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# **Enhancing Sustainable Marine Tourism: The Crucial Role of Environmental Conservation Programs in West Nusa Tenggara**

## Islahuddin<sup>1\*</sup>, Ali Muhtasom<sup>2</sup>, Anwari Masatip<sup>3</sup>, Herman<sup>4</sup>

- \*1Politeknik Pariwisata Makassar, Indonesia
- <sup>2</sup> Politeknik Pariwisata Lombok, Indonesia
- <sup>3</sup> Politeknik Pariwisata NHI, Bandung, Indonesia
- <sup>4</sup> Politeknik Pariwisata Lombok, Indonesia

\*Corresponding author's email: islahuddin@poltekparmakassar.ac.id

### **Abstract**

Marine tourism in West Nusa Tenggara (NTB) presents significant economic opportunities but poses risks to environmental sustainability without proper conservation efforts. This research explores how environmental conservation can be integrated into sustainable marine tourism development strategies to ensure that tourism growth does not harm NTB's natural resources. The study adopts a quantitative approach, surveying 100 key stakeholders, including tourism professionals and local Government officials, to analyze the relationship between environmental conservation and sustainable tourism success. Using multiple linear regression, the research reveals that public awareness of environmental conservation significantly impacts tourism sustainability. In contrast, Government actions and conservation efforts are perceived as less effective. The findings emphasize that challenges in conservation can motivate improvement efforts, suggesting that stakeholder collaboration is crucial in addressing obstacles and enhancing marine tourism's long-term viability. This study provides a basis for developing policies promoting economic growth and environmental protection in NTB, demonstrating that sustainable tourism can yield substantial economic benefits while preserving natural ecosystems. These insights aim to guide future efforts to balance tourism development with environmental conservation, establishing NTB as a model for sustainable marine tourism.

**Keywords**: Environmental preservation, marine tourism promotion, sustainable tourism

### 1. INTRODUCTION

Marine tourism in West Nusa Tenggara (NTB) has great potential to support the region's economic growth (Rosa 2017). However, without practical environmental conservation efforts, this growth could be detrimental to the sustainability of natural resources (Lu & Wang, 2023). This research explores how environmental conservation efforts can be integrated into sustainable marine tourism promotion and development strategies. This includes finding ways to ensure that economic growth from the tourism sector does not come at the expense of environmental conservation, such as engaging stakeholders in policies that support the protection of marine ecosystems. Thus, a balanced approach between economic benefits and environmental protection is needed to achieve sustainability holistically.

In the literature review, many theories discuss the relationship between tourism and the environment, but many gaps still need further research (Han 2021). Existing theories often need to address the specific challenges regions such as NTB face. (Edgell Sr 2019) where the linkage between tourism promotion and environmental preservation is still not optimal (Pan et al., 2018). Some research points to the importance of conservation, but how to integrate it into tourism promotion strategies remains to be seen (Job, Becken, and Lane, 2018). Therefore, there needs to be a deeper look into how these two aspects can support each other, especially in regions that rely heavily on marine tourism as the main engine of the local economy.

The main objective of this research is to increase understanding of how environmental conservation efforts can support the development of sustainable tourism practices in NTB. This research is expected to provide a solid basis for formulating tourism promotion strategies that attract visitors and protect marine ecosystems. In addition, this research aims to demonstrate that sustainable



tourism practices can provide significant economic benefits to local communities while preserving the natural environment, which is the main attraction of tourism destinations. By effectively combining environmental conservation and tourism promotion, NTB can serve as an example of how a balance between economy and ecology can be achieved.

The concept of Environmental Preservation refers to efforts to protect and maintain the natural environment to ensure the long-term sustainability of the ecosystem (Khairina, Purnomo, and Malawani 2020). Environmental preservation aims to maintain biodiversity, prevent ecosystem degradation, and protect natural resources from overexploitation (Ekka et al., 2023). This approach focuses on restoring or conserving already damaged resources and preventing future damage (Cairns, 2017). Environmental preservation is critical to maintaining the natural attractiveness that drives tourists (Mejjad, Rossi, and Pavel, 2022). Thus, environmental conservation is not only about maintaining ecosystems but also about maintaining economic sustainability that depends on environmental quality.

