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Local Communities Willingness to Pay for Conservation of Ecotourism Resources at Gelam Forest, Kelantan, Malaysia

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Abstract. Gelam Forest significantly has a unique biodiversity composition that is not found in other areas. This unique biodiversity has high potential for ecotourism that has yet to be explored and promoted in Malaysia. The purpose of this study is to estimate the economic value of Gelam (Mellaleuca spp.) forest for being developed as one of the potential ecotourism attractions in Kelantan. The primary data were collected through face to face surveys with the local community in districts of Bachok. A total of 200 respondents were participated in this study which consists of nearby locals that have different demographics. Contingent valuation method (CVM) was applied in this study to determine the local community's willingness to pay for ecotourism resources conservation at Gelam Forest. The result from logit regression indicates that the bid amount (price), income and education of respondents were significant predictors that influenced the level of willingness to pay for ecotourism resources conservation of Gelam Forest nearby to Universiti Malaysia Kelantan Bachok Campus. The estimated mean for public's willingness to pay is found to be RM 4.20 per head per year. It was concluded that Gelam Forest conservation initiatives were feasible for ecotourism development in future. The financial resources obtained from the amount of WTP might be used for conservation and as a fund for maintenances purposed.

1. Introduction

Gelam Forest is a unique wetland ecosystem dominated by Melaleuca cajuputi and is native to Australia, Peninsular Malaysia, Thailand, and Singapore [1]. Locally known as 'Kayu Putih', this plant species belongs to the family of Myrtaceae and can be easily distinguished by its soft, papery and flaky bark [2]. The mature trees may grow up to 40 m tall and 1.2 m in diameter [1]. This is a hardy plant as it can survive and grow in many types of soils [3]. This plant has many economic potentials as the Cajeput oil from the leaves have medicinal and insecticide properties and can be easily extracted for research and commercial purposes. The uniqueness of Gelam Forest is also reflective by the biodiversity of this ecosystem. The unique composition of flora that has potential medicinal values are yet to be explored. Ground lizards, nectarivorous and insectivorous bats and stingless bees are among faunal characteristics of this forest. The biodiversity in this ecosystem is also beneficial, as the production of stingless bee honey is a commercially popular product.

Mangrove and Gelam Forests are the two main wetland ecosystems in Malaysia. The formation of these two ecosystems is influenced by geomorphological features of the beach. The beaches of the west coast of Peninsular Malaysia are more prone to be muddy, hence suitable for mangroves forest. However, in the east coast, sandy beaches are more common and are suitable for Gelam Forests. Exceptions do occur as this forest is found in Kedah, Melaka, Negeri Sembilan too where the conditions are favourable for this species. In Kelantan and Terengganu, this forest is under threat due to conversion to other land uses especially for development [3]. In Kelantan, the remaining Gelam Forests can be found in Pasir Puteh and Bachok [4]. Universiti Malaysia Kelantan is privileged as a large track of land in Bachok consisting of Gelam Forest and has high potential to be used for research, teaching and ecotourism activities.

The uniqueness of Gelam Forest is also reflective by the biodiversity of this ecosystem. and also has a unique biodiversity composition that is not found in other areas. The flora is composed of plants that can withstand extreme conditions, and these plants have secondary metabolites for adapting to the conditions and for defence purposes. Hypothetically, due to high floristic composition in the forest, it is expected that fauna dependent on nectar, pollen and insects will be more abundant in this forest. This unique biodiversity has high potential for ecotourism that has yet to be explored and promoted in especially in Malaysia.

1.1 Ecotourism
The natural attractions developed are expected to realize the sustainable management of natural resources through the development of ecotourism. Ecotourism influences social, environment and economic aspect and contributes to the conservation of biodiversity [5,6]. Weaver [7] stated that ecotourism plays a significant role in contributing towards environmental benefits. The attribute of ecotourism as a key role in providing a direct financial incentive for the preservation of relatively undisturbed natural habitats [8]. This also contributes indirectly to protecting watersheds and the overall quality of water. In addition, Fang [9] research on ecotourism in Sichuan, China revealed that ecotourism appears to play an important role in protecting the natural environment. Managers of the areas involved took measures to effectively control logging, encourage sound energy use, and enforce visitor rationing policies, all of which in turn resulted in a 6.7 million hectare increase in forested area, with a vegetation cover of nearly 90%.

Ecotourism development can be promoted as a strategy for balancing regional economic growth and conservation objectives [10]. For instance, the ecotourism offers tourists an insight on the impact of human beings on the environment. It was developed to promote a greater appreciation of our natural habitats. Normally, ecotourism provides activities to minimize negative aspects of conventional tourism on the environment and enhance the cultural integrity of locals. Therefore, in addition to evaluate environmental and cultural factors, an integral part of ecotourism is to promote recycling, energy efficiency, water conservation, and the creation of economic opportunities for local communities [11]. In addition, ecotourism has significant role to balance the need and preferences of visitors with the interest of the locals and the conservation of forest biodiversity. It is also has become a popular choice for tourist recently because of its concept of nature preservation and conservation practiced [12]. Thus, the purpose of this study is to estimate the willingness to pay among the local communities for the conservation of ecotourism resources in UMK Gelam Forest, Bachok using dichotomous choice contingent valuation method.

