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Contingent Valuation of Ecotourism in Marine Parks, Malaysia: Implication for Sustainable Marine Park Revenue and Ecotourism Management

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Abstract: The merging of environmental conservation and ecotourism development results in the establishment of marine parks. The environmental conservation approach recognizes the right and influence of people in biological valuable areas, hence, more attention are given to human and biological preferences. The ecotourism development approach is linked with the environment to generate economic profitability in terms of ecotourism business activities. Information on visitor's willingness to pay provides useful guidelines sustaining on marine ecotourism resources. To determine willingness to pay (WTP) for conservation fees, contingent valuation surveys were interviewed to 215 visitors to Redang Island Marine Park, Malaysia, during April to July of 2007. The results of logit regression showed that the bid amount, respondent income level and local visitors were the most significant predictors of WTP. Results suggest that most visitors would be willing to pay conservation fee considerably higher than the current fee of RM5. The results indicate that visitors are willing to pay for conservation fee about RM7.8 and RM10.6 per visit for local and international visitors. The estimated present value of conservation benefits is estimated to be between RM4.25 mil to RM4.7 mil from the period of 1995 to 2005. Results of this study are very important in assists policy makers in management and operation for marine parks ecotourism especially on revenue mechanism.

Key words: Contingent valuation · Ecotourism · Marine park · Sustainable development · Conservation and economic valuation

INTRODUCTION

Apart from the objectives related to the conservation of marine ecosystem and biodiversity, the establishment of marine parks tends naturally to have a positive effect on the enjoyment and appreciation of natural resources by the public. Marine parks encourage the development of marine tourism and ecotourism. These benefits can be observed in the contribution to income at national or state level due to the arrival of tourists, the generation of direct and indirect employment and an increase in social and cultural development, Mohd Rusli *et al.*, [1]. Marine parks are often suitable as recreational areas or picnic sites as a result of their inherent beauty. The coral reefs, fish, mangroves, coastal vegetation, beautiful beaches and clear blue waters, together with the peaceful and harmonious condition of the islands, combine to offer an area for human enjoyment. This combination is the main attraction to tourists and might be of particular benefit to those who live in urban areas.

The establishment of marine parks as protected areas in Malaysia aims at protecting special biological and environment values. However, because of open access to marine park resources and failure of the market system in restricting their use, over-use and environmental degradation have resulted. The degradation of marine parks might affect the sustainability of ecotourism in future. In addition, the market failure is associated with users not paying the full costs of using the natural resources in the marine parks. Thus it is possible that the park may be subject to excessive use, overcrowding and biological degradation. The high level of usage may result in conflicts between users, the social and biological carrying capacity, limits of acceptable change and potential environmental degradation.

Conflicts between ecotourism uses and conservation needs arise when nature-based tourism industries rely on access and use of the resources in the protected areas. Marine parks as ecotourism sites (protected area) have considerable economic importance to the tourism industry

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and to local communities. The marine parks' ecotourism activities such as scuba-diving, snorkelling etc., may have potential negative effects on their ecotourism resources. Besides, beyond certain use levels, human contact with the natural resources reduces the quality of the recreational experience that can be derived from the resources.

The current management practice for an entrance fee system in marine parks is called "Conservation Fee". Since January 1999, a conservation fee has been imposed on visitors to marine parks. The conservation fee charged for adults is RM5.00 (US$1.32) per person and half price for students, retirees and children. No price differential is made between domestic and international visitors. The money from the entrance fee is put into a Marine Park Trust Fund, which is managed under the Department of Marine Parks and used for maintenance, management and building infrastructure in marine parks. However, this revenue is very low and the fact that low entrance fee charged. The possible implication of this situation is that tourists receive consumer surplus benefits because they only pay for a portion of the enjoyment and experience received from marine parks ecotourism sites. On the other hand, the parks need to gain minimum revenue to cover its operational costs.

