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Willingness to pay for protecting natural environments in Pulau Redang Marine Park, Malaysia

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Although marine parks, national parks, wildlife sanctuaries and reserves are established to conserve biodiversity and enhance ecotourism, some of the country's protected areas are under threat whether at varying degree. The biggest threat arises from human encroachment. To rescue these resources, appropriate conservation strategy must be put in place. This requires proper valuation of the environment. Taking Pulau Redang Marine Park (PRMP) as a case, information on people's willingness to pay (WTP) to protect the environment was gathered. Using the dichotomous-choice contingent-valuation method (CVM), it was found that the recreationists are willing to protect the park. The study showed that the average WTP ranged between RM10.86 and RM28.69 that could contribute between RM1.65 million and RM4.36 million in aggregate for the year 2008.

Key words: Contingent valuation method, ecotourism, marine park, sustainable development, conservation and economic valuation, Malaysia.

INTRODUCTION

The value of protected natural environments is important in decision-making in an increasingly natural-resource-scarce world. Natural environment includes protected areas such as forest reserves and marine parks which are also potential ecotourism areas. The increasing demand for tourism has led to the development of infrastructure facilities, particularly the development for natural ecotourism areas. However, the economic benefits of natural ecotourism areas are not readily known because of unavailable market price. This is true for the marine resources where the potential and realized benefits for recreation purposes are not valued. If this is not done, the allocation of marine resources cannot be determined optimally and conversion for other purposes might be possible. Quantifying the economic value of natural environment resources can show where goods and services are currently underpriced by the market. It can also indicate whether there is potential to develop new markets, to charge prices for the use of natural resources or to capture natural resource benefits as cash values. Other than generating revenues, prices and market measures can provide an effective means of regulating the demand for resources and of providing incentives for sustainable management.

Demonstrating the economic value of natural resources can make a convincing case for the conservation of the ecosystem. Higgins and Turpie (1997), for example, valued South Africa's mountain fybos ecosystems in order to argue for increasing funding and protection. Spurgeon (1998) showed how valuation can be used to support ecosystem rehabilitation and protection in coastal and marine habitats. Kumari (1995, 1996) calculated the

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economic values of forest and wetlands in North Selangor to make the case for increased international financing to secure global benefits. Specifically, for the case of protected area, the valuation of economic benefits through willingness to pay (WTP) can be used to defend the gazetting of new locations or to argue against changes in their protected status. Emerton et al. (1999), for example, calculated the economic value of ecosystem services and livelihood benefits from Nakivubo wetland in Kampala, Uganda, at more than USD1.5 million a year, using the results to make a strong case for it to be protected as part of the city's green belt.

Pulau Redang Marine Park (PRMP), Malaysia

Pulau Redang Marine Park is located about 45 km (24.2 nautical miles) North-Northeast of Kuala Terengganu. Currently, the population on the island was about 1300 people from more than 200 families. They engage in traditional fishing related activities and supplement their income from petty trading, harvesting of natural resources such as edible birds' nest from the swiflet colonies or guarding of turtle nests and eggs for the Department of Fisheries Malaysia. Some of them are also involved in the tourism activities, as tour boat operators, tourist guides or tour boatmen and assistants. Redang Island offers crystal clear waters and numerous diving sites for enthusiasts.

Redang Island and other several islands in the archipelago are recognized as having one of the best corals and marine ecosystems in Malaysia. The waters surrounding these islands were gazetted as part of the Pulau Redang Marine Park, under the establishment of Marine Park Malaysia Order 1994 (Fisheries Act 1995). The boundary of the marine park is established by a line linking all points to nautical miles from the shores (low water mark) of Pulau Redang and several other smaller islands, that is, Lima, Ekor Tebu and Pinang. The largest island is Pulau Redang, which is about 25 km^2 (9.5 $mile^2$) in area, and is dominated by two imposing North-south ridges separated by a low-lying central valley. The coast on the eastern side of the island is blessed with sweeping, white sandy beaches, while the western side is wilder, rockier in nature. The vegetation on the island is lush, characterized by varied forest types. The goals of the Pulau Redang Marine Park are to protect, conserve and manage in perpetuity marine environment of significance and to encourage public understanding, appreciation and enjoyment of Malaysia's natural heritage by present and future generations. This paradise island is perfect for snokerling, swimming, scuba diving, jungle trekking, boating and canoeing.

