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Achieving Sustainable Tourism through Payment for Ecosystem Service (PES) Program: Case Study of Marine Tourism in Gili Matra Indonesia

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Abstract: Harmonization of tourism and conservation activities can be used to achieve sustainable tourism. Regarding this matter, the Payment for Ecosystem Services (PES) program could be a promising solution to be implemented. By considering marine tourism in Gili Matra, Lombok, this study applied quantitative research method to analyzed the possibility of sustainable tourism development through the PES scheme for harmonizing marine tourism and preserve coral reefs. Data was collected thorugh survey to 100 international tourists that were selected randomly. Using the Contingent Valuation Method (CVM), this study found that international tourists were willing to pay an average of USD 21.46 per visit to contribute to the PES program to sustain the existence of coral reefs and other marine biotas as ecosystem services provided by Gili Matra. The tourists' educational and income levels influenced their willingness to pay.
Keywords: Coral Reef; Conservation; Willingness to Pay; Contingent Valuation Method; Environmental Awareness
JEL Classification: O13, Q56, Q57, P28

Introduction

The North Lombok Regency in West Nusa Tenggara Province (NTB) has a very strategic position concerning the development of the tourism sector with the Gili Matra region's existence, which consists of a group of small islands: Gili Air, Gili Meno, and Gili Trawangan. The relatively increasing number of visits to Gili Matra has an impact on the increasing availability of hotels, accommodation, and other infrastructure, which, in turn, can have a negative impact on the environmental capacity, both on land and at sea (Abeyratne, 1999; Burger, 2000; Giannoni & Maupertuis, 2007). As Saptutyningsih (2004) also mentioned, tourism may lead not only to a positive impact on the economy but also a negative impact on the environment, especially regarding the land carrying capacity.

The biggest feature of Gili Matra's tourist attractions is the marine park's beauty, including coral reefs and the marine life that surrounds it. Marine tourism activities promoted place more emphasis on economic aspects, in which tourism activities are highlighted to have a maximum positive economic impact.

At the same time, the conservation aspect is not given enough attention so that the condition of coral reefs and other marine biotas, which are the main tourist attractions, continues to deteriorate. If this continues, marine parks in the region will no longer be attractive in the long run and will have a negative impact on the tourism sector due to the reduced number of tourists visiting the area. The next impact is that economic growth, which previously depended on the tourism sector, will experience a slump (Giannoni & Maupertuis, 2007).

In order to prevent this from happening, efforts are needed to harmonize tourism and conservation activities (Budowski, 1976). In this case, Gili Matra's tourism activities need to be aligned with conservation efforts, including the conservation of coral reefs. One potential effort to be made is the Payment for Ecosystem Services (PES) program (Barr & Mourato, 2009). Payment for Ecosystem Services (PES) is defined as a voluntary transaction, in which clearly identified ecosystem services are purchased by at least one environmental service buyer from at least one environmental service provider in a condition that the provider continues to conserve the associated resources to ensure the ecosystem services' sustainability (Sunderlin et al., 2005; Wunder, 2007).

Associated with the concept of PES, tourism businesses and tourists are on the demand side, which acts as 'buyers' of ecosystem services, should pay a certain amount for the cost of preserving coral reefs and other marine biotas. On the supply side, related institutions, such as the Ministry of Maritime Affairs and Fisheries or local fishermen community, may act as 'sellers' of the ecosystem services. The funds collected from the Payment of Ecosystem Services are then directed to local communities' conservation activities and empowerment.

Research on PES programs' contributions to sustainable natural resource management and community empowerment has been conducted in various countries. For example, Bremer et al. (2014) found that PES programs in Ecuador contributed positively to community empowerment and sustainable natural resource management. In Vietman, Suhardiman et al. (2013) revealed that PES might contribute to better natural resource management if the competitive market exists or the government is involved in designing and enforcing the regulation. Mangubhai et al. (2020) recommend that Marine Conservation Agreement in Fiji, which is similar to PES, can contribute to protecting marine resources that can be achieved through strict monitoring and enforcement of the agreement. Research conducted in Raja Ampat Indonesia by Atmodjo, Lamers and Mol (2017) suggests that there was no apparent impact of the PES scheme on the ecosystem services provision in the region due to the lack of clearly defined ecosystem services.