In the long term profits for marine parks ecotourism development in Malaysia are disincentives for much needed investments for protection, conservation and operation. Insufficient funding for management and maintenance, inadequate infrastructure and unlimited number of visitors are some factors causing environmental problems and resource degradation in ecotourism sites. Sustainable development of ecotourism resources implies taking courses of action that do not jeopardize the long-term stability of the marine ecological systems or the survival of the key features of the cultural landscapes and marine habitat. To ensure sustainable development for the future of the ecotourism destinations in marine parks, the management approach must take into consideration the ecological, economic, social and cultural parameters. Thus, the ecotourism development must prepare to balance the needs and preferences of visitors, contribute benefits to local people and at the same time sustain the role of conservation of marine biodiversity.

The purpose of this study is to assess the value of ecotourism development in marine parks in Malaysia by using environmental economic tools to help develop management policies that enhance ecotourism contribution to sustainable development and conservation in Malaysia.

The Application of Contingent Valuation Method: The development of environmental valuation in Malaysia is very slow compared to other developing countries in Asia, Latin America and Africa. It began in the late 1980s and early 90s. The earlier stage uses of environmental valuation in Malaysia focus on the valuation of non-timber forest products such as rattan, bamboo, medicinal plants, wildlife, soil protection, carbon sequestration, biodiversity conservation and recreational opportunities, Mohd Rusli *et al.,* [2].

Nowadays, the development of environmental valuation in Malaysia has been rapid and it is increasingly used, not only focusing on non-timber forest products but also on various sectors includes ecotourism. In most applications, CVM has been the most commonly used approach, directly asking respondents' whether or not they would be willing to pay a certain amount of money for realizing the level of the non-market good described [3]. Table 1 shows some of the environmental goods and services studies by using CVM methods in Malaysia.

A study by Nik Mustapha [4] was carried out at Tasik Perdana recreational area in Kuala Lumpur using the dichotomous choice contingent valuation method incorporating the logit and probit models. The mean willingness-to-pay ranged from RM84 to RM106 from both models while the median WTP ranged from -RM109 to RM36. Median WTP measures was argued to be more robust than the mean WTP and in this study he concluded that the median WTP figure for the outdoor recreational resources in Tasik Perdana recreational resources in Tasik Perdana was about RM36.

Alias *et al.,* [5] conducted a study of willingness of Local Tourists to Pay for Conservation of Tourism Sports in the Damai District Sarawak. The study applied the dichotomous choice of Contingent Valuation Method (CVM) to visitors sampled randomly. Results using the logit model indicated a per person median value of RM11.64 WTP for the preservation of Damai.

Alias and Ruhana [6] apply the dichotomous choice CVM to the outdoor-recreational resources of the Malaysian Agricultural Park, Bukit Cahaya Sri Alam, Selangor. The WTP figure derived from the model shows that visitors are willing to pay higher fees than the present fees charged. Jamal and Shahariah [7] applied the Dichotomous-Choice Contingent Valuation Method on Paya Indah wetlands in Kuala Langat, Selangor to estimate the non-marketed benefits of conserving the wetland from the perspective of non-users, in particular among urban households in Selangor. Results indicate that the mean willingness to pay (equivalent surplus),

Table 1: Examples of contingent valuation Studies in Malaysia

Year	Researcher	Environmental Goods and Services	Estimated WTP (Mean or Median) (RM)
1993	Abdullah, N.M.	Urban Park	RM36
1998	Yeo, B.H.	Marine Parks	RM16
2002	Jamal and Shariah	Mangrove Forest	-
2002	Alias *et al.,*	Tourism Sport	RM 11.64
2003	Alias and Ruhana	Agro-Park	RM28-RM 31
2008	Alias Radam *et al.,*	Wetland	RM3.77
2005	Puan Chong *et al.,*	Highland Forest	RM20-RM27
2007	Dayang Afizah *et al.,*	National Park	RM7.80
2008	Zaiton Samdin	National Park	RM6.30- RM 18.50

