entrance fees in Nusa Penida

4.1 Potential benefits of entrance fees

Implementing entrance fees in the Nusa Penida Marine Protected Area (MPA) presents several potential benefits. Entrance fees can generate a consistent and sustainable revenue stream that is crucial for funding ongoing management and conservation activities. This funding can support essential operations such as patrolling, monitoring, and maintaining infrastructure, which are necessary to protect the MPA's rich biodiversity and ensure its ecological integrity (Pascoe, S., et al. 2014). Additionally, entrance fees can help mitigate the financial instability caused by fluctuating external donations and government budgets, providing a more reliable financial foundation for long-term conservation efforts (Yunitawati, D. & Clifton, J. 2021).

Beyond financial stability, entrance fees can also encourage responsible tourism. By associating a cost with access to the MPA, visitors may become more aware of the value of the protected area and their role in its preservation. This can lead to more environmentally conscious behavior, reducing the impact of tourism on sensitive ecosystems (Pascoe, S., et al. 2014; Mach, L. 2020).

4.2 Successful Models from Other Regions

Several successful models from other regions can provide valuable insights for implementing entrance fees in Nusa Penida. For instance, the Bonaire National Marine Park in the Caribbean has successfully implemented a user fee system where divers pay an annual fee of around $25. This fee has generated substantial revenue, which has been reinvested into conservation and management activities, including reef monitoring, law enforcement, and educational programs (Thur, S. 2010; Mach, L. 2020).

Similarly, the Tubbataha Reefs Natural Park in the Philippines charges a conservation fee of $50 per diver per entry. This fee structure has proven effective in generating funds for park management and has been instrumental in maintaining the park's high biodiversity and excellent ecological status (Mach, L. 2020). These examples demonstrate that well-designed and transparently managed fee systems can significantly enhance the financial sustainability of MPAs.

4.3 Stakeholder support and opposition

The implementation of entrance fees in Nusa Penida MPA will require careful consideration of stakeholder perspectives. Stakeholder support is crucial for the success of such initiatives. Local communities, tourism operators, and visitors are the primary stakeholders who will be directly affected by the introduction of fees.

Local communities and conservation organizations often support entrance fees when they see direct benefits, such as improved infrastructure, better management, and enhanced environmental protection. For example, in Komodo National Park, local communities have supported entrance fees because they have seen tangible benefits, including increased tourism revenues and better-managed resources.

Conversely, there may be opposition from tourism operators who fear that higher costs could deter tourists. This concern is particularly relevant in regions where tourism competition is high, and travelers have alternative destinations. However, studies have shown that divers and eco-tourists are generally willing to pay higher fees if they are confident that the funds will be used effectively for conservation purposes. Transparent management and clear communication about how the fees are utilized can help mitigate opposition and gain broader acceptance.

4.4 Expected Ecological and Financial Outcomes

Implementing entrance fees in Nusa Penida MPA can lead to several positive ecological and financial outcomes. Ecologically, the additional funding can enhance the MPA's capacity to enforce regulations, reduce illegal activities such as destructive fishing, and support restoration projects. This can result in healthier marine ecosystems, increased biodiversity, and improved resilience to environmental changes (Gravestock, P., et al. 2008).

Financially, entrance fees can provide a sustainable revenue stream that reduces dependency on external funding sources. This financial independence can ensure continuous management efforts even during economic downturns or when external funding becomes scarce. For example, in Bunaken National Marine Park, Indonesia, entrance fees have provided a steady source of income that supports not only conservation efforts but also local community development projects, fostering a sense of ownership and responsibility among local stakeholders (Pascal, N., et al. 2021; Gravestock, P., et al. 2008).

Implementing entrance fees in Nusa Penida MPA can lead to several positive ecological and financial outcomes. Ecologically, the additional funding can significantly enhance the MPA's capacity to enforce regulations, reduce illegal activities such as destructive fishing, and support restoration projects. This can result in healthier marine ecosystems, increased biodiversity, and improved resilience to environmental changes (Brown, C., et al. 2023). Better management of tourism activities funded by these fees can help reduce the ecological footprint of visitors, thereby preserving the natural beauty and ecological health of the MPA. Improved conservation measures supported by the fees can lead to healthier coral reefs, greater fish biomass, and overall enhanced marine biodiversity (Brown, C., et al. 2023; Pascal, N., et al. 2021).