Research conducted by Allendorf and Yang (2013) in China showed that an understanding of ecosystem service could be the basis for harmonizing the relationship between people's economic livelihoods and environmental conservation. Nevertheless, the research focused more on raising the awareness of related parties and did not formulate activities to harmonize economic activities and conservation. Meanwhile, Schuhmann et al. (2013) analyzed the scuba divers' willingness to pay for marine biodiversity in Barbados, the Caribbean island. They uncovered a potency for marine biota conservation

through the economic benefits of dive tourism activities in the area. However, this study did not recommend a scheme to balance tourism activity with the conservation of coral reefs and marine biota.

Research that examines the scheme of harmonization of tourism and conservation activities is still lacking and remains a gap in the literature. Thus, to fill the literature gap, this study aimed to analyze the potential for harmonization of marine tourism activities and marine conservation, in this case, coral reefs, through the PES scheme. The creation of a PES system is expected to contribute positively to marine resources' sustainability, including coral reefs as a major tourist attraction in Gili Matra and local communities' empowerment to create sustainable tourism activities. By taking the Gili Matra area as a case study, it is expected that this study can suggest a policy that can be applied in other similar marine tourism locations to create a harmonious relationship between tourism, conservation, and the empowerment of local communities.

Research Method

This study employed a quantitative method. Data for this study were collected through a survey of 100 international tourists in Gili Matra selected randomly. The survey collected information on tourists' opinions about the state of coral reefs' benefit for humans and the respondents themselves. Then, the survey sought tourist willingness to pay (WTP) for coral reefs conservation. The maximum WTP of tourists for coral conservation was modeled and elicited through a Contingent Valuation Method (CVM) (Bateman & Turner, 1992). This method uses survey techniques to find out how much the value of environmental good and service for individuals or society.

In this survey, the CV (Contingent Valuation) questions provide a hypothetical scenario that the local government would charge every tourist a certain amount of money used explicitly for coral conservation. A bidding game technique (Calia & Strazzera, 1999) was used to capture the maximum amount of money that tourists were willing to contribute to the sustainability of the coral reefs ecosystem.

This study also identified factors influencing the amount of WTP of the tourist. For this purpose, an econometric model was developed as follows:

$$WTPi^* = \beta x_i + \varepsilon_i$$

where β is a vector of the slope parameter, and x_i is an observation vector on the independent variable for individual i. The error term (ε) is assumed to be a normally distributed random variable with an average of zero. The respondents' WTP was hypothesized to be influenced by several independent variables: education, income, gender, and previous visit. A stepwise regression technique was utilized to find the best model that could further be used for analysis.

Result and Discussion

Respondents' Characteristics

Gender

One hundred international tourists were randomly selected as respondents of this study. Among them, 53% were female, and 47% were male.
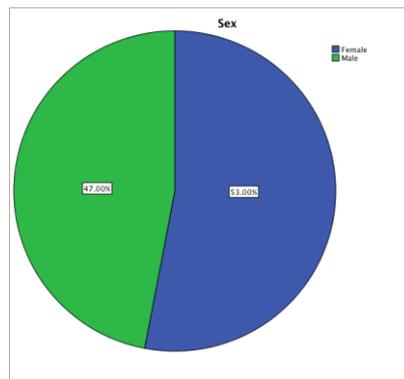
Figure 1 Gender

Education

Education was measured by the length of school (years) taken by the respondents. Out of the hundred respondents, most of them (37%) have studied for 16-20 years or with the highest-level equivalent to Senior High School. In the second place, 31% of respondents were educated over 20 years. Meanwhile, the respondents' lowest education level was 6-12 years, with 12%.
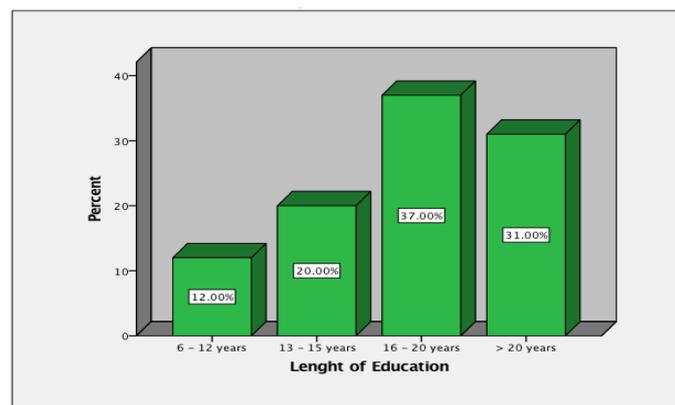
Figure 2 Education

