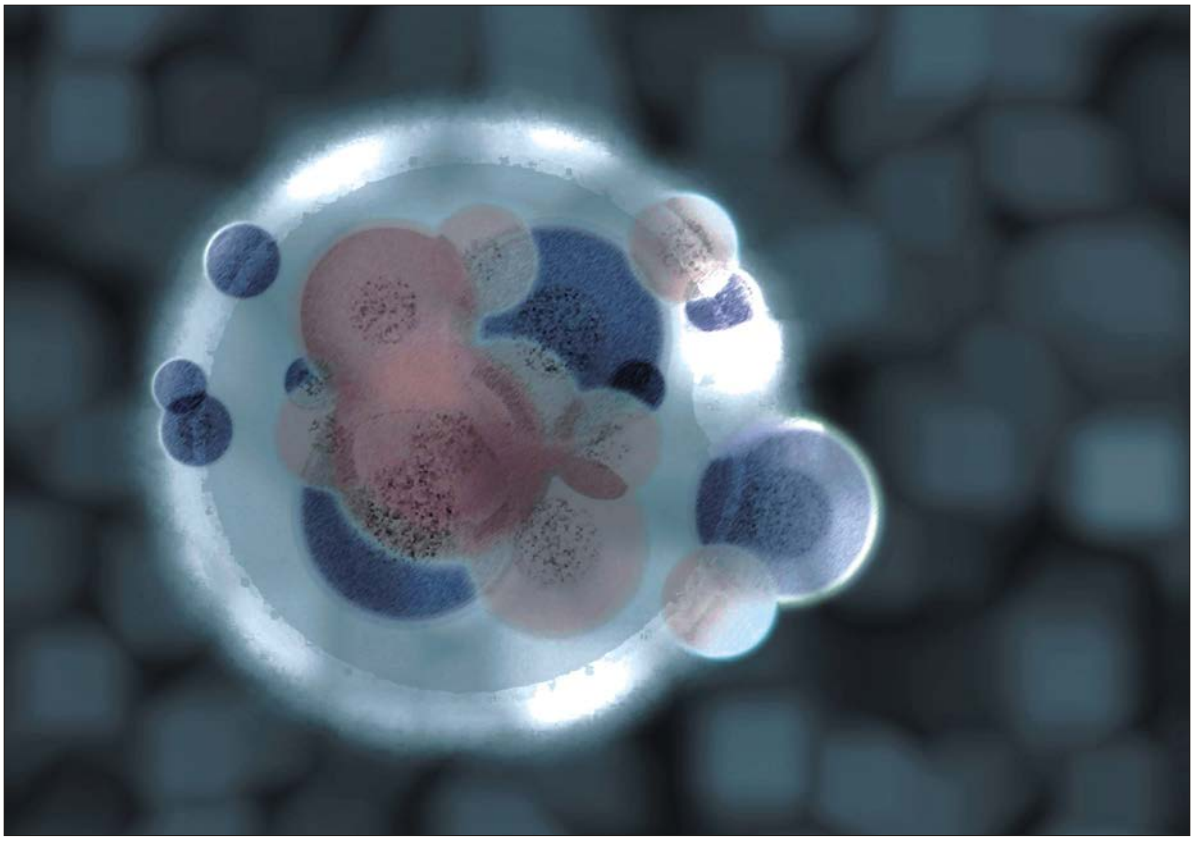

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Valuing the Opportunities of Wildlife-based Recreation in Fraser's Hill as Support for Nature Conservation

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Abstract: This study was intended to demonstrate that people are willing to pay to secure the option of future use of natural area. The relevant values were captured using Contingent Valuation Method where a total of 209 on-site visitors that were randomly selected for the study. Results indicated that the conservation value of Fraser's Hill ranges between RM33 and RM45 per visitor. The study implies that the protection of natural resources is essential in terms of various values in particular the non-use value that should be considered in policy making associated with development of the resources. Priority should be given on promoting the appreciation of these assets, rather than developing artificial alternatives.