Financially, entrance fees provide a consistent and reliable source of funding, reducing dependency on volatile external donations and government allocations. This financial stability allows for long-term planning and sustained conservation efforts, ensuring the MPA's ecological and economic benefits are preserved for future generations (Brown, C., et al. 2023; Pascal, N., et al. 2021). Furthermore, revenues from entrance fees can be reinvested into local communities, supporting sustainable development projects and enhancing livelihoods. This creates a positive feedback loop where improved conservation attracts more visitors, further boosting revenues

(Brown, C., et al. 2023; Pascal, N., et al. 2021; Wiadnya, D. G. R., et al. 2011)). Overall, the stable revenue stream generated by entrance fees ensures that Nusa Penida MPA can maintain its conservation initiatives and support local economic development simultaneously.

5 Comparison from two willingness to pay studies in Nusa Penida

5.1 Differences Between First Study (2011) and Second Study (2016)

The two studies on the willingness to pay (WTP) for conservation in Nusa Penida MPA highlight significant differences in methodology, data collection, sample size, WTP values, and the basis of the scenarios used.

5.1.1 Methodology used

The first study conducted in 2011 utilized a structured questionnaire with an open-ended Contingent Valuation Method (CVM) to estimate visitors' willingness to pay. By contrast, the second study in 2016 employed a more detailed and structured CVM approach. The second study included specific sections on visitor profiles, valuation scenarios, and follow-up questions, to provide a more comprehensive and nuanced understanding of visitors' WTP.

5.1.2 Data Collection

In the first study, data collection was carried out through face-to-face surveys with visitors. This method allowed for direct interaction and immediate clarification of questions but was limited by the sample size and potential interviewer bias. The second study, however, used self-administered surveys supervised by enumerators, targeting manta ray divers. This approach ensured a broader and more targeted respondent base, reducing potential biases and enhancing the reliability of the data collected.

5.1.3 Sample Size

The first study did not specify the exact sample size, which limits the ability to assess the robustness of its findings. On the other hand, the second study clearly stated a sample size of 229 respondents, providing a more solid foundation for statistical analysis and increasing the credibility of its conclusions.

5.1.4 WTP Value

The WTP values obtained in the two studies showed notable differences. The first study estimated visitors' WTP for general entrance fees to be between US$ 5 and 10, but the actual fee implemented was approximately US$ 0.50 (7000 IDR), reflecting significant resistance from stakeholders. In contrast, the second study focused on daily permit fees for manta ray diving and found a mean WTP of US$ 10.0, with a median of US$ 10.0 and a slightly lower mean of US$ 7.2 for Indonesia-based visitors. These higher WTP values suggest that visitors are willing to pay more for specific, targeted conservation efforts compared to general entrance fees.

5.1.5 Scenario Basis

The scenarios used as the basis for WTP also differed between the studies. As shown in Table 2 below, the first study assessed WTP for general entrance fees intended for overall park management and conservation. This broad approach faced challenges in stakeholder acceptance and implementation. Conversely, the second study focused on a specific daily permit fee for manta ray diving, aimed at enhancing manta protection and management. This targeted approach provided clearer projections for revenue generation and demonstrated a higher potential for practical implementation.

Table 2. Differences between the two WTP study in Nusa Penida

Aspect	First Study (2011)	Second Study (2016)
Methodology	Structured questionnaire, open-ended CVM	Structured questionnaire, detailed CVM
Data Collection	Face-to-face surveys with visitors	Self-administered surveys supervised by enumerators
Sample Size	Not specified	229
WTP Value	US$ 5 - 10, implemented US$ 0.50	Mean US$ 10.0, Median US$ 10.0, US$ 7.2 for Indonesia-based visitors
Scenario Basis	General entrance fees for overall park management	Daily permit fee for manta ray diving, targeted conservation efforts

5.2 Similarities Between First Study (2011) and Second Study (2016)

Despite the differences in methodology, sample size, and specific focus areas, the two studies on the willingness to pay (WTP) for conservation in Nusa Penida Marine Protected Area (MPA) share several similarities. These commonalities provide insights into the consistent themes and findings across both studies, as shown in Table 3.