1.2 Contingent Valuation Method (CVM)
Contingent Valuation Method (CVM) is a valuation based on a questionnaire that offers the respondents an opportunity to make an economic decision on a goods and services which no market exists yet. Endalew *et al*. [13] states that CVM obtains option price estimates in presence of uncertainty, able to value good not previously available and estimate all existence class benefits and relevant ordinary curve, which are estimated. Furthermore, CVM remains an important tool for forest resource economist because forest ecosystem provides various goods and services which are not be

easily separated [14]. The CVM is an estimation method to value the non-market goods and services of environmental attributes or amenities such as values of certain areas, endangered species, recreational opportunities, scenic resources, and others. These values are basically measured based on the willingness to pay for environmental improvement. The most appealing aspect of CVM is that it allows estimation of total value rather than components of the total value itself [15].

Contingent Valuation Method is chosen in this study because this method can measure non-use values or values that are not traded in the market. Nor Hizami *et al*. [16] addressed on the use of CVM as a standard measure of the economic value of non-market goods, such as recreation, resources, wildlife, and environmental products. Hanley and Spash [17] state that CVM was originally proposed by Davis [18] and the interests in CVM grew significantly since the 90s, and this technique continued to be used widely. The interest to measure non-use or passive value is one of the reasons on the extensive use of CVM [19] and the only way to capture non-use value is through a survey method. There are basically three parts in CVM as show by Carson *et al*. [20] as follows:

- Presentation of the hypothetical market and the scenario under which the goods or service is offered
- Questions for the respondents to elicit his/her willingness to pay (WTP)
- Questions for the respondents to relate his/her WTP to the socioeconomic and demographic characteristics.

2. Methodology

2.1 Study Area

Gelam Forest was located in the province of Bachok district (5°59'22.8'N, 102°23'33.4''E) adjacent to Universiti Malaysia Kelantan, Bachok Campus [21]. This site is the only remaining sites that still exist after Pasir Puteh district which has constituted the core area of the biosphere reserve. It contains high potential to be used for research, teaching and ecotourism activities. The uniqueness of Gelam Forest is also reflective by the biodiversity of this ecosystem. The location of survey site was shown in Figure 1. Five randomly selected sub-district at varying distances (1 – 10 km) of the locals residential area outside the Gelam Forest are involved in this study. The sub-district of Bachok selected were Beris Lalang, Kandis, Jelawat, Gunong and Kuala Melawi which were nearby to the Gelam Forest site.

Figure 1. Map of study area at Bachok Sub-District, Source; Google Earth (2018)

2.2 Data collection
Prior conducting the actual data collection, the preliminary visit was conducted at the area of study to acquire permission from related authorities and village leaders to gather information process at their district. The purpose of preliminary visit is to request their assistance in identifying the designated respondents. The data collection process used is face to face interviews.

The survey was conducted in the 5 randomly selected communities nearby the Forest Gelam from July to August 2017. The total of 200 respondents were participated in this study with fourty respondents from each community were randomly selected from market places, houses, and community centre. The respondents chosen only 18 years and above in order to avoid bias in data collection process [22]. Potential respondents were approached and asked if they were willing to participate in the study. In addition, the survey was conducted by trained and experienced enumerators, which was monitored by the research team.

This study used primary and secondary data. The primary data was gathered from the personal interview with the respondents and the questions were prepared using local language which is Bahasa Melayu. A structured closed-ended questions were used in the survey. The first part of the questionnaires collected the data about respondents' demograbphic, socioeconomic characteristic, followed by second part is about awareness about Gelam Forest conservation, and lastly are elicitation of the respondent's willingness to pay for conserving the Gelam Forest. Meanwhile, the secondary data were collected from various sources information such as journal, book, library, websites, report and other literature.

2.3 Data Analysis
The single-bounded dichotomous choice contingent valuation (DC-CV) model was applied to examine the data. Two possible results are identified: either the respondent is not willing to pay for the bid level of entrance fee offered or the respondent is willing to pay for the bid level of entrance fee offered. Bid price is the dependent variable, where 1 = 'yes' and 0 = 'no' in response to the hypothetical referendum question. Hence, the equivalent WTP measures were calculated using logit regression

model at mean price and income level. A software program Limdep is used to calculate the actual value of visitors' willingness to pay.

3. Result and Discussion

3.1 Respondent's Socio-demographic Profile

A total of 200 questionnaires were administered in the survey for analysis. The respondent's characteristics selected for discussion includes age, gender, education level, type of profession, nationality, place of origin, and monthly household gross income. Table 1 reviews the frequency and percentage distributions for corresponding demographic profile of respondents obtained from the survey.

In terms of gender, majority of the respondents (55.0%) are male of the difference in the proportion of male respondents and female respondents are due to random sampling used and women may have been absent when interviewers approached while conducting a survey. Hence, less than half of the respondents (33.5%) are single and (66.5%) of visitors are married. They are only two different races involved in this survey, which are Malay and Indian as the residential area mostly comprise of Malays (98.5%) rather than other races such as Indian. A majority (31.5%) of the respondents are in the 21 – 30 years' age group followed by the 30 – 40 years old group (25.5%), 40 – 49 years old (19.0%), below 20 years old (14.5%), and (1.5%) are respondents above 50 years' age group. This study signifies that ecotourism is a "youthful" activity for the younger generation [23].