MATERIALS AND METHODS

Surveying visitors or recreationists is done by using a structured questionnaire, the source of primary data. Before the questions were asked, the respondents were briefed on the objectives and the purpose of the survey. The questionnaire was administered in a single interview with every respondent. An interviewing session for a respondent took about 30 - 40 min. The approach of CVM for this study used the dichotomous choice – double bounded format. The format gives the respondent an apportunity to choose the amount of WTP. Through this format, the response 'yes' or 'no' was needed for the WTP questions. There are 6 different bids given to different respondents randomly. Each respondent only has to say 'yes' or 'no' to the bid posed to him. Six bids were selected for use: RM1, RM2, RM5, RM8, RM10, and RM30. The charges are chosen based on a pilot study. In a pilot study involving 38 respondents, the study asked (open-ended question) possible payment that respondents might be willing to pay above the current fee (RM5.00). In the pilot study, the lowest WTP given by respondents was RM1 and the highest WTP was RM50. However, only one respondent give RM50. Therefore, RM1 and RM30 were chosen as the lowest and highest WTP respectively. Same method is used by Hall et al. (2002) to determine bid values, based upon results from pre-testing or pilot test. They used open-ended questions which give them values from USD0 - USD260. They choose to place a bid from USD2 - USD100. In order to understand the determinants of the visitor's WTP responses and to see whether these determinants were consistent with economic demand theory, a series of multivariate analyses were performed with the data obtained from the questionnaire. Various independent variables were used to attempt to explain the variation in different measures of visitor's WTP for conservation of the marine park.

This study was concentrated on the users' group for a number of reasons. The individual visitors instead of households were chosen as respondents for interview. "Visitors" were broadly defined as those who use the park and participate in the activities provided. In terms of sample interviewed, Roscoe (Sekaran, 1992) proposes rules of thumb for determining sample size as larger than 30 and less than 500 are appropriate for most research; and for samples that are broken into sub-samples, a minimum sample size of 30 for each category is necessary. As a further guideline, Calia and Strazzera (1998) in their study on bias and efficiency of single versus double bound CVM model, define "small size sample" as sample of 100 or less; categorize sample size of 250 – 400 as "medium size sample"; and more than 1000 as "large sample size". They conclude that even for a medium sample size, both single and double bound CVM perform well in giving point estimates for the parameters and of the mean WTP. Given the limited time and budget constraints, the study managed to obtain 308 responses for the analysis. The survey was undertaken in March-July 2004. The analyses were done in stata/SE 8.0 and LIMDEP 7.0.

Econometric models

Logistic model

The exploration of whether a person is willing to pay for conservation of the marine park was done using logistic model. This model was chosen because of its ability to deal with a dichotomous dependent variable and a well-established theoretical background. The model is specified as follows:

$$P_i = E(Y = 1/X_i) = [1/\{1 + e^{-(\beta 0 + \beta i \sum Xi)}\}] \quad (1)$$

where P_i = the probability that Y =1, X_i is a set of independent variables explained above and β_i is coefficient to be estimated corresponding to logistic distribution. Taking a natural logarithm of Equation (1), the study obtained,

$$L_i = ln\{P_i/(1- P_i)\} = \beta_0 + \beta i \sum X_i + e_i \quad (2)$$

where L_i , which is called logit, is the log of the odd ratios and is linear in both independent variables and parameters. The estimation method to be used will be the maximum likelihood estimator (MLE).

Double-bounded dichotomous choice model

In this model, respondents are presented with two levels of bid where the second bid is contingent upon the response to the first bid. If the individual responds "yes" to the first bid, the second bid (denoted B_i^u) is an amount greater than the first bid ($B_i < B_i^u$); if the individual responds "no" to the first bid, the second bid (B_i^d) is some amount smaller than the first bid ($B_i^d < B_i$).