Key words: Contingent valuation, logistic analysis, option value, wildlife-based recreation

INTRODUCTION

In tropical countries, highlands are popular recreational areas and retreats due to its physical attractions of greenery and cool climate. In Malaysia, it is reported that more than 600,000 tourists visit our highlands each year and the revenue generated contributes significantly to the national economy[1]. Besides that, highlands are also noted for its biodiversity. The montane forests provide a vital habitat for many species of flora and fauna including some of the endangered and endemic species. Thus, the unique and natural features of highland provide a prefect opportunity for doing nature-based activities, in particular those related to wildlife such as birdwatching.

Without in-depth consideration, many will think that development in highlands would be beneficial as it attracts more people, improves facilities and infrastructure to fulfill the needs of visitors. However, development on highlands actually destroys the reason people make their visit in the first place. Development affects the environment adversely through land clearings and cuttings. New areas are encroached where irreparable damage occurs to the ecosystem. For species that are specifically confined to highlands, they might be seriously threatened due to localized habitat disturbances. In addition, development might attract many non-nature oriented visitors to the area and consequently causing congestion and pollution. It is most certainly caused the decrease in enjoyment among visitors of the place.

It should therefore be stressed that highlands are sensitive to disturbances due to the combination of high rainfalls, the terrain and the nature of the soils. All of those factors lead to the instability of the Malaysian highlands when disturbed. Furthermore, the montane forest has a poor ability to regenerate, which implies that further consideration is needed to avoid irreversible damage to this fragile ecosystem[2].

As already demonstrated in many instances, improper development on highlands has caused various impacts to the communities and ecosystems. Hence, a proper assessment of the ecological goods and services provided by the highlands is essential in avoiding irrational decision associated with these precious resources. This paper is intended to demonstrate that people are willing to pay to secure the option of wildlife-based experiences and the relevant value is estimated by using contingent valuation method (CVM), which may further justify the protection of a natural area.

Background to study site: Fraser's hill: The main range of Peninsular Malaysia is considered a vital life-support system. Running two-thirds of the length of the peninsula, it helps maintain a healthy environment for the surrounding areas and provides many natural resources that contribute towards various sectors. Fraser's Hill is one of the three hill resorts located on the Main Range. Compared to its counterparts, i.e. Cameron Highlands and Genting Highlands that have engaged in extensive agriculture activities and massive development, Fraser's Hill is considered the least developed resort.

Fraser's Hill is situated about 80 km north of Kuala Lumpur and physically occupies a total land area of about 2,804 ha. With average altitude between 790-1,448 m above sea level and average temperature of 22°C, it comprises of a number of forest types ranging

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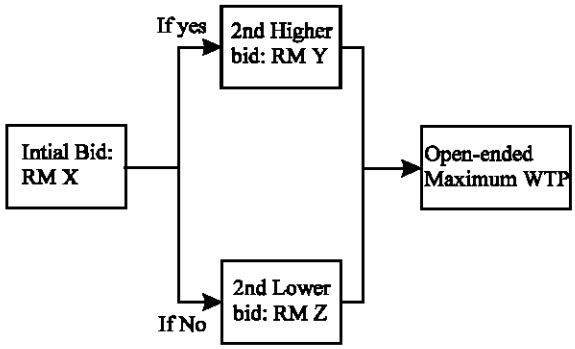

Fig. 1: The double-bounded dichotomous choice and open-ended elicitation format

from hill dipterocarp to montane forests. Following this, more than 900 species of seed plants belonging to 120 families have been recorded which include 36 endemic species[3].

The diversity of fauna in the area is recognized with the prime event of International Bird Race, which has been held annually since 1988 and its current status as a bird sanctuary was bestowed in the 1950s[4]. More than 260 species of birds representing 41% of the peninsula's total have been recorded including three endemic and other endangered species. As an important site for bird migration, at least 64 species have been found migrating through the area. In relation, Fraser's Hill is nominated under birdlife international criteria as an important bird area (IBA)[5].