Environmental preservation can manifest in various forms (Amirovna, 2022). One of the primary forms is the sustainable management of natural resources, such as marine pollution control, waste management, and protection of coral reefs and endangered marine species (Nama et al., 2023). In addition, policies that support protecting marine protected areas, both at the local and national levels, are an essential part of this effort (Gruby et al., 2021). Initiatives such as ecotourism or environmentally-based tourism are a concrete manifestation of environmental conservation (Maestro et al. 2019). In some regions, the involvement of local communities in environmental conservation efforts is increasingly becoming a concern, as community-based approaches have proven effective in maintaining ecosystem sustainability while enabling local economic development (Zhang et al., 2020).

Marine Tourism Promotion is a strategy designed to increase tourist interest and visitation to marine tourism destinations (Kim et al. 2017). It involves various marketing and communication efforts to highlight the uniqueness and potential of marine tourism areas, such as beaches, islands, coral reefs, and marine biodiversity (Miller, 1993). The aim is to increase public awareness of what marine destinations offer and entice tourists to enjoy the beauty and experiences that can only be found in marine areas (Davis, 2023). In the context of sustainable tourism, marine tourism promotion also needs to consider the environmental impacts that increased tourist arrivals may have and how promotion can help mitigate these impacts (Darius et al. 2019) (Giang and Khanal 2024).

Manifestations of Marine Tourism Promotion include a variety of approaches, ranging from advertising campaigns to the use of social media to the organization of special events such as marine festivals or water sports activities (Vázquez, García, and Valenciano 2021). Digital marketing and social media platforms play an essential role in promoting marine tourism today, as videos, images, and testimonials from visitors can quickly spread and attract new tourists (Hudson 2017). In addition, collaboration with the private sector and local stakeholders is also an effective way of promotion, such as by promoting ecotourism programs. Another form of promotion is the development of environmentally friendly infrastructure, which can attract tourists by offering facilities that support marine tourism activities while protecting the environment (Sentanu et al. 2021) (Jamal and Stronza 2009).

Sustainable Tourism is a concept that refers to the development and management of tourism that considers the long-term impact on the environment, society, and the local economy (Edgell Sr 2019). The main objective of sustainable tourism is to ensure that tourism activities do not damage the local natural, social, and cultural environment but rather contribute to its preservation (Li, Wu, and Patwary, n.d.). In this regard, sustainable tourism emphasizes the need to balance economic growth generated from tourism with the protection of natural resources and community welfare (Saarinen 2019). The concept also includes efforts to reduce the carbon footprint, support more efficient use of resources, and pay attention to local communities' welfare in the tourism industry (Pan et al. 2018) (Edgell Sr 2019).

The manifestation of Sustainable Tourism can be seen in various actions, such as the implementation of strict tourism regulations related to the capacity of visits to natural tourism areas,



the development of environmentally friendly tourism infrastructure, and efforts to educate tourists about the importance of environmental conservation (Baloch et al. 2023). Developing community-based tourism, where local communities are directly involved in the management and receipt of economic benefits, is also a concrete example of sustainable tourism (Giampiccoli, Mtapuri, and D u ewska 2020). In addition, sustainable tourism encourages using green technologies and more efficient resource management, such as renewable energy, proper waste management, and reforestation or restoration programs for damaged ecosystems (Baloch et al. 2023). All of these aim to ensure that the tourism sector can continue growing without damaging the environment and socioculture.

The importance of this research lies in the fact that without proper management, tourism growth can potentially damage the natural environment, which is the area's main attraction. Based on the literature review and research objectives that have been outlined, the hypothesis proposed is that tourism practices that pay attention to environmental conservation will generate more significant long-term benefits, both in terms of economy and ecology. Thus, this research strongly argues that a sustainable approach to marine tourism management in NTB is necessary. This is not only to preserve the environment but also to ensure that tourism in the region can continue to develop responsibly and sustainably.

