WILLINGNESS TO PAY FOR THE SUSTAINABILITY OF RECREATIONAL FOREST RESERVE IN MALAYSIA: CASE STUDY GUNUNG NUANG, HULU LANGAT, SELANGOR

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Abstract

Recreational areas centred around nature are gaining popularity among Malaysians. One such area, the Gunung Nuang Recreational Forest, charges a minimal fee of only RM1. In view of rising maintenance costs, it is necessary to determine the amount that the public is willing to pay for access to Gunung Nuang. As environmental factors can not be assigned monetary value, a Contingent Valuation method is utilized for this purpose. This paper aims to determine the willingness to pay of visitors to Gunung Nuang Recreational Forest. The results show that visitors are willing to pay up to RM2.50 per entry. This study is also intended to aid technical officers in future valuations of this nature.

Keywords *Contingent Valuation, Natural resources, Willingness to pay*

Introduction

Recreational areas are provided for the public to experience the natural ecosystem and resources in the area. Lately, such recreational areas are gaining popularity among urbanites, especially during the weekend or public holidays. Most of them intend to escape the hustle and bustle of city life. Visits to public recreational areas are usually charged a mimimal fee although they may require substantial maintenance. Gunung Nuang recreational forest (GNRF) which is located close to Kuala Lumpur City Centre become more popular among the urban citizen to enjoy the flora and fauna within the recreational area. The fee per entry to GNRF is currently only RM1.00 per person. This amount is insufficient to cover the maintenance costs of this recreational area. However, the authorities of GNRF are unaware of the appropriate increase in fee, seeing that no prior study has been done on this matter. For

that reason, this study will utilise the contingent method to calculate the willingness to pay (WTP) of GNRF patrons, and perform a valuation of GNRF, taking into account its environmental aspects.

The Contingent Valuation method is an economic method to determine the value of an item that has a natural resource, concerned directly with the attitude of users and their willingness to pay (WTP) or willingness to accept (WTA) a product. Products with environmental aspects cannot be traded in the open market unlike other products that satisfy the theory of demand and supply. Property that cannot be traded in the open market are known as passive property, or a non use value; or only having ecosystem value or environmental value. Such property cannot be valued with conventional methods. Hence a distinct method is required, such as the contingent method. This paper will elaborate further on the contingent method by means of a case study of the Gunung Nuang recreational Forest (GNRF), Selangor. The estimation of willingness to pay will assist the authorities in calculation of new entrance fees for GNRF and hence the income can be used for all kind of maintenance for GNRF in order to ensure of the sustainability of GNRF for the next generation. Eventually, this paper will also serve to assist the valuation department in the valuation of sites concerning ecosystem and environmental services.

Gunung Nuang Recreational Area

Gunung Nuang is the highest point on the border separating the states of Pahang and Selangor. At 1,493 meters tall, it is also the highest area in Selangor, and is also part of the Titiwangsa Mountain Range. Gunung Nuang is under the superivision of the Forestry Department of Selangor, a government department responsible for the management and conservation of wildlife and reserve forests in Peninsular Malaysia. The department has built three trails to the peak of Gunung Nuang, through Kuala pangsun in Hulu Langat, Kampung Kemensah in Gombak and Bukit Tinggi in Bentong, Pahang, respectively. After dark, hikers will be able to see Genting Highlands from the top of Gunung Nuang. The hike through the designated trails takes around six hours up and four hours down. The trail goes through reserve areas with bamboo, forest trees and wild flowers that are not found on low lands. Hikers also pass creeks and a waterfall that lead on to a river, a popular spot for tourists. The river is also the main source of water reserves at the Hulu Langat Dam, supplying water to

the Klang Valley area. Besides being a forest reserve and a water source, Gunung Nuang also brims with wildlife, prompting local and international tourists to frequent the area. Located just 40km from Kuala Lumpur City Centre, Gunung Nuang is a popular family recreation spot. Therefore, the maintenance and conservation of the aera is extremely important for the benefit of current and future generations. Conservation of nature does not have monetary value and there is no preceeding literature to determine the value of GNRF. The altered Contingent method outlined in this research paper has been identified as the most appropriate for this purpose.