Table 2: Number of Visitors to Pulau Redang Marine Park

Year	International Visitors	%	Domestic Visitors	%	Total
1995	4,035	18	18,690	82	22,725
1996	7,755	22	26,988	78	34,743
1997	5,940	16	30,258	84	36,198
1998	7,544	22	26,922	78	34,466
1999	7,559	16	39,449	84	47,008
2000	9,244	18	43,390	82	52,634
2001	8,041	11	65,539	89	73,580
2002	7,563	12	56,263	88	63,826
2003	4,565	06	71,654	94	76,219
2004	31,251	22	111,225	78	142,476
2005	24,296	20	98,863	80	123,159

Source: Department of Marine Parks

which reflects the non-use values of Paya Indah wetlands, accrued to urban non-user households in Selangor ranges from RM28 - RM31 annually. From all studies mentioned above, it is revealed that the large sum of monetary value that visitors are willing to pay indicates that the magnitude of social benefits that society obtains from conserving nature is highly valued by the general public.

Study Area: The Pulau Redang Marine Parks (PRMPs) are located in the north-eastern corner of Peninsular Malaysia, off Terengganu's coastline. They consist of 11 islands with a fast-growing popularity for tourism and ecotourism. The PRMPs can be further sub-divided into five groups, all of which have been declared as marine parks. These groups are known as Pulau Redang Marine Park (PRMP), Perhentian Island Marine Park (PPMP), Lang Tengah Island Marine Park (LTIMP), Kapas Island Marine Park (KIMP) and Tenggol Island Marine Park (TIMP).

The establishment of PRMP has helped to sustain the marine environment for its use as an ecotourism destination, besides providing an excellent opportunity for visitors to appreciate the beauty of coral, marine life and nature. The existence of the marine park centre at Pinang Island in PRMP gives an opportunity for those who visit the centre to gather relevant information about what is available to see and do within the park. They also gain the knowledge and information required to understand and observe the rules and regulations governing the park. The educational programmes also are conducted to create awareness about the protection and conservation of marine resources and their habitats. Most of the programmes involve government agencies, students and local people continuously throughout the year to educate people about the marine park.

Nowadays, PRMP itself is becoming an increasingly important ecotourism destination in Malaysia. For example, whilst in 1995 PRMP was visited about 22,725 visitors have increased on a yearly basis and in 2005 it received more than 123,000 visitors (Table 2). This overwhelming increase in visitor numbers now poses a serious challenge to the Parks Management, who must cater for the needs of the tourists whilst ensuring that economic concerns, environmental awareness, marine ecosystem protection and conservation are maintained, [2].

MATERIALS AND METHODS

CVM Theoretical Framework: This study attempts to measure conservation benefits from visitors perspective (use values). The contingent valuation method (CV) is used to derive willingness to pay (WTP) of users in PRMP for conservation of marine ecotourism resources. From this value, the aggregate monetary benefits of conserving marine parks are estimated. In estimating this value, the CV with close-ended WTP elicitation format was employed.

Contingent valuation is defined as 'any approach to valuation of a commodity that relies upon individual responses to contingent circumstances posited in an artificially structured market' [8]. In the studies for marine parks, individuals were asked directly to reveal how much they were willing to pay to avoid some assumed levels of decline in the provision of a group of services representing a certain quality of marine parks resources as a marine ecotourism destination. The theoretical basis of CV used in this study is the equivalent surplus (ES) measure of welfare, which measures the amount a person is willing to pay or accept to place him on a better utility or welfare level if changes in quality of goods in question do not occur.

Questionnaire Design: The survey questionnaire is a survey instrument that sets out a number of questions to elicit the monetary value of a change in a non-market good. Hence, it should be designed to get respondents to think seriously about the topic of interest, to provide the necessary information for them to be able to make informed decision and to encourage them to identify and reveal their monetary valuations.

Contingent valuation method (CVM) uses survey question to elicit the society's preference for public goods by creating a hypothetical market. CVM questionnaires can be designed to elicit willingness to pay (WTP) or willingness to accept (WTA) estimates for a change in the level of provision of a public good. Eventually, the decision to use WTP or WTA depends on the property rights of the good. However, WTA estimates are often biased upwards; therefore most of CV studies are designed to elicit WTP estimates [9].