### 2. RESEARCH METHODOLOGY

The quantitative approach was used because it effectively measures the relationship between variables. In this study, data were collected through a survey using a questionnaire. The research sample consisted of 100 purposively selected respondents, including tourism professionals, local Government officials, and communities that play an active role in environmental conservation in West Nusa Tenggara. Surveys with questionnaires were used because they are efficient in obtaining quantitative data, can reach a large number of respondents in a relatively short time, and collect information covering many aspects in depth.

In analyzing the data, this study applied multiple linear regression techniques to understand how environmental conservation efforts affect sustainable tourism success. This technique allows researchers to measure the relationship between the dependent variable, tourism success, and several independent variables related to conservation efforts. Multiple linear regression analysis is often used in social research because it can reveal complex relationships between variables related to how environmental conservation supports the sustainability of the tourism sector.

The sample used in this research was chosen with diverse respondents in mind, ranging from professionals to local communities. This approach is essential as it provides a well-rounded perspective on the issue under study. Involving various stakeholders in tourism and environmental conservation gives weight to the research results, given that their involvement directly influences policies and practices. By involving local communities, the research results are also more relevant and applicable in sustainable tourism management.

For efficiency, a questionnaire was used as the main tool for data collection. The questions in the questionnaire were designed so that respondents understood them well and could provide relevant answers. Using valid and reliable questionnaires will improve the quality of data obtained and the accuracy of the analysis results.

Overall, the methods used in this study provided a comprehensive picture of the relationship between environmental conservation efforts and the success of sustainable tourism in West Nusa Tenggara. This study provides empirical evidence supporting the importance of integrating environmental conservation in tourism development strategies through a quantitative approach with multiple linear regression analysis. The results of this study are expected to contribute to better policy-making in the management of environmentally friendly tourism in the future.

#### 3. FINDINGS AND DISCUSSION

Validity and Reliability Test Results

The validity test was conducted to determine whether the items in the questionnaire used could accurately measure the research variables. In the context of this study, the validity test aims to measure the extent to which the items measuring the Environmental Conservation and Sustainable Marine Tourism variables measure the intended variables. Validity was tested by looking at the correlation between the item score and the total variable score using Pearson correlation. Items are valid if r count > r table, where in this study, r table is at 0.256 with a significance level of 10%. Therefore, each item must have an r count greater than 0.256 to be declared valid.

The validity test results showed that all items used to measure the Environmental Conservation and Sustainable Marine Tourism variables have a calculated r-value that is more significant than the r table. For example, the item measuring the importance of environmental conservation for the future of NTB has an account of 0.035, and other items such as "conservation efforts in NTB are adequate" and "public awareness of conservation" also have count values that are far above the r table value. Thus, all items in this study were declared valid, meaning the instrument can measure the research variables accurately and consistently.

Good validity of the instrument assurance that each question asked to respondents accurately reflects the concept being measured. A valid instrument is essential in ensuring that the data collected reflects the true reality in the field. With validity already tested, researchers can proceed to the next step of analysis without worrying that the research instrument contains bias or inaccuracy in measurement.

Instrument reliability is measured to ensure that the questionnaire used consistently measures the same variable. Reliability testing is done by looking at *Cronbach's Alpha* value, the most commonly used index for measuring internal reliability. This study considers a variable reliable if Cronbach's Alpha value is greater than or equal to 0.70. This Cronbach's Alpha value shows how well the items in a set of questions are interconnected and consistent in measuring the same variable.

The reliability test results show that the Environmental Conservation variable has a Cronbach's Alpha value of 0.71, and the Sustainable Marine Tourism variable has a value of 0.76. Thus, these two variables can be declared reliable because Cronbach's Alpha value exceeds the 0.70 limit. This high reliability means that the items in the questionnaire measuring the two variables are consistent and reliable for use in research. Good reliability ensures that the instrument will give similar results if used under the same conditions at different times.

Consistency in measurement results is critical in quantitative research because it provides confidence that variations in respondents' answers reflect changes in the measured variables, not because of instrument inconsistencies. With good validity and reliability tests, the questionnaire used in this study is suitable for measuring the variables under study so that the results of data analysis can be relied upon.