Economic valuation : Natural resources are valued for variety of uses and reasons, which can be described by the concept of total economic value (TEV). Basically, the TEV comprises of two categories, namely use and non-use values. The use values are accrued from the use of natural resources either directly or indirectly. For instances in the case of highlands, the direct use values may be derived from consumptively through harvesting of timber and non-timber products or non-consumptively through various forms of recreational activities engaged in the areas. While indirect values are gained from ecological functions of highlands such as watershed protection, climate moderator, soil conservation, flood prevention and carbon fixing. All these values can be measured either through the direct market price or based on the prices that spent on related goods or services.

On the other hand, non-use values refer to benefits that arise without any physical use of the resources, which are divided into option value, existence value and bequest value. Option value is related to the opportunity for future use instead of using it at the present time. Existence value is the benefit derived from simply knowing that the resource exists even if one has never utilized or having any intention of using it. Bequest value is derived from the desire to pass on the relevant value to future generations. All three of these values are intangible and difficult to value. An alternative approach in measuring such values is through the survey-based contingent valuation method (CVM) by asking people directly their willingness to pay (WTP) or willingness to accept (WTA) based on a hypothetical scenario. This study was prepared upon the concept of non-use values in which an individual may be willing to contribute for protection of natural resources in order to secure the option for future use of the resources in question.

Design and implementation of CVM survey: In design of CVM scenario, respondents were asked the highest amount that they would be prepared to pay into a Bird Trust Fund each year that would lead to the protection of the area for birds. This procedure was felt to be more realistic and easy to comprehend scenario among the respondents. Respondents were also reminded on their budget constraint in making such decision.

The final version of questionnaire was produced after a focus group discussion and two pretests were conducted. The questionnaire was divided into four sections. The survey began with an introduction and explanation of purpose of study. The first section solicited information such as familiarity with the site and other highlands. The second section was an outline of scenario with respect to WTP for area protection. This is followed by questions on WTP and the reason for payment. The last section was questions on socio-economic background of respondents, which include age, education level and monthly income.

The WTP elicitation format used was the double-bounded dichotomous choice (DBDC)[6,7] with a follow-up open-ended question. Initially, respondent was asked to pay a pre-chosen and randomly assigned amount. If the answer is yes, a pre-chosen higher amount was assigned or otherwise, a pre-chosen lower amount was assigned. After two discrete questions, an open-ended question on maximum WTP was asked. The combined elicitation format was used in order to induce respondents to state their true WTP.

Four sets of amounts were used, i.e. (A:5,10,1), (B:10,20,5), (C:20,50,10) and (D:50,100,20) where the first element of each set (X) corresponds to the initial bid, the second element (Y) to the higher bid and the third element (Z) to the lower bid (Fig. 1). The amounts or bid levels used were within and closely matched the optimal designs for DBDC questions as explained by Hanemann and Kanninen[8].

A total of 209 on-site visitors were randomly selected during the survey that conducted from September 2002 to May 2003. The sample was stratified according to

different locations, days and times of visit[9]. This is done so that visitors concentrated at every site during different time would have equal chances to be selected. In relation, the four questionnaire versions were also equally split with a distribution proportionate to the sample size at every location.

During the survey, mainly verbal description was used in order to provide clear information about the study area. Visual aid showing pictures of birds was used as supportive instrument. The key issues with respect to study design and implementation have been extensively reviewed in literatures[9-14].

Profile of respondents: From the survey, the mean age of respondents was 34 years with average income of RM3,030 per month. Majority of the respondents (55.17%) are professional and management workers, which also explained the high percentage (76.09%) of respondents having college or university education.

From the total samples, a majority were local visitors (84.21%) and remainders were foreign visitors (15.79%). About 81.34% have visited Fraser's Hill more than once and 77.51% knew that the place is famous as birdwatching destination. The increase in accuracy of WTP statements is expected as respondent's familiarity with the natural resource is high[15].

WTP estimation: In estimating the values to protect Fraser's Hill for the option of future use, the WTP function follows the general function expressed in literature:

$$WTP = f(X_i)$$

Where, X_i is a vector of independent variables which represented by a range of socioeconomic variables as well as variables measuring number of visits and environmental contribution.