Contingent Valuation Method

Economists usually focus on market price of a good with economic value. However, Clark (1915) and Hine (1951) found that there many goods such as ulities and any goods relate to environmental value cannot be valued as normal market price but to be valued base on unpaid cost. Economists also view endangered natural resources as not having value, but instead posing a social cost. Bowen (1943) and Ciriacy-Wantrup (1947) were the first to suggest structured interviews to the public as a form of measuring the social good of land conservation. Ciriacy-Wantrup also included the aesthetical dimension of nature into his measurements. Ciriacy-Wantrup felt that natural resources could nto be traded but had its own demand. This opinion contradicts Samuelson (1954) who felt that behavioral strategy interfered with identifying the benefits of a public good. In Samuelson's (1954) words, *"It is in the selfish interest of each person to give false signal, to pretend to have less interest in a given collective activity than he really has".*

At the same time, Lester (1946) and Machlup (1946) debate about businesses that solely intend to profit from marginal cost pricing. Lester's (1946) respondents were neo-classical fashion businesses, whose validity was questioned by Machlup (1946). However, Samuelson (1954) asserts that a questionnaire should take into account all economic aspects including marketing and transportation. This idea was later realized by economists who altered the method to assign monetary value to output, which proved useful for government policy formation. This method was also used in the Court of Appeals, D.C. Circuit in the State of Ohio v. U.S. Department of the Interior, 880 F.2d 32 (D.C. Cir. 1989). The judgement encouraged the use of this method to value natural resources including non-use components,

assuming that non-use values can be valued. The judgement later took the form of law to value injury to natural resources in the Clean Water Act 1972 (CWA); the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA); the Superfund Amendments and Reauthorization Act 1986 (SARA) and the Oil Pollution Act 1990 (OPA).

Academicians among economists began discuss contingent valuation as early as the 1950s, where this method was used to value natural resources with essentially, no value. This was largely pertaining to real estate products concerning the American National Parks (land base) and American Army Corp of Engineers (water base). After World War 2, the public began to show interest in recreational areas that involved governemtn land. Due to the government's tight finances, a marketing company was commissioned to conduct a survey to identify the people's demand for national parks and to investigate the number of people who were willing to pay a daily 'water base' fee. A cost and benefit analysis was then done to aid the government in making a decision regarding water based recreation such as in electrical operation areas and flood control areas. The first economist to do this empirically was Davis (1963b) in his thesis entitled "The value of outdoor recreation: an economic study of the Maine woods". Davis (1963b) was of the opinion that surveys could provide a picture of the market estimate by providing facility alternatives to the public as well as a simulation of their behavior towards market prices. He also succeeded in getting respondents to offer a price for the services they will be receiving in future. Davis (1963b) prompted other economists to further investigate this contingent method.

Later on, Ridker (1967) and also Ridker and Henning (1967) applied the hedonic method to value air pollution, as he felt that the public could value air as it had 'psychic costs'. He included a few questions regarding WTP in two of his questionnaires. A few years on, more economists began to perform contingent valuation to value natural resources and recreational facilities. One of them is Mathew and Brown (1970), who conducted a study to value sport fishing using a simple questionnaire, followed by Brown and Hammack (1972) who conducted a survey via postal mail to obtain WTP (willing to pay) and WTA (willing to accept) if respondents were required to let go of their rights as waterfowl hunters. Other instances of WTP valuation are a valuation to reduce congestion at a hiking site (Cicchetti and Smith, 1973), and a survey to determine costs before outdoor recreational areas were reduced (Brown et al, 1978). WTP was also examined by Darling (1973) in relation to

facility payments at three urban parks in California and by Sinden (1974) to set a monetary value to recreational facilities by sketching indifference curves. The first book to focus on the valuation of non market outdoor recreation was by Sinden and Worrell (1979). Hanemann (1978) then investigated water pollution by determining the WTP to improve water quality at Boston Beach. Hanemann (1978) compared a random utility model to a travel cost model, based on the findings of his questionnaire. Hanemann's (1978) research provided a stronger theoretical framework and approach to Contingent Valuation and the travel cost model.