Thus, there are four possible outcomes: (a) both answers are "yes"; (b) both answers are "no"; (c) a "yes" followed by a "no"; and (d) a "no" followed by a "yes". The likelihoods of these outcomes are denoted as γ^{yy}, γ^{nn}, γ^{yn}, γ^{ny}, respectively. Given the assumption that each respondent is maximizing their utility, the formulas for these likelihoods are as follows. In the first case, the study has $B_i^u > B_i$ and $\gamma^{yy}(B_i,B_i^u) = \Pr\{B_i \leq \max \text{WTP and } B_i^u \leq \max \text{WTP}\}$ (3)
$= \Pr\{B_i \leq \max \text{WTP} | B_i^u \leq \max \text{WTP}\} \Pr\{B_i^u \leq \max \text{WTP}\}$
$= \Pr\{B_i^u \leq \max \text{WTP}\} = 1 - G(B_i^u,\theta)$ since, with $B_i^u > B_i$, $\Pr\{B_i \leq \max \text{WTP} | B_i^u \leq \max \text{WTP}\} \equiv 1$. Similarly, with $B_i^u < B_i$, $\Pr\{B_i^d \leq \max \text{WTP} | B_i \leq \max \text{WTP}\} \equiv 1$. Hence,

$\gamma^{nn}(B_i,B_i^d) = \Pr\{B_i > \max \text{WTP and } B_i^d > \max \text{WTP}\} = G(B_i^d,\theta)$. (4)

When a "yes" is followed by a "no", the study has $B_i^u > B_i$ and

$\gamma^{yn}(B_i,B_i^u) = \Pr\{B_i \leq \max \text{WTP} \leq B_i^u\} = G(B_i^u;\theta)$; (5)

and when a "no" is followed by a "yes", the study has $B_i^d < B_i$ and

$\gamma^{ny}(B_i,B_i^d) = \Pr\{B_i \geq \max \text{WTP} \geq B_i^d\} = G(B_i;\theta) - G(B_i^d;\theta)$. (6)

Given a sample of N respondents, where B_i, B_i^u, and BID1 are the bids used for the ith respondent, the log-likelihood function takes the form,

$$\ln L^D(\theta) = \sum_{i=1}^{N} \{d_i^{yy} \ln \gamma^{yy}(B_i, B_i^u) + d_i^{nn} \ln \gamma^{nn}(B_i,B_i^d) + d_i^{yn} \ln \gamma^{yn}(B_i, B_i^u) + d_i^{ny} \ln \gamma^{ny}(B_i,B_i^d)\}, \quad (7)$$

where d_i^{yy} , d_i^{nn} , d_i^{yn} and d_i^{ny} are binary-valued indicator variables. The ML estimator for the double-bounded model, θ^D, is the solution to the equation $\partial \ln L^D(\theta^D)/\partial\theta = 0$, subject to $\partial^2 \ln L/\partial Q^2 < 0$.

The mean for the double bounded approach is calculated as the area under the probability function of accepting the bid using integration technique. The area shows the proportion of the population who would consume the good at each price level, and their associated utility. It can be expressed as:

$$E(WTP) = \int_L^U (1+e^{a+bWILLINGNESS})^{-1} db \quad (8)$$

where $(1+e^{a+bWILLINGNESS})^{-1}$ is the probability of saying "yes" and U and L are the upper and lower limits of the integration respectively. Whereas the median is as follows:
$\alpha/B1$

Since in the analysis, the studies include covariates, α is a linear function of the covariates, instead of the intercept. That is $\alpha = X\beta$, where X is a vector of covariates and β is a vector of parameters.

Bivariat probit model

Following this, another nonlinear model using bivariate probit was employed to estimate the values with a binary dependent variable, the "yes" and "no" responses to the WTP question. For this model, the estimation of mean and median WTP was done by using the estimated coefficients given by Cameron and Quiggin (1994). The estimation of the coefficients using bivariate probit model includes two related models, which can be expressed as:

$$Y^*_1 = \alpha_1 + \beta_1 B_1 + \sum_{i=2}^{n} \beta_i x_i + \varepsilon_1 \quad (9)$$

$$Y^*_2 = \alpha_2 + \beta_1 B_2 + \sum_{j=2}^{m} \beta_j x_j + \varepsilon_2 \quad (10)$$

$corr\ [\varepsilon_1, \varepsilon_2] = \rho$

Where Y_1 and Y_2 are the binary responses to the WTP questions; B_1 and B_2 are the bids in the first and second bid question; X_i represents socio-demographic variables and α's and β's are the coefficients to be estimated.

EMPIRICAL RESULTS

For the purpose of the study, estimations are undertaken by using both the single and double-bounded dichotomous choice models. For the single-bounded dichotomous choice model, the study estimated the WTP using Logistic model, while for the double-bounded dichotomous choice analysis the study used a log-logistic and log-normal model including the bivariate probit model. The explanatory variables used are listed in Table 1. These variables were included into the models partly because they were believed to be important determinants of WTP.