Income

The respondents' income was proxied from their expenditure. It was done because income is personal and confidential data for most Westerners. To produce valid and

unbiased income data, a proxy was employed using the expenditure variable. Based on the expenditure level, respondents were divided into four groups: (1) less than 1,000 USD; (2) 1,000 - 2,000 USD; (3) 2,000 - 3,000 USD; (4) more than 3,000 USD. Of the hundred respondents, the majority had monthly expenditures of between 1,000 - 2,000 USD, with a percentage of 42%. Meanwhile, the smallest group of respondents had a monthly expenditure of 2,000 - 3,000 USD, with 8%.

Origin of Respondents

In this study, most respondents came from Germany with a percentage of 14% and Britain with 12%. In the third place, most respondents were from France with a percentage of 11%. Meanwhile, in the fourth place, most respondents came from Australia and America with 8% each. Other respondents came from various countries in the world.
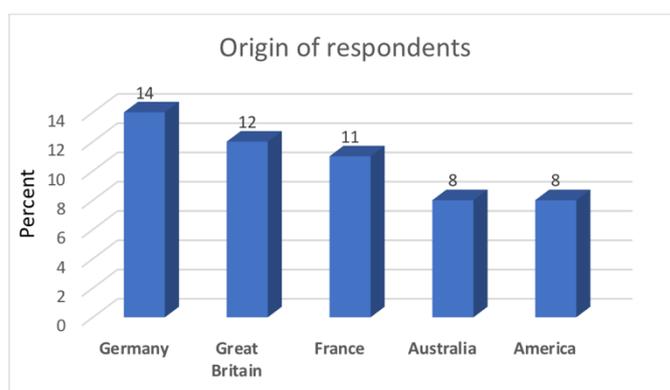
Figure 3 Origin of Respondents

Previous visit

Of the one hundred respondents, 52% were tourists who had previously come to Gili Matra. Meanwhile, 48% of respondents were tourists who visited Gili Matra for the first time. Tourists who had visited Gili Matra before, the majority had visited 1-3 times with a percentage of 66%. Meanwhile, 20.83% of them had visited 4-6 times. Only 12.5% of these tourists had the frequency of previous visits more than six times.
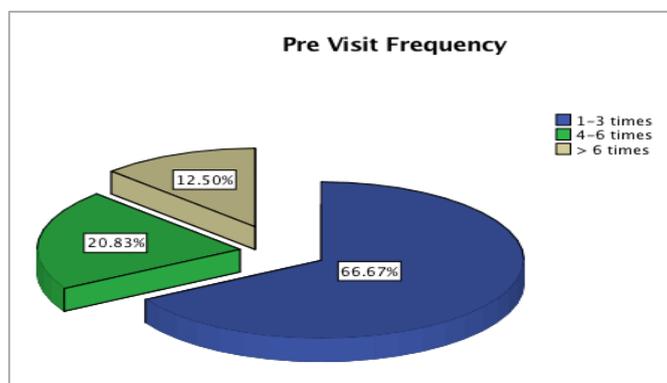
Figure 4 Previous visit

Willingness to Pay by Tourists for the Conservation of Coral Reefs

The survey results using the Contingent Valuation Method (CVM) showed that the average willingness to pay (WTP) of international tourists for ecosystem service fees or coral reef conservation funds on Gili Matra was USD 21.46 per visit. The lowest WTP was zero USD, meaning that tourists did not want to pay for ecosystem services or funds for coral reef conservation. Meanwhile, the highest WTP was 200 USD per visit. Most respondents (20% of them) were willing to pay 5 USD.

Based on this result, this study argues that there is a potency to harmonize tourism and natural resource conservation. This finding is in line with Schuhmann et al. (2013) and Mangubhai et al. (2020). For effective PES implementation, a clear definition of the ecosystem services is needed, as Allendorf and Yang (2013) mentioned. Thus, the unclear impact on nature conservation found by Atmodjo et al. (2017) can be avoided. This study also supports Suhardiman et al. (2013), considering the government's involvement in regulating the PES program.