From a theoretical perspective, Weisbrod (1964) investigated the quasi-option value, as did Arrow and Fisher (1974). Freeman (1979) measures environmental benefits by preparing a standard triumvirate beased on hedonic pricing, travel cost model, and WTP by means of a survey to obtain the non-marketed product value. All these research has the potential to describe the economic effect that may reflect the market price. Existing literature recommends non-parametric methods when deriving the estimates of the mean and median of WTP from the questionnaires. Nelson (1982), used a survival analysis method to calculate the WTP, whereby a survival function will provide the dollar value of the WTP. Peto (1973) and Turnbull (1976) suggest the Kaplan-Meier non-parametric method. Carson (1994), in his valuation of a conservation zone in Kakadu, Australia, used the Weibull analysis, which is appropriate for price elasticity. All the distributions mentioned above involve the calculation of the area under the survival curve.

As a developing country, Malaysia seems to have sidelined environmental conservation and sustainability. However, lately, environmental issues are being brought to the forefront by researchers and activists alike. A survey by Anuar (2007) found that the Contingent method scored the highest (on average) in the valuation of indigenous lands as the environmental aspect was paramount. This finding has also been substantiated by Norliza (2011). There are also a few student theses that centre around contingent valuation. Teh (1997) used this method to investigate factors influencing WTP for the recreational centre, Mines Wonderland, whereas Boni (1997) evaluated the WTP of patrons of Pulau Penyu in Sabah. On the other hand, Suryani (1999) used linear regression to conclude that the WTP of the Canopy Walkway in Kuala Tahan is RM8.50 for foreign tourists and RM5.50 for locals. Shahwahid (1999) used the contingent method to measure the economic value of forest swamps and subsequently, he investigated the average WTA in relation to malodour and health problems from waste dumping is RM39.50 a year (Shahwahid, 2012).

The main criticism of using this method is the accuracy of the practical estimation. The word "contingent" refers to estimating the value of a good by posing hypothetical questions regarding its value. In essence, the method does not measure something concrete. As it uses a questionnaire, biased answers are possible if the interview process is not carefully reviewed and monitored (Hanemann, 1994). The biasness of the questioinnaire and the methodology that relies on imagination makes it hard for professionals to accept this method. However, economic experts are of the opinion that this method is the most appropriate to value natural resources and environmental elements, which otherwise cannot be expressed in monetary terms.

Research Methodology

Contingent Valuation Method is used for the purpose of this research. This method is also known as economic valuation, which is the valuation of goods with no market value in order to assign a monetary value to it. Commonly used to value non-use products, it is the standard method to value non-market goods such as natural recreational areas, wildlife and other environmental elements (Hanemann, 1994). The contingent method will be used in this study to determine factors affecting the WTP of respondents, estimate the value of respondent's WTP for GNRF and subsequently determine the Capitalised Value of GNRF. Primary data for this research sourced from the individual interviews of respondentts, guided by a survey questionnaire. The survey was carried out from the months of June to October 2012 in Gunung Nuang recreational forest.

There are five phases involved in this method (Hanemann, 1994), namely:

Identifying the hypothetical market

The hypothetical market of the environmental good needs to be identified. The factor of market price payment does not exist in this context. Therefore, the questionnaire needs to describe scenarios with environmental aspects.

Price offered

The execution of the questionnaire must be monitored to avoid biased answers from the respondents. This is done by conductinig independent individual interviews. Respondents

will be asked about their WTP and WTA in reference to the hypothetical situations described in the questuionnaire.

Estimation of mean / median WTP/WTA

Once the WTP/WTA price offer is collected, an average price needs to be calculated, usually based on the mean or median. *Protest prices* need to be excluded from analysis as they are considered to be outliers in the data. The use of the Logit and Probit model is recommended for the analysis of factors affecting WTP/WTA, which is based on a probability model. This probability model will also be used to calculate the area under the curve of the average WTP/WTA.