Willingness = $\alpha + \beta_1$AGE + β_2YRSEDU + β_3INCOME β+ β_4FOREIGN + β_5 PERCEP + β_6VISIT+ β_7BID1 + β_8BID2

Results for the logistic model show that age (AGE) of the respondents and bid assigned for conservation fee are positively related (Table 2). When the age of the respondents increases, the probability of saying 'yes' will increase. Thus, the age of respondents increased by one year; the probability of saying 'yes' increased to 0.5%. Results also show the positive relationship for years in education (YRSEDU). The higher in education resulted higher probability of accepting the bid. In other words, higher educated person is more likely to pay. Besides that, the higher the monthly income (INCOME), the more likely the respondents will accept a given bid. For the perception on recreational facilities and services provided (PERCEP), a positive perception from respondents resulted in higher probability of saying 'yes' or accepting the bid. People who are satisfied with the recreational facilities and services provided are willing to pay more. However, inconsistency in terms of expected sign still remained for variable measuring number of visit (VISIT). The coefficients for bid offered (BID1) are negatively correlated with the probability of acceptance as expected. The negative and statistically significant coefficients on bid suggested that the higher the amount respondents

Table 1. Variables used in estimation models.

Willingness	Dependant variable with 1 if respondent is willing to pay for the amount asked to them, 0 otherwise
AGE	Age of the respondent
YRSEDU	The visitor's number of years in school (Years in education)
INCOME	Monthly gross income (RM/month)
FOREIGN	Foreign visitors (dummy, 1= foreigner, 0=local)
PERCEP	Visitors perception on recreational facilities & services Provided
VISIT	Number of visit (dummy, 1=visit two time & above, 0= first time visit
BID1	Dichotomous choice bid assigned. There are 6 sets of bid; RM1, RM2, RM5, RM8, RM10 and RM30
BID2	Follow-up bid assigned

Table 2. The estimated parameters of the models for the preservation of the PRMPs.

Variable	Coefficient of the models				
	Logistic model initial bid	Bivariate probit		Log-logistic	Log-normal
		WTP^1	WTP^2		
Constant	-0.480(1.208)	-0.344(0.698)	-0.331(0.625)	0.236(0.722)	0.146(0.424)
AGE	0.005(0.018)	0.002(0.010)	0.003(0.009)	0.001(0.012)	0.003(0.007)
YRSEDU	0.142(0.062) **	0.085(0.036) **	0.074(0.032) **	0.125(0.038)***	0.073 (0.023)***
INCOME	0.00004(0.00005)	0.000025(0.000026)	0.0000037(0.000023)	0.084(0.042) **	0.038(0.025)*
FOREIGN	3.138(1.343) **	1.7697(0.641) ***	1.002(0.449) **	1.573(0.595) ***	0.959 (0.367)***
PERCEP	-0.023(0.376)	-0.022(0.216)	0.204(0.203)	0.491(0.258)*	0.270(0.152)*
VISIT	-0.612(0.366)	-0.361(0.217)*	-0.066(0.196)		
BID 1 (start bid)	-0.255(0.042)***	-0.139(0.023)***		-1.665(0.153)***	-0.991(0.083)***
BID 2			- 0.116(0.018) ***		
-2 log likelihood	113.109	251.181		332.870	330.107
No. of obs.(n)	248	248		308	308
Pseudo R^2	0.338				
Chi squared				665.741	660.214

*Significance at 10% level; **significance at 5% level and *** significance at 1% level.

were asked to pay, the less likely they would pay.

For bivariate probit model, the results indicate that the years in education (YRSEDU) have a statistically significant positive impact on both the respondents initial and subsequent decision on their contribution towards willingness to pay for preservation of the PRMP. Namely, the regression coefficient is 0.085 at the initial response and 0.074 at the follow-up response, which means that the higher level in education the higher the probability that people shall accept the proposed willingness to pay or in other words they would be willing to pay more. The foreigner (FOREIGN) variable shows positive relationship of individual's willingness to contribute to conservation effort in PRMP. The value of regression coefficient was 1.77 for initial and 1.002 for follow-up response. Also, the number of visit (VISIT) for this variable only proved to be a statistically significant determinant in relation to an individual's initial bid on willingness to pay for the preservation of PRMP. The regression coefficient is -0.361, which means that in case of respondents with the background or experience visiting PRMP before, the probability of acceptance of initially proposed willingness to pay value reduces, compared to respondents who are visiting PRMP for the first time. In other words, people who are the first time visitors to PRMP would be willing to pay more compared to others who have an experience visiting PRMP before.