Questionnaire for this research has been designed to gather primary information such as socio demographic profile, attitude and visitors' willingness to pay for ecotourism resources in marine parks. The questionnaires consist of structure question that divided into two forms: dichotomous choice and multiple categories question. Generally, the questionnaire will divided into four categories; (a) characteristic of visitors and society, (b) attitude of visitors in relation to sustainability of ecotourism resources, (c) visitor's perception about ecotourism resources and (d) willingness to pay of visitor for marine parks conservation fee (bid price presented).

A dichotomous choice question offers just two answer choice, yes or no. Meanwhile, the multiple categories question has more than two answers. Dichotomous choice is a single, "take it or leave it (TIOLI)" bid offer presented to each respondent. This technique is simple and inexpensive to administer by mail. However, the information derived from the responses must be transformed into WTP or WTA estimates based upon a utility theoretic method which predicts the probability of a yes response.

For the purpose of this study, primary data from 215 visitors were collected in PRMP through interviews by mean of questionnaires. Information on socio-economic characteristics of respondents obtained included race, place of origin, age, marital status, education and size of family members, occupation and monthly and supplementary gross income. The personal interviews were conducted on visitors at marine parks by filling the questionnaires at the chosen location. Each of the respondents was told regarding the details on the purpose of preservation of island, facilities available and format used in CVM. Respondents were asked the following question and required to respond either 'Yes' or 'No':

'If the conservation fees are increased by RM x, would you willing to pay so that you could continue to use this ecotourism site?'

Where x ranged from RM6 to RM10, representing a 'reasonable' additional amount of conservation fee to many privately managed marine parks in Malaysia.

Willingness to Pay Estimation: Following recommendations from environmental literature [10], the closed-ended (CE) WTP approach to estimate the benefits from the conservation and preservation the marine parks was used. The Visitors were asked as whether they would pay specific additional fees amount for a given commodity, with possible responses being "YES" and "NO". The bid amount is varied across respondents and the only information obtained from each individual is whether his/her maximum WTP is above or below the bid offered.

Logistic regression technique was used to estimate WTP [11]. Using this approach the probability of saying "YES" to a bid at different level of the independent variable is estimated as

$$P = (1 - e^{x})^{-1} \quad (1)$$

Here, x is the "bid amount" (price) and P is the probability of accepting the price. Mean WTP is estimated as the area under this probability function. This area shows the proportion of the population who would consume the good at each price level and their associated utility. The area under the curve is estimated by integration techniques and can be expressed as;

$$E(WTP) = \int_{L}^{U} (1 + e^{a + bPRICE})^{-1} dPRICE \quad (2)$$

Where, $(1 + e^{a + bPRICE})^{-1}$ are the probability of saying "YES" and U and L the upper and lower limits of the integration respectively.

Estimating mean WTP within this framework relies on making some assumption about upper and lower limits of the integral, i.e. knowing the price amounts at which probability saying "NO" is zero and probability saying "YES" is one. Applying this to marine parks and assuming that individuals will not pay if they receive a disutility from it, negative WTP can be ruled out and zero is used as the lower limit. Bishop and Heberlein [12] and Sellar *et al.*, [8] used the upper range for the integration of their price amounts as the upper limit for the integration. Hanemann [11] argued that such an approach makes a certain assumption about the probability distribution for the unknown WTP in the sample. He argued that the upper limit should be infinity and that using the highest offered amount may be a poor approximation of the mean utility estimated when integrating between zero and infinity. In this study, zero was chosen as the lower limit of the integral and the maximum value as the upper limit. Confidence interval of WTP also calculated using the variance-covariance matrix and a technique adopted for dichotomous CVM by Park *et al.,* [13].

The ability to seek willingness to pay is represented by the dichotomous variable of WTP with values of 1 for those willing to pay the additional amount of conservation fee and 0 is otherwise. An OLS regression of the above relationship with WTP as the dummy variable is beset by several problems namely: (1) non-normality of the error term, (2) heteroscedasticity and (3) the possibility of the estimated probabilities lying outside the 0-1 boundary [14]. Since the dummy WTP is actually a proxy of the actual propensity or ability of willingness to pay, the probit and logit models guarantee that the estimated probabilities lie in the 0-1 range and that there are nonlinearly related to the explanatory variables. The differences between these two approaches are mainly in the distribution of the regression error terms. The logit approach assumes that the cumulative distribution of the error term is logistic while probit assumes that is normal.