Multiple Regression Analysis

Multiple regression analysis determines the relationship between several independent variables and one dependent variable. In this study, the Sustainable Marine Tourism variable is the dependent variable. In contrast, the independent variables include several aspects related to environmental conservation, such as the importance of conservation for NTB's future, adequate conservation efforts, Government actions, public awareness, and challenges faced. This analysis resulted in a regression equation representing these variables' linear relationship. The equation obtained is  $Y=0.950+0.361X1+0.148X2-0.146X3+0.301X4+0.116X5Y=0.950+0.361X_1 + 0.148X_2 - 0.146X_3+0.301X_4+0.116X_5Y=0.950+0.361X_1+0.148X_2-0.146X_3+0.301X_4+0.116X_5$ .

The equation shows that the variable Environmental Conservation is very important for the future of NTB  $(X_1)$ , which has the most significant influence on Sustainable Marine Tourism, with a regression coefficient of 0.361 and a p-value of 0.000, which means the influence is highly significant. Meanwhile, the variable Environmental conservation efforts in NTB are adequate  $(X_2)$  has a more minor influence (0.148). Although its p-value is close to the significant limit (0.053), its



influence is not considered strong enough. In contrast, the variable NTB Government actions  $(X_3)$  has a negative influence of -0.146, indicating that an increase in the perception of the effectiveness of Government actions decreases Sustainable Marine Tourism. However, this influence is not statistically significant (p = 0.066).

Public awareness in NTB about the importance of environmental conservation ( $X_4$ ) has a significant favorable influence with a coefficient of 0.301 and a p-value of 0.000, indicating that increasing public awareness will significantly impact marine tourism's sustainability. In addition, the challenges still faced to improve conservation effectiveness ( $X_5$ ) also have a positive and significant influence with a coefficient of 0.116 and p 0.041. This means that the more challenges are recognized, the more they will drive improvements in sustainable marine tourism, perhaps because awareness of the challenges triggers actions to address them.

Hypothesis Test Partial Test (t-Test)

A partial test or t-test is conducted to determine the effect of each independent variable individually on the dependent variable. In this study, the t-test is used to test whether each variable related to environmental conservation significantly influences Sustainable Marine Tourism. Based on the t-test results, the variable Environmental conservation is significant for the future of NTB  $(X_1)$ . It has a t-count value of 4.120 with a p-value of 0.000, indicating that this variable significantly affects Sustainable Marine Tourism. This shows that people's perceptions of the importance of environmental conservation greatly influence the sustainability of marine tourism in NTB.

Meanwhile, the variable Environmental conservation efforts in NTB are adequate  $(X_2)$  has a t-count value of 1.957 with a p-value of 0.053. Although this value is close to the 5% significance level, this variable is not considered to have a significant effect. This could indicate that despite the conservation efforts made in NTB, the community has not fully felt the impact on marine tourism. In addition, the variable NTB Government takes somewhat effective actions in environmental conservation  $(X_3)$  has a t-count value of -1.860 with a p-value of 0.066, indicating that Government actions do not have a significant influence on Sustainable Marine Tourism, even potentially providing a negative influence.

In contrast, the public awareness variable on the importance of environmental conservation ( $X_4$ ) has a very high t-count value of 5.923 with a p-value of 0.000, which shows a very significant effect. This indicates that public awareness is one of the main factors influencing the sustainability of marine tourism in NTB. In addition, the variable Challenges faced in conservation ( $X_5$ ) also has a significant influence, with a t-count of 2.068 and a p-value of 0.041, which means that conservation challenges provide a positive boost to sustainable marine tourism.

Simultaneous Test (F Test)

A simultaneous test was conducted to see the effect of the independent variables on the dependent variable. In the simultaneous test, researchers want to know whether the variables used in the study together significantly influence Sustainable Marine Tourism. Based on the F-test results, the F-count value of 21,026 with a p-value of 0.000 indicates that simultaneously, independent variables such as the importance of conservation, Government efforts, public awareness, and challenges faced all together have a significant effect on Sustainable Marine Tourism.