The other model tested in this study was log-logistic and log-normal models. According to the results, the coefficients on FOREIGN are significant at 1% level of significance and have positive signs with the WTP, which is similar to the results found in Mahdzan et al. (2000), meaning foreign visitors are more likely to say "yes" to the bid amount offered to them. The coefficient on YRSEDU is also significant at the 1% level of significance and has a positive sign indicating that the higher the education, the more likely the respondents are willing to pay for the preservation of the PRMP. A priori, the study

Table 3. Mean and median WTP estimated for the sample.

Models		Mean WTP (RM)	Median WTP (RM)
Logistic	Initial bid	16.87	16.81
Bivariate probit	Initial bid	17.83	17.20
	Follow-up bid	17.73	16.55
Log-logistic		10.86	5.15
Log-normal		28.69	5.05

would expect that a higher level of education will lead to a higher probability of the bid amount being accepted. This expectation is due to the assumption that educated people have more information and are more aware of environmental issues (Arin and Kramer, 2002). In the study by Lockwood et al. (1993), education has a positive effect on WTP because it is related to income where a higher level of education means a higher income. In relation, INCOME is significant at the 5% level of significance in log-logistic model and 1% level of significance in log-normal model; both are positive sign indicating that the higher the monthly income, the more likely they will agree to pay for preserving the park. This result is in line with the past studies done by Carson et al. (1994) and Alias and Shazali (2005) which indicate a positive relationship between income and WTP. The BID1 is highly significant and has the expected negative sign, meaning that the higher the amount respondents were asked to pay, the less likely they would pay. This demonstrates respondents carefully considered the amount they were asked to pay. All the variables in the double-bounded approach are significant at a different level except for AGE which is insignificant in the double-bounded approach and is therefore, eliminated from the model. This means that the variable “AGE” does not have a significant effect on the probability of saying “yes” to the bid amount offered.

Estimation of mean and median willingness to pay

There are four approaches involved in estimating mean and median WTP, namely through logistic, bivariate probit, log-logistic and log-normal analysis. The calculated mean and median values are listed according to models estimated using different approaches in Table 3.

Referring to estimates obtained from positive WTP responses, the mean WTP was quite close to the median WTP for logistic model. The estimation of the mean WTP was RM16.87. From the bivariate probit models, the mean WTP ranges from RM17.73 - RM17.83 slightly higher than logistic. On the other hand, models estimated through log-logistic provide lower estimates to that of logistic and biprobit model, of RM10.86. The log-normal model provides the highest estimate of RM28.69. From the overall results, the mean WTP is found to be slightly higher than median WTP.

Aggregation

In order to aggregate the WTP for the preservation of PRMP, the individual WTP obtained from the analysis was multiplied by the number of visitors to PRMP. The yearly calculated conservation values or benefits for PRMP based on the mean willingness to pay computed from respected models for the year 1994 - 2008 are shown in Table 4.

In mid-1990s, the expected values based on mean from all models are quite small. However, it increases every year. In 1994, the estimated benefit based on mean willingness to pay for the logistic model was about RM140, 847.63. This value increased more than eighteen times in the year 2008, which is RM2.5 million. For the bivariate probit model was about RM148,862.67 and 2.7 million for initial bid and RM148,027.77 and RM2.6 million for follow-up bid for the same year. Using log-logistic and log-normal analysis, it was estimated the benefit was about RM1.6 million and RM4.3 million respectively for the year 2008. In this study, in order to estimate the economic value of recreational site at Pulau Redang Marine Park, as mentioned earlier, the values of WTP should be multiplied by the number of visitors. To increase the economic value of this Park, a few actions should be taken to encourage more people to visit the park. The current conservation fee (RM5.00) is considered very minimum. Since the maximum WTP found in this study was RM28.69, this value can be used by the authority to determine the appropriate conservation fee.