There are two types of models involved in WTP estimation. The logistic model is formulated to closely correspond to WTP by encountering individual's referendum bid given as one of the independent variables[6]. The model is chosen because of its ability to deal with a dichotomous dependent variable. The model takes the form:

$$P_i = E(Y_i = 1) = 1/[1 + \exp(\alpha + \beta_1 BID_i + \beta_i X_i + \varepsilon_i)]$$

Where, P_i is a probability that $Y_i = 1$ (yes response), BID_i is the bid assigned, X_i is a vector of independent variables while α, β_1 and β_i are an intercept and a vector of coefficients to be estimated corresponding to a logistic distribution. ε_i is a random error that follows the normal distribution with mean zero and standard deviation δ. By taking a natural logarithm of the above equation,

$$L_i = \ln (P_i/1-P_i) = \alpha + \beta_1 BID + \beta_i X_i + \varepsilon_i$$

Where, L_i which is called logit, is the log of the odds ratio and is linear in both independent variable and parameter. The estimation method is maximum likelihood and the coefficients obtained are consistent. Each coefficient is interpreted as the change in the log odds associated with a one-unit change in the independent variable.

The linear model using OLS method was employed by using the maximum WTP stated as dependent variable against other independent variables, which can be expressed as;

$$WTP = \alpha + \beta_i X_i + \varepsilon_i$$

Where, X_i is a vector of parameters and ε_i is a random error that assumed to be normally distributed with mean zero and standard deviation δ.

Initially, the invalid responses are identified and excluded from the WTP estimation, as is customary to do so in most CVM studies[9]. From the study, majority of the respondents (71.29%) are identified as valid bidders who stated that they hold true value for the conservation program. While another portion (17.70%) of the samples are willing to pay certain amount but not specifically for the conservation program and therefore were excluded from the analysis. The rest of the invalid responses are non-responses (8.61%), protest bids (1.44%) and outliers (0.96%). The useable WTP response rate of 71.29% is considered reasonable and falls within the range obtained in other personal contingent valuation surveys[16-19].

The basic models to explain the WTP for protection of study area includes variables that economic theory would suggest as important. The definitions of variables used in the analysis are presented in Table 1.

In general, an indication of the validity of the results of a contingent valuation survey is whether the signs of the coefficients of the variables are in line with a priori expectations. From the results in Table 2, this does not seem to be the case as inconsistencies occurred in terms of the anticipated signs and significance of coefficients.

It is doubted that the differences or inconsistencies in the models might have arisen because of framing effects or collinearity within set of potential independent variables. Subsequently, collinearity was identified with AGE, EDU and INC at the 5% level, which could be an explanation for the initial results obtained. This is further evidenced as the removal of either one of the variables

Table 1: Definition of variables

Dependent variables	Description	
WTP 1	Willingness to pay for 2nd lower dichotomous choice 1 = Yes, 0 = No	
WTP 2	Willingness to pay for 1st dichotomous choice 1 = Yes, 0 = No	
WTP 3	Willingness to pay for 2nd higher dichotomous choice 1 = Yes, 0 = No	
WTPMAX	Maximum amount stated (RM per year)	
Independent variables	Description	Expected relationship
VISIT	Number of visits in the last 5 years	+
AGE	Age in years	?
EDU	Years in school	+
INC	Income (RM per month)	+
CON	Dummy for contributed money to enviroumental organizations 1 = yes, 0 = no	+
BID 1	2nd lower dichotomous choice bid given: 1, 5, 10 and 20 (if answered no for 1st bid)	-
BID 2	1st dichotomous choice bid given: 5, 10, 20 and 50	-
BID 3	2nd higher dichotomous choice bid given: 10, 20, 50 and 100 (if answered yes for 1st bid)	-

+ indicates positive relationship; - indicates negative relationship; ? indicates no prior expectation