RESULTS AND DISCUSSIONS

Sample Characteristics: The socio-economic characteristics of respondents for PRMP are shown in Table 3. Majority of the respondents were male (58.1%), their age in mid-twenties to mid-thirties, college and university graduates and work with private sectors. However, majority of respondent's gross monthly income levels was very low (RM1001-RM2000). People in this age category with this level of education attainment and higher in income level are likely to be aware of conservation and environmental issues. However, with demographic variables, there seems to be no consensus on the economic literatures as to the sign and important of income on conservation and environmental concern.

Contingent Valuation Method Estimates: Table 4 shows only PRICE, INCOME and LOCAL TOURIST among demographic variables had significant impact on WTP for conservation of marine ecotourism in Redang Island Marine Park. Other socio-demographics variables such as age, gender, employment, educational levels are not significant for both models. However, in this case, both results show consistent with findings in the economic literature where the influence of these variables on WTP environmental services is not conclusive.

Income is a significant variable and positive relationship in the analysis for both models (logit and probit) which consistent with some of previous studies in marine parks. Normally, high-income respondents put a premium on environmental conservation compared with their lower income.

Table 5 shows the result of estimating of mean WTP for PRMP. Estimating the logit model at the sample mean predicted respondent WTP value equal RM7.84 for local tourist and RM10.63 for international tourist. It is worth noting that the mean WTP value quoted by local respondent below the mean WTP value international respondents. This disparity in WTP given the higher income of foreign tourist and their better ability to pay compared domestic tourists in PRMP.

Table 3: Socioeconomic Profile of Respondents

	PRMP (n=215)	
	Freq.	Percent
Gender		
Male	125	58.14
Race		
Malay	94	43.72
Chinese	108	50.23
Indian	2	0.93
Others	11	5.12
Education level		
Primary school	8	3.72
Secondary school	57	26.51
College/institute	51	23.72
University	99	46.05
Marital status		
Single	86	40.00
Married	126	58.60
Widow	3	1.40
Employment status		
Student	13	6.05
Self-employed	24	11.16
Work with government	28	13.02
Work with private sector	131	60.93
Others	19	8.84
Age		
Less than 25 year	3	1.40
26 - 30 year	91	42.33
31 - 35 year	62	28.84
36 - 40 year	32	14.88
41 - 45 year	18	8.37
46 - 50 year	4	1.86
More than 50 year	0	0
Origin of tourist		
Domestic tourist	164	76.28
International tourist	51	23.72
Income level		
Less than RM1000	11	5.12
RM1001 - RM2000	85	39.53
RM2001 - RM3000	43	20.00
RM3001 - RM4000	22	10.23
RM4001 - RM5000	16	7.44
More than RM5000	38	17.67

Table 4: Parameter Estimates for Dichotomous Choice Model

	Logit Model	Probit Model
Intercept	3.0850	1.8914
	(2.9151)*	(2.9974)*
PRICE	-0.2257	-0.1413
	(-2.4263)*	(-2.4899)*
INCOME	0.00019	0.00012
	(2.2759)*	(2.3360)*
LOCAL TOURIST	-1.3903	-0.8232
	(-2.5852)*	(-2.7265)*
Log-likelihood	-120.7700	-120.3300
MCFADDEN R-SQUARE	0.1314	0.1346
% Right Prediction	66.98	66.98

Note: Figure in the parentheses is t-ratio and * Significant at 1% level

Table 5: Estimating of Mean WTP

Model	Tourist Origin	WTP (RM)
Logit Model	Local tourist	7.84
	International tourist	10.63
Probit Model	Local tourist	7.11
	International tourist	9.81

To compute the aggregate benefit of conservation in study site, we used the estimated WTP from Table 5. The numbers of parks visitors of 11 years (1995-2005) were used; resulting in a figure of 0.71 mil visitors to PRMP over the period. By using the mean WTP for logit and probits models, gives the average benefits estimate of RM 0.064 mil per year for PRMP (Table 6).