Data analysis

The mean of the price offered is converted to the total population value. The total value needs to take into account all relevant valuation components. This has to be considered when preparing the questionnaire. If using the sample mean, it will have to be recalculated using the population mean. This is because the sample mean may be biased due to misleading answers. For example, a respondent may have a high income, but describes a lower income range, or vice versa. Therefore, the interview has to be conducted in such a way to reduce bias.

Contingent Valuation

Ensure protest answers are not taken into account. Ensure that respondents understand the scenario presented in the questionnaire. The formula used should be based on the factors of contingent valuation

Sample

A sample is required for the purposes of this study. This sample should represent the population of visitors to GNRF. This study uses random sampling to identify respondents, whereby all visitors have the same probability of being selected. The sample size is paramount to the reliability of a survey. According to Ryan (1995), the sample size required can be calculated by formula if the total population number is known, although the variance and standard deviation is not known.

Based on preliminary surveys, it was found that 90% of visitors appreciate GNRF in one way or another. Hence, it is safe to use p=0.9 as the population estimate. Statistically, the error term is usually between 3% and 5%, but in this study 3% is used so that the error term does not significantly affect the analysis. The z score used is 1.96, with a confidence level of 95%. This means that the results are favourable if 95% of the data has a standard deviation from the mean within the range of -1.96 and 1.96. N is obtained from the data of visitors for the year 2012 as shown in Table 1 below, sourced from Selangor Forestry Department.

Table 1: Number of Visitors to Gunung Nuang Recreational Forest

Year	Jan	Feb	Mac	Apr	May	June	July	August	Sept	Okt	Nov	Dis	Total
2010	1340	1209	1004	1113	1615	1277	1160	1015	503	1033	1247	1278	13791
2011	1244	1418	1700	1446	1715	1529	1845	527	1024	1371	1047	1101	15967
2012	1308	1158	1652	1116	977	1400	1045	640	1320	582	1157	NA	10,616

Source: Selangor Forestry Department

The formula used by Ryan (1995) is as follows:

$$n = \frac{NPQ}{\frac{(N-1)\,\beta^2}{Z^2} + PQ}$$

Whereby:

N is the monthly population size

n is the sample size

P is the population proportion/ estimate

Q is (1-P)

β^2 is the allowed error term

Z is the Z score based on the 95% confidence level (1.96)

$$n = \frac{(1203)(0.9)(0.1)}{\frac{(1203 - 1)\,0.03^2}{(1.96)^2} + (0.9)(0.1)}$$

$$= 291 \text{ samples required}$$

For the purposes of this study, 300 samples were analysed.

Preparation of the Survey Questionnaire

The survey questionnaire is a combination of open and closed questions, and is divided into four parts, outlined below:

Section A: Respondent Profile, such as age, gender, profession and so on

Section B: Respondent attitude towards GNRF

Section C: Respondent Perception towards GNRF

Section D: Contingent Valuation Data: Willingness to Pay (WTP)

Individual interviews were conducted for this study, where respondentts were asked to fill out the questionnaire according to a prior group briefing. Respondentts were able to answer the questionnaire on their own time, without any influence from the enumerator. Any mention or question of politics, local governance, state government Exco or government departments were not considered. Preliminary questioning was carried out to 50 patrons in June 2012. The questionnaire was improved based on the preliminary group's suggestions. The Cronbach's Alpha value for the questionnaire used in this investigation is 0.716, hence the questionnaire is consistent and reliable.

Logit Probit Regression Model: Estimation of WTP

Contingent Valuation uses survey to arrive at the economic value. The aim of this study is to estimate the monetary value of a good. Regression method is used to determine the validity, reliability, and significance of this contingent technique, whereby the WTP of respondents will be modeled using Logit Regression (Ramanathan, 2002).To estimate the WTP for GNRF, the dependent variable is a dummy variable, with its value represented by 1 = Yes (Willing to pay) and 0 = (Not willing to pay). The Binary logit model is the most appropriate method to estimate the mean of WTP (Gujarati, 2003). The WTP of visitors was determined by estimating the demand function, whereby demand is based on utility maximization frameworks. Utility and preferences will show the number of visitors who appreciate natural resources. In brief, the Contingent Model is obtained via utility maximization.