5.2.1 Objective

Both studies aimed to explore the potential for implementing entrance fees as a sustainable funding mechanism for the Nusa Penida MPA. They sought to understand visitors' willingness to contribute financially to the conservation and management of the area, reflecting a shared goal of enhancing the MPA's financial sustainability and conservation efforts.

5.2.2 Methodology

Both studies employed the Contingent Valuation Method (CVM) to estimate visitors' willingness to pay for conservation. CVM is a widely used approach in environmental economics to assess the value that people place on non-market goods, such as environmental conservation and natural resource management. By using this method, both studies provided a systematic way to capture visitors' valuation of the MPA.

5.2.3 Focus on Visitors

Each study targeted visitors to the Nusa Penida MPA, recognizing the significant role that tourism plays in the area's economy and conservation funding potential. They collected data from individuals who directly experience the MPA's offerings, such as divers and general tourists, to gauge their willingness to pay entrance fees for its conservation.

5.2.4 Stakeholder Engagement

Both studies acknowledged the importance of stakeholder engagement in the successful implementation of entrance fees. They considered the perspectives of various stakeholders, including visitors, local communities, and tourism operators, to understand potential support and opposition to the proposed fees. This inclusive approach aimed to ensure that the findings were grounded in the realities of stakeholder dynamics and that the proposed fees would be feasible and acceptable.

5.2.5 Conservation Funding Needs

The studies highlighted the critical need for sustainable funding to support the MPA's management and conservation activities. They identified the existing financial gaps and emphasized how entrance fees could address these challenges by providing a reliable and consistent revenue stream. Both studies underscored the connection between adequate funding and the effective conservation of the MPA's rich biodiversity.

5.2.6 Challenges and Barriers

Each study identified challenges and barriers to implementing entrance fees, such as potential resistance from stakeholders and logistical issues related to fee collection and management. They discussed the need for transparent and efficient use of the collected fees to build trust among stakeholders and ensure the long-term success of the funding mechanism.

5.2.7 Willingness to Pay (WTP) Insights

Both studies provided valuable insights into the range of willingness to pay among visitors. While the specific WTP values differed, they both demonstrated that visitors were generally willing to contribute financially to the MPA's conservation. This willingness was influenced by factors such as the perceived benefits of conservation, the effectiveness of management, and the transparency of fee utilization.

Table 3. Similarities between the two WTP study in Nusa Penida.

Aspect	Description
Methodology	Both used Contingent Valuation Method (CVM)
Focus	Explored sustainable funding mechanisms for NP-MPA
Challenges	Highlighted challenges in implementing the suggested fees
Motivation	Securing funding for effective management and conservation of NP-MPA's biodiversity

5.3 Stakeholder Support and Opposition

The implementation of entrance fees in Nusa Penida MPA will require careful consideration of stakeholder perspectives. Stakeholder support is crucial for the success of such initiatives. Local communities, tourism operators, and visitors are the primary stakeholders who will be directly affected by the introduction of fees.

Local communities and conservation organizations often support entrance fees when they see direct benefits, such as improved infrastructure, better management, and enhanced environmental protection. For example, in Komodo National Park, local communities have supported entrance fees because they have seen tangible benefits, including increased tourism revenues and better-managed resources.

Conversely, there may be opposition from tourism operators who fear that higher costs could deter tourists. This concern is particularly relevant in regions where tourism competition is high, and travelers have alternative destinations. However, studies have shown that divers and eco-tourists are generally willing to pay higher fees if they are confident that the funds will be used effectively for conservation purposes. Transparent management and clear communication about how the fees are utilized can help mitigate opposition and gain broader acceptance.

6 Discussion

6.1 Relationship between Funding Sources, Management Activities, and Ecological Outcomes

The relationship between funding sources, management activities, and ecological outcomes in marine protected areas (MPAs) is intricate and vital for the success of conservation efforts. Sustainable funding sources ensure that management activities can be carried out effectively, leading to positive ecological outcomes. In the Nusa Penida MPA, the shift from NGO-driven funding to local governance has underscored the critical need for a reliable and continuous funding mechanism to maintain and enhance ecological health.