To translate these annual benefits into the total present values of the conservation of ecotourism, we discounted the benefits accruing using an estimate of the social discount rate. Social discount rate is appropriate here because the park is a public good and should be lower than Malaysia market interest rate. An estimate of 3% of discount rate was used in this calculation. Using this rate, the estimated present value of conservation benefits in PRMP is estimated to be between RM4.25 mil to RM4.7 mil.

Table 6: Estimated Benefits (RM) of Conservation in PRMP based on Logit and Probit

			Logistic Model			
	Number of Visitors		Logit Model		Probit Model	
Analysis Year	Domestic	International	Domestic WTP = 7.8	International WTP = 10.6	Domestic WTP = 7.1	International WTP = 9.8
1995	18,690	4,035	146529.6	42892.1	132885.9	39583.35
1996	26,988	7,755	211585.9	82435.7	191884.7	76076.55
1997	30,258	5,940	237222.7	63142.2	215134.4	58271.4
1998	26,922	7,544	211068.5	80192.7	191415.4	74006.64
1999	39,449	7,559	309280.2	80352.2	280482.4	74153.79
2000	43,390	9,244	340177.6	98263.7	308502.9	90683.64
2001	65,539	8,041	513825.8	85475.8	465982.3	78882.21
2002	56,263	7,563	441101.9	80394.7	400029.9	74193.03
2003	71,654	4,565	561767.4	48526.0	509459.9	44782.65
2004	111,225	31,251	872004.0	332198.1	790809.8	306572.3
2005	98,863	24,296	775085.9	258266.5	702915.9	238343.8

CONCLUSION

Our study on willingness to pay for conservation fee in PRMP has shown encouraging results. Generally, most visitors report that they are willing to pay substantially more than the current conservation fee practice. The findings show that most of the respondents are willing to pay for the conservation fee and higher than current charged. Local and international visitors are willing to pay 50% and 100% of conservation fee higher than current conservation fee of RM5 respectively.

The aim of this study was to estimate the WTP for conservation benefits of ecotourism in PRMP. Given concerns about increasing coral reef damage in marine parks and lack of awareness among visitors on marine beauty resources, the results of the study could be useful to park management in setting appropriate conservation fee. The results indicate that visitors are willing to pay about RM7.80 to RM10.60 per annum for conservation, resulting in total benefits of between RM4.25 mil to RM4.7 mil, using a social discount rate of 3%.

Our study suggests that the park authorities may wish to consider increasing the current conservation fee. However, perhaps the uncertainties in the real effects on visitation of a conservation fee increase, the implementing this fee on a trial basis or pursuing incremental increases over time should be considered. In addition, the findings show that the international visitors are willing to pay conservation fee almost double than local visitors. Our study suggests that the parks authorities may wish to consider 'multi-tiered' conservation fees. Lindberg [15] justified that the international visitors receive substantial enjoyment from the experience in ecotourism sites, yet pay low entrance fees and they do not pay taxes to support the park. Thus, in this case, multi-tied structure may be more suitable and may wish to consider implementing in marine parks.

The study reveals that an increase in the conservation fee is likely to provide additional resources for conservation and sustainable revenue on ecotourism development in marine parks. This effort would contribute significantly to reduce some of the issues and problems arise in marine parks; lack of financial for maintenance and operational, carrying capacity and congestions issues.

The implication of this study is important as a guideline to assist the park authorities or decision-makers in terms of welfare measures such as ecotourism and conservation benefits especially considering the importance of our natural resources in order to meet developmental needs and other economic activities. The findings of this study may also be incorporated in the economic analysis for determining the viability of conserving the marine ecosystem in the long run. Furthermore, the estimated benefits obtained from this study (source) may be transferred to other similar marine parks for the purpose of policy or management decisions affecting the target resource.

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