These results indicate that the model used in this study is good enough to explain the variation in the dependent variable. In this context, it is essential to see that although some of the independent variables are not partially significant, when tested simultaneously, all of them collectively exert a significant influence on the dependent variable. This indicates that factors related to environmental conservation cannot be viewed in isolation but must be considered holistically to understand their impact on sustainable tourism.

The conclusions from these simultaneous tests provide a more comprehensive explanation of how the various elements affecting environmental conservation are interconnected and impact marine tourism. This is important in policy formulation, as to improve the sustainability of marine tourism in NTB, more thorough and integrated actions must be taken by the government, community, and environmental conservation efforts.

Coefficient of Determination  $(R^2)$ 

The coefficient of determination  $(R^2)$  is a measure that shows how well the independent variables in the regression model can explain variations in the dependent variable. In this study, the value of  $R^2 = 0.510$  indicates that 51% of the variation in the Sustainable Marine Tourism variable can be explained by the independent variables used in the model, such as the importance of environmental conservation, Government efforts, public awareness, and challenges faced. Meanwhile, the remaining 49% is influenced by other variables not included in this research model.

The R² value of 0.51 indicates that this model can explain the phenomenon under study, although other variables outside the model also influence it. Other variables not included in the model may include broader Government policies, economic support for the tourism sector, tourism infrastructure, and external factors such as climate change and natural conditions in the NTB region. In this case, the researcher suggests that additional variables such as tourist perceptions of security, private sector participation, climate change, and natural conditions should be included in further research to get a more complete picture.

With a good R² value, this study has provided valuable insights into the factors influencing sustainable Marine tourism in NTB. The results also provide a strong foundation for local governments and other stakeholders to develop more focused policies in support of sustainable tourism, taking into account environmental conservation aspects and increasing public awareness. However, this study also recognizes limitations that need to be considered, especially related to other variables that may also play an important role in future marine tourism sustainability.

### 4. CONCLUSION

Overall, this study shows that environmental conservation, particularly community awareness and conservation challenges, are key factors influencing the sustainability of marine tourism in NTB. However, more attention needs to be paid to the effectiveness of Government policies and more tangible conservation efforts so that the community and the tourism sector can significantly feel the impact.

This study declared all items on the Environmental Conservation and Sustainable Marine Tourism variables valid and reliable. This indicates that the instrument used can measure variables accurately and consistently. The validity value indicates a reasonably high correlation between the questionnaire items and the measured variables. In addition, the reliability value with Cronbach's Alpha  $\geq 0.70$  ensures that this instrument can be used consistently in repeated measurements.

The results of multiple regression analysis show that several aspects of Environmental Conservation have a significant influence on Sustainable Marine Tourism. In particular, the variables of the importance of environmental conservation for the future of NTB and public awareness of the importance of conservation have a significant favorable influence. This suggests that the community's perception of the importance of protecting the environment and the level of community awareness of the importance of conservation are essential factors in supporting the sustainability of marine tourism.

Challenges in conservation efforts were also shown to significantly influence sustainable Marine tourism. The greater the challenges recognized, the greater the drive to improve tourism sustainability efforts. This suggests that challenges are not only seen as obstacles but can also motivate increased conservation-related awareness and actions, ultimately supporting tourism sustainability. Despite the government's conservation efforts, community perceptions of the government's actions and adequate conservation efforts do not significantly affect sustainable Marine tourism. This may be because the community has not yet felt the real impact of the Government's conservation policies or actions, so its contribution to tourism sustainability has not been felt significantly.

Simultaneous testing through the F-test shows that all independent variables together significantly affect sustainable Marine tourism. These results confirm that achieving sustainable marine tourism requires comprehensive attention to various aspects of environmental conservation, which interact and influence each other. Finally, the coefficient of determination (R<sup>2</sup>) of 0.510 indicates that 51% of the variation in sustainable Marine tourism can be explained by the



environmental conservation variables studied. However, 49% of the variation is still influenced by other factors not included in this model, such as broader government policies, tourist perceptions, natural conditions, and private sector participation.

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