6.1.1 Funding Sources

Initially, Nusa Penida MPA received substantial financial support from NGOs such as The Nature Conservancy (TNC), which facilitated the establishment and initial management activities. However, the withdrawal of these funds left a significant gap that the local and national government struggled to fill adequately. The resulting financial instability has impacted the MPA's ability to sustain critical management activities such as patrolling, monitoring, and community engagement. The introduction of entrance fees could provide a stable and consistent revenue stream, which is essential for long-term financial sustainability and effective management of the MPA.

6.1.2 Management Activities

Effective management activities, funded by reliable financial sources, are crucial for the success of MPAs. These activities include enforcement of regulations, habitat restoration, monitoring of ecological health, and educational programs for local communities and tourists. In the absence of stable funding, Nusa Penida MPA has faced challenges in maintaining these activities at optimal levels. For instance, reduced patrolling efforts can lead to increased illegal fishing and other harmful activities, negatively affecting the ecological balance. Consistent funding through entrance fees can ensure that these management activities are continuously supported, leading to improved ecological outcomes such as healthier coral reefs, greater fish biomass, and enhanced biodiversity.

6.1.3 Ecological Outcomes

The direct relationship between well-funded management activities and positive ecological outcomes is evident. Adequate funding allows for more comprehensive conservation efforts, resulting in better-protected ecosystems. For Nusa Penida MPA, continuous financial support through entrance fees can lead to significant improvements in the ecological health of the area. This includes the preservation of critical habitats, protection of endangered species, and overall enhancement of the marine biodiversity.

6.2 Potential Barriers to Implementing Entrance Fees

Implementing entrance fees in Nusa Penida MPA faces several potential barriers. These include resistance from stakeholders such as local communities and tourism operators, logistical challenges in fee collection and management, and the need for effective enforcement mechanisms. Stakeholders may be concerned that entrance fees could deter tourists, impacting their livelihoods. Additionally, ensuring that the collected fees are transparently managed and effectively utilized is crucial to gaining stakeholder trust and support.

To overcome these barriers, several strategies can be employed:

- Stakeholder Engagement: Involving local communities, tourism operators, and other stakeholders in the planning and implementation process can help build support and address concerns. Regular communication and participatory decision-making processes are essential.

- Transparent Management: Establishing a transparent system for fee collection and utilization is critical. Clear communication about how the fees are used for conservation and community benefits can enhance stakeholder trust.
- Efficient Collection Mechanisms: Implementing efficient and user-friendly fee collection mechanisms, such as digital payment options, can reduce logistical challenges and ensure smooth operations.
- Effective Enforcement: Strengthening enforcement mechanisms to ensure compliance with the fee system and regulations is vital for the system's success.

6.3 Role of Continuous Leadership and Clear Management Responsibilities

Continuous leadership and clear management responsibilities are crucial for the successful implementation of entrance fees. Strong leadership ensures that the vision and goals of the MPA are consistently pursued, while clear management responsibilities help in the efficient execution of management activities. In Nusa Penida MPA, the transition from NGO-driven management to local governance highlighted the need for strong local leadership and clearly defined roles to maintain and enhance the effectiveness of conservation efforts.

6.4 Proper Institutional Model for Managing Entrance Fees

Based on experiences from other countries, the proper institutional model for managing entrance fees involves a combination of government oversight and stakeholder participation. For instance, in Bonaire National Marine Park and Tubbataha Reefs Natural Park, the implementation of entrance fees has been successful due to the establishment of dedicated management bodies that include representatives from government agencies, NGOs, local communities, and tourism operators. These bodies are responsible for overseeing fee collection, ensuring transparent utilization of funds, and engaging stakeholders in decision-making processes (Thur, S. 2010; Mach, L. 2020).

- Bonaire National Marine Park: In Bonaire, an annual fee for divers generates substantial revenue, which is reinvested in conservation activities. The management body includes various stakeholders, ensuring transparency and accountability in fund utilization.
- Tubbataha Reefs Natural Park: Similarly, Tubbataha charges a conservation fee per diver, which supports park management and conservation projects. The management board includes government representatives, NGOs, and community leaders, fostering a collaborative approach to conservation.