However, not all respondents in this study agreed with the PES contribution. About 12% stated they did not want to contribute. They put forward several reasons, including that repairing coral reefs is the Indonesian state's responsibility. Besides, they did not believe if the money collected would be used properly. Several other respondents did not want to contribute but gave no reason. Some factors influenced the respondents' WTP. This matter is discussed in the following paragraphs.

As mentioned in the method section, the econometrics model in this study was run using the stepwise regression technique to find the best model that could be used for analysis. It was a model that all the independent variables significantly influenced the dependent variable. It resulted in three models, as exhibited in Table 1.

Table 1 Regression Estimation Coefficient

Variable	Model 1		Model 2		Model 3	
	Betta	**t statistic**	**Betta**	**t statistic**	**Betta**	**t statistic**
Constant	36,741	2,755*	36,562	2,761*	31,295	2,436*
Education	-6,338	-2,124*	-6,428	-2,188*	-6,077	-2,063*
Income	7,501	2,403*	7.482	2,410*	7,396	2,367*
Gender	-8,626	-1,480	-8.661	-1,494		
Previous visit	-1.208	-0,206				
F-statistics	2,897*		3,888*		4,656*	
Adj R^2	0,071		0,080		0,069	

* Significance at α 5%
Source: Data processed.

Table 1 presents the effects of independent variables on the amount of money that respondents were willing to pay for coral reef conservation. The estimated regression coefficient showed the marginal impact of the independent variable on the amount of money that was willing to be paid by respondents.

The stepwise regression resulted in three models in this study, as presented in Table 1, namely:

Model 1: WTP = f (Education, Income, Gender, Previous visit)
Model 2: WTP = f (Education, Income, Gender)
Model 3: WTP = f (Education, Income)

From the three models, it was found that the third model produced the best-estimated value. Only two of the estimated coefficients, namely education and income, significantly affected the WTP at a significance level of 95%. It signified that these variables significantly affected the amount of money that respondents were willing to pay for coral reef conservation through ecosystem service fees. Respondents' income had a positive and significant impact on the amount of WTP. Respondents with high incomes tended to have a higher WTP value. An increase in income by 1% would increase WTP by 7.39%, ceteris paribus. This finding reflects someone's level of environmental awareness, supporting Altin et al. (2014) and Duroy (2005), who argue that when family income increase, the level of environmental awareness also increases. However, this study contrast with Jacobsen and Hanley (2008), who state that the rise of income will be followed by lower WTP for environmental conservation.

The education coefficient sign was negative, indicating that the higher the respondents' education, the lower their willingness to pay for ecosystem service fees. A one-year increase in respondent's education would reduce his/her WTP by 6.07%, ceteris paribus. These estimation results contradict the expectation that people with high education levels are more aware of environmental conditions and are thus more willing to contribute to conservation efforts. This finding also contrasts with Aminrad, Zakaria and Hadi (2011) and Altin et al. (2014), who found increasing education level would increase someone's environmental awareness level.

Meanwhile, the tourist's previous visits to the tourism destination and gender did not affect tourists' willingness to contribute to the Payment of Ecosystem Service fees. This finding does not corroborate with Altin et al. (2014), who argue that women have better environmental awareness than men.

This study contributes to the literature on sustainable tourism. It can reference sustainable tourism in the small island through PES application that considers international tourists on the demand side.

Conclusion

This study found a potency to balance tourism and coral reefs conservation in Gili Matra, Lombok. This argument comes from the fact that international tourists are willing to contribute to coral reef conservation by allocating cash during their visit. This study found that international tourists who came to Gili Matra were willing to pay an average of 21.46 USD per visit. This amount of WTP was influenced by the respondents' income and

education. High-income people tended to pay more than those who had less income. Ironically, people with better education tended to pay less than those with lower education. This study also concluded that gender and the tourist's previous visit to a tourism destination did not influence their willingness to conserve the related environment.

Considering that there is a willingness to pay from tourists for coral reef conservation, this study recommends that a Payment for Ecosystem Services (PES) program is possible to be developed on Gili Matra to promote the sustainable tourism industry.

This study is not perfect, however. The number of sample are only 100 people which is relatively small. Thus, further study that accommodate larger sample is recommended.

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