CONCLUSION AND RECOMMENDATIONS

Pulau Redang Marine Park (PRMP) is a natural environment area with a rich diversity of aquatic flora and fauna. The establishment of PRMP is to protect the aquatic flora and fauna and also to allow natural regeneration of aquatic life. The idea is to promote scientific study and research on the marine ecosystem. PRMP with its attractions is suitable as “pleasure grounds or picnic sites” which offer recreation and enjoyment especially for urbanites. Today, many authorities realize that promoting

Table 4. Estimated benefits (RM) of conservation PRMP based on mean logistic, Bivariate probit analysis, log-logistic and log-normal model.

		Logistic model	Bivariate probit model		Log-logistic model	Log-normal model
Year	No. of visitor	Initial bid WTP=16.87	Initial bid WTP=17.83	Follow-up bid WTP=17.73	WTP=10.86	WTP=28.69
1994	8349	140847.63	148862.67	148027.77	90670.14	239532.81
1995	22725	383370.75	405186.75	402914.25	246793.50	651980.25
1996	34743	586114.41	619467.69	615993.39	377308.98	996776.67
1997	36198	610660.26	645410.34	641790.54	393110.28	1038520.62
1998	34466	581441.42	614528.78	611082.18	374300.76	988829.54
1999	47008	793024.96	838152.64	833451.84	510506.88	1348659.52
2000	52634	887935.58	938464.22	933200.82	571605.24	1510069.46
2001	73580	1241294.60	1311931.40	1304573.40	799078.80	2111010.20
2002	63826	1076744.62	1138017.60	1131635.00	693150.36	1831167.94
2003	76219	1285814.53	1358984.80	1351362.90	827738.34	2186723.11
2004	142476	2403570.10	2540347.10	2526099.50	1547289.36	4087636.44
2005	123159	2077692.30	2195925	2183609.10	1337506.74	3533431.71
2006	135098	2279103.26	2408797.34	2395287.54	1467164.28	3875961.62
2007	151397	2554067.39	2699408.51	2684268.81	1644171.42	4343579.93
2008	151824	2561270.88	2707021.92	2691839.52	1648808.64	4355830.56

Note: Data were collected from Marine Park Seksyen, Ministry of Natural Resources and Environment, Malaysia.

areas which are still in virgin condition and protected under the law can lead to greater interest in ecotourism. In the case of PRMP, the park provides excellent ecotourism products which can become an economic force in the future. The increase in the number of visitors to the park does indicate its economic potential.

PRMP, the earliest marine ecosystem gazetted as a marine protected area under the Fisheries Regulation 1983, received more than 151,824 tourists during the year 2008 and this figure is expected to increase in the future. This situation or trend becomes a challenge to the authorities to cater to the needs of tourists and at the same time ensure that the ecosystem is well preserved. The main attraction of the park to tourists is its coral reefs, which attract mostly snorkellers, although some diving activity does occur in the area.

Determination of economic values for protected areas or natural resources is useful in comparing the benefits of different projects or programmes and as a guide to policy-makers in deciding the best alternative use of the resources. Besides, the management of natural resources as well as the regulation of other activities that affect the resources can be undertaken more efficiently. The policy- makers should really consider the impact of any policy made on these marine parks. From the study, it is proven that preserving these marine parks should be the government's priority. This can be seen from the willingness to pay by the visitors, for preserving the whole ecosystem in these marine parks.

At the moment, Malaysian government seemed "very reluctant" to implement economic tools as one of their ways of handling environmental issues. Most of the recreational sites, gazetted or non-gazetted, still do not or do impose only a very marginal entrance charge. As an example the entrance fee to the PRMP, which is just RM5.00 per person per adults and normally they will waive the fee for school children coming in groups or persons who claim that they enter for educational purposes. Therefore, the study would very much like to suggest to the authority to start using economic tools to protect the environment while providing funding for the same purpose. A benefit capture instrument should be implemented in order to target tourists' consumer surplus. From the issues brought up in this study, the WTP of visitors per visit is between RM10.86 - RM28.69; the study suggests that the fee to the PRMP should be increased from the current charges of RM5.00 for adults and RM2.50 for children below 12.

Quantifying the economic values of protected areas can show where goods and services are currently under-priced and can also capture benefits for the protected areas as cash values or monetary values as well as generating revenues. Prices and market measures can provide an effective means of regulating the demand for resources and incentives for sustainable management.

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