Implementing a similar model in Nusa Penida MPA, with a dedicated management body that includes diverse stakeholders, can ensure effective management of entrance fees and enhance the overall sustainability of the MPA. This model can facilitate transparent fund management, stakeholder engagement, and continuous improvement in conservation efforts.

7 Conclusion and Recommendations

7.1 Summary of Key Findings

This study explored the implementation potential of entrance fees as a sustainable funding source for the management of the Nusa Penida Marine Protected Area (MPA). The analysis revealed several critical insights:

- Financial Instability and Governance Challenges: The transition from NGO-driven funding to local governance has exposed significant financial instability, hindering effective management and conservation activities. Governance shortcomings, including inconsistent leadership and unclear management responsibilities, have further exacerbated these challenges.

- Stakeholder Dynamics: There is mixed support among stakeholders for implementing entrance fees. While local communities and conservation organizations generally favor sustainable funding mechanisms, tourism operators express concerns about potential negative impacts on visitor numbers.
- Potential Benefits of Entrance Fees: Implementing entrance fees can generate a stable and consistent revenue stream, supporting essential management activities such as patrolling, monitoring, and infrastructure maintenance. This funding can enhance ecological outcomes by enabling more comprehensive and effective conservation efforts.
- Successful Models from Other Regions: Case studies from other regions, such as Bonaire National Marine Park and Tubbataha Reefs Natural Park, demonstrate that well-managed entrance fee systems can significantly enhance the financial sustainability and ecological effectiveness of MPAs.

7.2 Recommendations for Implementing Entrance Fees in Nusa Penida

- Stakeholder Engagement: Engage local communities, tourism operators, and other stakeholders in the planning and implementation process. Regular communication and participatory decision-making can help build support and address concerns.
- Transparent Management: Establish transparent systems for fee collection and utilization. Clearly communicate how the funds will be used to support conservation and community benefits, thereby enhancing stakeholder trust and cooperation.
- Efficient Fee Collection Mechanisms: Develop efficient and user-friendly fee collection mechanisms, such as digital payment options, to minimize logistical challenges and ensure smooth operations.
- Strong Leadership and Clear Management Responsibilities: Ensure continuous leadership and clearly defined management responsibilities. This will provide consistent guidance and accountability in the MPA's management.
- Effective Enforcement Mechanisms: Strengthen enforcement mechanisms to ensure compliance with the fee system and MPA regulations. This includes adequate training and resources for enforcement personnel.

7.3 Future Research Opportunities

Future research should focus on several key areas to support the implementation and management of entrance fees in Nusa Penida:

- Visitor Willingness to Pay (WTP): Conduct updated and more extensive WTP studies to refine the fee structure and ensure it aligns with visitor expectations and willingness to contribute.
- Ecological and Socioeconomic Impacts: Evaluate the ecological and socioeconomic impacts of entrance fees over time. This includes assessing changes in biodiversity, habitat health, and community livelihoods.
- Best Practices and Lessons Learned: Analyze best practices and lessons learned from other MPAs that have successfully implemented entrance fees. This can provide valuable insights and practical guidance for Nusa Penida.
- Adaptive Management: Investigate adaptive management strategies that can respond to changing environmental conditions, visitor numbers, and stakeholder needs. This will help ensure the long-term sustainability of the MPA.

7.4 Broader Implications for Sustainable MPA Funding

The findings from this study have broad implications for sustainable MPA funding beyond Nusa Penida. Implementing entrance fees can provide a viable and effective solution to the common

challenge of financial instability faced by many MPAs. By generating consistent revenue streams, entrance fees can support comprehensive management activities, leading to improved ecological outcomes and enhanced conservation effectiveness.

Moreover, the successful implementation of entrance fees requires robust governance frameworks, transparent fund management, and active stakeholder engagement. These elements are crucial for building trust, ensuring compliance, and achieving sustainable conservation goals. The experiences of Nusa Penida and other MPAs can serve as valuable models for similar efforts, highlighting the importance of innovative funding mechanisms in the conservation of marine ecosystems.

In conclusion, the introduction of entrance fees in Nusa Penida MPA presents a promising opportunity to enhance financial sustainability and ecological health. By addressing the identified challenges and implementing the recommended strategies, Nusa Penida can become a model for effective MPA management and sustainable funding, contributing to the broader goals of marine conservation and environmental stewardship.

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