An individual's utility function can be defined as:

$U(X,Z)$. (1)

Where:

U is the level of satisfaction / utility derived from a good/ service

X is the vector of goods in the market

Z is the vector of goods based on natural resources

Assuming an individual can achieve maximum utility by choosing goods available in the market, the function of maximum utility can be mathematically written as:

(2)

$Maximize\ U(X,Z),\ Sum\ P_i\ X_i = Y$

Where:

P_i is the price of the *i*th good

X_i is the quantity consumed of the *i*th good

Y is the individual's income

The optimization yields function based on demands and can be expressed as:

$X_i = h_i\ (P,Z,Y),\ i=1,2,3\ldots,n$ (3)

where:

I is the index of the ith good from the Vector Z

Therefore, the utility function can be indirectly expressed as:

$v(P,Z,Y) = v[h(P,Z,Y), Z]$ (4)

In this case, utility can represent a function of price, income and natural resources. Assuming at least one element will increase while other elements constant.

Assuming also, that only goods z increase, where the subscript 0= before increase and 1= after increase, that is $Z^1 > Z^0$. Z^1 is goods after increase, and Z^0 is goods before increase. Hence:

$v' = v(P,Z',Y) > v^0 = (P, Z^0Y)$ (5)

$v(P,Z',Y\text{-}c) > v^0 = v^0\ (P, Z^0Y)$ (6)

Where c is the variation of compensation that can be received after seeing the change of Z^0 to Z^1. The variation of compensation can be thought to be the WTP for the increase.

Based on the method outlined by Hanemann (1984), the estimation of WTP is equal to the surplus, where a visitor will state the utility from purchasing an environmental resource such as eco-tourism at GNRF.

$$V' = v(1,Y,S) \text{ atau } v^0 = v(0,Y,S) \quad (7)$$

WTP towards environmental elements are defined as N. If one is willing to pay for environmental factors, N=1, and if one is not willing to pay, N=0. Y represents the monetary value and S is a vector of other variables that influence the taste of preferences. Utiltiy is assumed to be a random variable with a parametric probability distribution, with v(1,Y,S) and v(0,Y,S) and statistical components e_r *(ε_0 and ε_1)* are independent and identically distributed random variables, with a mean of 0.

Therefore, the formula can be written as:

$$v^1 = v(i,Y,S) = v(i,Y,S) + \varepsilon \text{ where } I = (0,1) \quad (8)$$

When respondents are asked about the payment (c) for a natural resource in GNRF, the visitor will pay the amount if:

$$H \quad v^1 = v(1,Y\text{-}C:S) + \varepsilon_1 > v(0,Y,S) + \varepsilon_0 \quad (9)$$

ence, the probability of respondent responses are:

$$P_1 \text{ Pays } \{WTP\} = P_r \{\text{Willingness }\}$$
$$= \Pr(v(1,Y\text{-}C:S) + \varepsilon_1 > v(0,Y,S) + \varepsilon_0 \quad (10)$$

Or

$$P_1 = P_r \{\text{Willingness to pay}\}$$
$$= 1 - P_1 \quad (11)$$

Assuming ε_1 and ε_0 are independent and identically distributed random variables

$n = (\varepsilon_1 - \varepsilon_0)$

Therefore the probability that one is willing to pay is :

$P_1 = F_n$ (Change in V) (12)

Where:

Change in V = V (1,Y-X: S) – V (0, Y-C, S) (13)

The binary statistical model can be interpreted as an outcome of utility: maximization choice. This analogy is based on the integration of situations based on traditional demand theory.

Hanemann (1984) proposes that the indirect utility function be specified as follows:

$v(i,Y,S) = \alpha_1 + \beta Y \quad \alpha>0, I = 0,1$ (14)

When the vector *S* is suppressed, then:

$Y_v = (\alpha_0 -- \alpha_1) + \beta C$ (15)

The discrete statistic model becomes:

$P_1 = F_n (\alpha + \beta X)$ Where $\alpha = (\alpha_0 -- \alpha_1)$ *or* (16)

Changes v $= (I, Y:S)$ $= \alpha_1 + \beta ln\ Y.\ \beta> 0, I = 0.1$ (17)

The Contingent method format has a binary choice of variables that requires a qualitative choice model. The Logit and Probit models are usually used in qualitative choice methods (Capps and Cramer, 1985). The logit model is used in this study to estimate the WTP. This method defiens the probability of the answer *Yes* for price of choice to be:

$P = (1\text{-}e^{-x})^{-1}$ (18)

Where X is the estimate of the logit regression formula and P is the probability of accepting the price. The average WTP is estimated to be the area under the probability curve. This area shows the population that uses environmental goods at every level of value in relation to utility.