Table 2: Model estimation with overall variables

	Regression coefficients			
	Model 1: WTP1 (Logit)	Model 2: WTP2 (Logit)	Model 3: WTP3 (Logit)	Model 4: WTPMAX (OLS)
VISIT	0.684(0.734)	0.202(0.152)	0.015(0.076)	2.272(0.868)**
AGE	0.169(0.246)	-0.011(0.063)	-0.013(0.043)	-0.161(0.571)
EDU	-0.171(0.644)	-0.292(0.177)*	0.240(0.132)*	1.059(1.619)
INC	0.001(0.002)	0.001(0.001)**	-0.0001(0.0002)	0.002(0.002)
CON	1.265(4.486)	0.870(0.814)	0.716(0.653)	10.594(7.749)
Intercept	3.280(16.646)	4.523(3.506)	-1.945(2.490)	5.499(33.800)
BID 1	-0.557(0.425)			
BID 2		-0.069(0.022)***		
BID 3			-0.043(0.010)***	
% correct prediction	66.70	86.70	73.50	Adj R^2 = 0.103
-2 log likelihood	10.166	58.021	85.541	
n	15	98	83	95

Table 3: Model estimation with selected variables

	Regression coefficients			
	Model 1: WTP1 (Logit)	Model 2: WTP2 (Logit)	Model 3: WTP3 (Logit)	Model 4: WTPMAX (OLS)
VISIT	0.809(0.645)	0.211(0.146)		2.118(0.808)**
AGE			0.041(0.026)	
EDU			0.134(0.078)*	
INC	0.001(0.001)	0.001(0.0005)*		0.002(0.002)
CON	1.513(2.521)	0.347(0.729)	0.394(0.476)	11.615(7.396)
Intercept	2.089(2.750)	0.188(1.027)	-2.462(1.574)	17.209(7.148)**
BID1	-0.409(0.226)*			
BID2		-0.069		
(0.021)***				
BID3			-0.034(0.008)***	
% correct prediction	66.70	85.70	74.40	Adj R^2 = 0.116
-2 log likelihood	11.229	61.059	137.282	
n	15	98	121	95

Standard errors in parentheses * indicates statistical significance at the 10% level ** indicates statistical significance at the 5% level
*** indicates statistical significance at the 1% level

Table 4: Summary statistics

Variables	Mean	Standard deviation	Minimum	Maximum
VISIT	5.05	4.48	1.00	25.00
AGE	34.13	8.45	15.00	60.00
EDU	17.34	2.80	12.00	22.00
INC	2,984.17	1,774.22	300.00	9,500.00
CON	0.34	0.47	0.00	1.00

Number of observations: 149 (valid bids)

Table 5: Mean and median WTP

		Model 1: WTP1		Model 2: WTP2		Model 3: WTP3		Model 4: WTPMAX	
		CON = 1	CON = 0	CON = 1	CON = 0	CON = 1	CON = 0	CON = 1	CON = 0
Overall	Mean WTP	24.75	22.48	57.65	45.41	60.08	45.20	44.92	34.32
	Median WTP	24.75	22.48	57.38	44.77	58.26	41.61	N/A	N/A
Selected	Mean WTP	26.10	22.40	66.60	61.63	53.82	44.42	45.49	33.88
	Median WTP	26.10	22.40	66.45	61.42	48.67	37.09	N/A	N/A

CON represents dummy variable for environmental contribution that included in the estimated models in which 1 for yes and 0 for noN/A-not applicable

Table 6: Conservation and present value

	Mean WTP (RM)		Conservation value (RM)	Present value[a] (RM)
Overall Model	CON = 1	44.92	2,162,898.00	21,628,980.00
	CON = 0	34.32	1,652,508.00	16,525,080.00
Selected Model	CON = 1	45.49	2,190,343.50	21,903,435.00
	CON = 0	33.88	1,631,322.00	16,313,220.00

CON represents dummy variable for environmental contribution that included in the estimated models in which 1 for yes and 0 for no[a] 10% discount rate

from the models has yielded consistent results with the theory.

Following this, the potential explanatory variables are added and removed in turn to create a series of variables useful for inspection relationships with the valuation response and consideration was taken on the variance explained, collinearity between variables and item non-response.

Referring to the results in Table 3, all of the selected variables are basically in line with a priori expectations. In Model 1, 2 and 4, the explanatory variables that include variables measuring number of visits (VISIT), income (INC) and contribution to environmental organizations (CON) are all in the expected direction with WTP responses, which supported the conventional theory. While in Model 3, variables measuring age (AGE) and years of education (EDU) are included instead of INC because of the significance in explaining the function.