The area under the curve can be derived using integration techniques as follows:

$E(WTP) = \int_L^u (1 + e^{a+bPrice})^{-1}$ d Price (19)

Where :

$(1+ e^{a+bPrice})^{-1}$ is the probability of answering "Yes", and
U is the upper limit of integration
L is the lower limit of integration

Assuming that visitors will not pay if not satisfied with the utilities provided, it is expected that a negative WTP value will obtained, hence "0" is set as the lower limit and the maximum value offered is set as the upper limit (Hanemann, 1984). The ROC (*Receiver Operating Characteristic*) application in the SPSS software is used to calculate the actual value of WTP for GNRF. The ROC is used to look at sensitivity levels and specific score levels of visitor's WTP (Pepe et. al.,2004).

Result and discussion

Respondent profiles

The first section opf the questionnaire records respondent profiles. The data collected include age, gender, marital status, race, education, career, income and hobby. The questionnaire was administered to 300 respondents. 75% of respondents are between 17 and 30 years of age, whereas 14% are between 31 and 40 years. 51.3% of respondents are male, whereas 48.7% are female. Respondents who were single form 68.7% of the sample whereas 31.3% are married. Mostly, respondents were Malay (94.3%). In terms of education, 40% are degree holders and 20% are diploma holders. This shows that tertiary educated patrons frequent GNRF, however, the incomes recorded were mostly below RM3000 (84%). This can be attributed to the fact that 39% of respondents are still students, continuing their higher education. It was found that GNRF is popular among such students as a location for their co-curricular activities. 84% of respondents stated travelling/ tourism to be their hobby, with 67% having travelled for leisure more than twice for the past 5 years. Non-governmental organisations such as anti-drug organisations, Camping clubs, Hikers clubs, scouts and the SPCA also form a number of the visitors to GNRF.

Attitude of Respondents towards GNRF

Section B of the questionnaire concerns the attitude of visitors towards GNRF. This section looks at the visitor's opinions on the utilities, services and other aspects of GNRF. The Likert scale is used to rate the factors that attract visitors to GNRF. As many as 44% of visitors come here for the rivers, followed by 19% who come to hike while the rest come for picnics and camping. Only 45% of respondents are first time visitors. 61% have been to GNRF more

than twice in the past 5 years, and many seem to have learnt about GNRF from friends and teachers at school. 77% of visitors acknowledge that GNRF is an important eco-tourism spot that has many benefits to the public. More than 50% of visitors agree that GNRF has an impressive and beneficial natural environment. They also agree that GNRF can generate economical benefits via eco-tourism. In relation to that, visitors also feel that conserving this natural resource is extremely important and everyone has to play their part. However, they are not all in agreement when it comes to increasing the entrance fee.

Perception of Respondents towards GNRF

Section C focuses on the perception of visitors towards the importance of natural resources at GNRF and their satisfaction towards the resources and services in GNRF. The two main reasons cited by visitors for choosing GNRF are that it is sheltered away from the city (37%) and for the fresh, unpolluted air (37%). Together with 22% who cited appreciating the beauty of nature, this makes a total of 96% who come to GNRF for environmental reasons. The remaining 4% work at GNRF. The questionnaire found more than 70% of visitors are satisfied with the presence of wildlife, rivers, picnic spots, camping sites and hiking trails. However, they are not too satisfied with the infrastructure provided, the safety levels, the cleanliness of the resort and toilets, and the services of the staff. IN relation to the Information centre at GNRF, visitors feel improvements are necessary to the educational and research material provided. Some have also expressed concern over the care provided for the birds and wildlife. This signals that the Forestry Department or Tourism Ministry needs to be more involved and perhaps intervene to improve services at GNRF in view of public interest.

Willingness to Pay (WTP)

Section D is required to carry out the Contingent valuation. Visitors are asked questions about their willingness to pay to conserve the natural resources at GNRF. In a positive light, 86% are willing to pay for entry to GNRF. At the moment a minimal fee of RM1 per entry is charged by the Forestry Department. Based on the suggestions of fees given,62% were willing to pay between RM1 and RM4, whereas 38% were willing to pay more than RM5. However, when asked to indicate their own price, it was found that 50% were willing to pay between RM5 and RM10, 40% were willing to pay between RM1 and RM4 and only 10% quoted prices higher than RM11. Conversely, even the respondents who stated they were not willing to pay as environmental conservation was the government's responsibility quoted prices between RM0.50 and RM3.

Logistic Analysis

Logistic regression analysis was done to predict factors that affect the willingness of visitors to contribute to eco-tourism conservation efforts. The model has a significance level of $p<0.05$. This shows that the logistic model takes into account the dependent and independent variables. The results of this model are favourable, with a Cox & Snell R square value of 0.032 and Negelkerke R square of 0.057. This is validated by referring to the chart above; the visitors response are favourable. This model shows a high coefficient with a predictive power of more than 85%. This test found that there are 25 significant factors affecting the sustainability of GNRF, including the environmental factors of the area, the desire to ensure sustainability, eco-tourism, a source of forest products, education and research, source of fresh air, source of water, protected flora and fauna, land protection efforts, the beauty of the rivers, camping sites, picnic sites, hiking trails, overall cleanliness of resort, good service by staff, research centre, and a place to observe wildlife and birds.

Having an interest in tourism is a significant factor in the willingness to pay of the visitors. The coefficient for this factor is 1.226 whereas the odd ratio is 3.409. The *odd ratio* indicates that visitors who enjoy tourism are 3.409 times more willing to pay for the aesthetic value of GNRF as compared to visitors who do not have an interest in tourism.

The logistic analysis is then used to calculate the (WTP) for entry fees to GNRF by taking into account all the factors identified above. Survival analysis using the ROC curve was used to obtain the maximum price that visitors are willing to pay. The results of this analysis shows that the area under the curve is 0.854 (95% Confidence interval :0.809-0.899) with a 95% confidence level and the result is significant with a value approaching 1 and the p-value is 0.00. Referring to the cut off value, we find that the best cut off value achieved is 2.50 with a sensitivity value of 0.698 and a specificity of 0.905. This value shows that visitors are willing to pay up to RM2.50. They are not willing to pay a fee higher than this.

Calculation of Estimate for GNRF Economic Value

WTP entrance fee of RM2.50 per pax	RM	2.50
Average number of visitors a month	1,224	
Number of visitors a year	X 12	14,688
Total entrance fee	RM	36,720.00
Maintenance costs (*)		0.00
Net Income	RM	36,720.00
Y.P in perpetuity @ 6.5% (**)		15.384615
Estimation of Capitalised Value of GNRF after taking into account environmental factors	RM	564,923.08
Say:	RM	565,000.00

(*): Estimation of maintenance costs borne by government, as currently maintenance is handled by the Forestry Department.
(**): Average BLR rate @ 6.5%

Conclusion

In conclusion, the data and findings in this study show that the willingness to pay (WTP) of visitors to Gunung Nuang recreational Forest (GNRF) is influenced by many significant factors, most of which are environmental. Their WTP is also linked to their interest towards tourism, cleanliness and safety of the area, and their income ranges. Approximately, visitors are willing to pay more than RM5 as entry fee if the sustainability of the area is guaranteed. There are also patrons who are willing to pay RM50 per entry provided that the area is conserved, safety is guaranteed and the infrastructure is improved. The authorities of GNRF need only RM2.50 per entry to maximize their services, whereas descriptive averages show that visitors are willing to pay up to RM7.50. This will result in *Capitalised Value* of RM1,700,000.00 and will ensure more quality services can be provided in GNRF.

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