As expected, the increase in number of visits (VISIT) also increases the likelihood of accepting a given bid. Respondents who visited the area frequently are more likely to pay. This explained that familiarity of the site is positively related to WTP responses. Besides that, the higher the monthly income (INC), the more likely the respondents will accept a given bid. Those contributed money to environmental organizations (as represented by CON) were more likely to pay than those who have not involved in such activities. It is similar in the case of education (EDU). The higher education also results in higher probability of accepting the bid. In other words, a higher educated person is more likely to pay.

As indicated in logistic regression models, the coefficients for bid offered (BID) are negatively correlated with the probability of acceptance as expected and all are significant at least at the 10% level. The negative and statistically significant coefficients on bid suggested 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.

Based on benchmark for CVM studies[9] of a minimum adjusted R^2 of 15%, the relatively low adjusted R^2 being 11.60% still compares favourably with published CVM work. In addition, the WTP functions predict around 60 to 80% of the responses correctly. The summary statistics of variables used in the models are reported in Table 4.

Mean and median WTP: For the logistic models, the mean and median WTP values are calculated with the formula illustrated in Hanemann *et al.*[6] by taking into consideration the average levels of the socio-economic and other explanatory variables. While for the OLS model, the average levels of the explanatory variables were inserted into the model to obtain mean WTP.

The mean WTP was quite close or slightly higher than the median WTP for all logistic models (Table 5). For Model 1, 2 and 3, the estimation involving all variables gives comparable estimates to that with selected variables. For the estimation involving all variables, the mean WTP ranges from RM22.48 to RM60.08 per individual while the figure ranges from RM22.40 to RM66.60 per individual in the case when selected variables were included. For Model 4, the estimates remain stable across all estimation approaches. The mean WTP ranges between RM33.88 and RM45.49. In addition, the values are within the ranges obtained from the logistic models.

WTP aggregation: Due to the consistency and instrument design, the mean values estimated for Model 4 were chosen for aggregation in order to provide the conservative measure of WTP.

The survey revealed that respondents placed a remarkably high value on the conservation of the area (Table 6). Taking the population size of 48,150 visitors in the year of 2002, the aggregate conservation value or

benefit of protecting Fraser's Hill ranges between RM1.6 million and RM2.1 million annually or between RM16.3 million and RM21.9 million in terms of present value using social discount rate of 10%.

The conservation value of Fraser's Hill as placed by visitors is rather substantial. The results from the estimated models indicated the conservation value ranges between RM33 and 45 per visitor. Taking into consideration of 10% discount rate, the present value would range between RM16.3 million and RM21.9 million.

As also revealed in the study, majority of the respondents agreed that Fraser's Hill should be protected for birds. From the total respondents selected, almost half of them have involved in birdwatching. This indicates that people are willing to pay to secure the benefit not only for oneself but others as well.

While recognizing the need for development, one must not overlook that it is the unique and natural features that assembles its major asset. It should be highlighted again that Fraser's Hill is an international renowned birdwatching site and one of the few premier locations for birdwatching in Peninsular Malaysia. The good responses from both local and foreign participants to the International Bird Race would be a rigorous indicator. Hence, steps must be taken to ensure that this is a continuous event. Since the birds have become a prime tourist attraction, this should provide a perfect opportunity to promote and educate the public about the birds indeed.

From the findings, it would appear to make good economic sense to conserve the area in order to maintain the opportunities of doing various activities in particular related to birds. The area is a source of economic rents and will benefit the state and national government. If properly captured, the economic benefits would ideally be channeled back to the local communities, which would provide an additional incentive to protect the resources.

Given its natural resources and existing facilities, ecotourism is a viable option that should be extensively promoted. Stringent measures coupled with adoption of sustainable practices must be undertaken. The related financial savings should be aimed on restoration and rehabilitation of environmental damage where aesthetic and biological aspects of the environment should be retained. Further consideration would be on how to improve nature experiences of visitors and determine the carrying capacity of the area.

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