This study found that majority of the respondents from the local community has high level of education. It can be expressed by 36.0% respondents have studies at university followed by 15.5% respondents studied in college. While a quite large percentage of respondents (36.0%) had only secondary level of education and a small number of percentages (2.5%) had only primary education. As for respondents' employment status, the highest numbers (29.0%) of the respondents are working in the private sector. The second largest are working in the government sector (26.5%) followed by pensioner (20.5%), 13.5 % worked as self-employees, 8.5% of the respondents are unemployed and 2.0% are students.

Table 1. Socio-Economic Profile of Respondents

Variable	Frequency	Percent
Gender		
Male	110	55.0
Female	90	45.0
Race		
Malay	197	98.5
Others	3	1.5
Age		
< 20 years' old	29	14.5
21 – 30 years' old	63	31.5
30 – 40 years' old	51	25.5
40 – 50 years' old	38	19.0
51 – 60 years' old	16	8.0
> 60 years' old	3	1.5
Marital Status		
Single	67	33.5
Married	133	66.5
Education Level		
Primary School	5	2.5
Secondary School	72	36.0
College	31	15.5

Variable	Frequency	Percent
University	92	46.0
Occupation		
Government	53	26.5
Private employee	58	29.0
Self-employee	27	13.5
Pensioner	41	20.5
Student	4	2.0
Unemployed	17	8.5
Place of Origin		
Kelantan	200	100.0
Monthly Gross Household Income level		
RM 1000 – RM 3000		
RM 3001 – RM 6000	164	82.0
RM 6001 – RM 9000	34	17.0
RM 9001 – RM 12000	2	1.0
	1	0.5

The result of this study also found that the respondent's place of origin indicates that 99.0 are permanent residents of the area and only 1.0 % are from other states and are at the study area for job purposes. The respondents' monthly gross household income levels are dominantly 82.0% from RM1000 – RM3000, followed by RM3001 – RM6000 (17.0%), RM6001 – RM9000 (1.0%) and RM9001 – RM12000 (0.5%). Most of the respondent's gross household's income level is below RM3000 as most of them are working as farmers and working at private sectors near their home.

3.2 Willingness to Pay Analysis.
This section discusses about the WTP stated by the respondents. The analysis used is the dichotomous choice CVM. Apart of the dichotomous choice, each respondent is asked whether they would be willing to pay a particular price for the conservation of Gelam Forest as for ecotourism development by allowing them to answer the question with 'yes' or 'no' to the price of entrance permit offered (bid). Bidding price between RM2 to RM10 were assigned when conducting the survey. The distribution frequency of respondent's willingness to pay at each bid amount is shown in Table 2.

Table 2. Locals Willingness to Pay

Price (RM)	Yes		No		Total	
	Freq	%	Freq	%	Freq	%
2	33	16.5	7	3.5	40	20
4	27	135	13	6.5	40	20
6	18	9.0	22	11.0	40	20
8	16	8.0	24	12.0	40	20
10	5	2.5	35	17.5	40	20
Total	99	49.5	101	50.5	200	100

This study employed 200 samples of questionnaire for the survey. About 99 (49.5%) out of 200 respondents indicated their willingness to pay for the given bid. Meanwhile, 101 respondents (50.5%) are not willing to pay at the suggested price. This is because have lack of knowledge   about the significance of future benefits of Gelam Forest. The respondents also stated lack of confidence on the development of Gelam Forest as an ecotourism destination.

The result of the study also presented that lower the bidding price, large number of respondents are willing to pay for conservation of ecotourism resources. This result shows consistency with the

theoretical expectation, whereby, as the given bid is decreased, the number of respondents willing to pay increases, and vice versa.

Thus, there is a negative relationship between WTP and conservation fee. Practically, on the first bid level, value of RM2 is given to the respondents, approximately 16.5 % of respondents are willing to pay and only 3.5% indicated unwillingness to pay. When a given bid level increases to RM10, more respondents are not willing to pay (17.5%) while only a small percentage of respondents (2.5%) are willing to pay for the given bid level. This study proves that the characteristic of response by the visitor is in parallel with the theory of willingness to pay as in previous literature. Hence, theoretically, this study also proved that the majority of local community around the area of Gelam Forest was accepted and agreed that ecotourism development will benefit the economics of life and also will preserve the valuable resources in the Gelam Forest as aesthetic value in future.

3.3 Binary Logit Regression
This study also applied the binary logit regression for analysing the probability of local's willingness on conservation of ecotourism resources at Gelam Forest. This analysis is also used to test if there was a significant difference in the variables of the socioeconomic factors, and to provide further information about the independent variables which influenced willingness to pay. Most studies in the literature found that the economic characteristics, socio-demographic characteristics, and the characteristics of the good itself are the components that contribute to the willingness to pay [25]. Table 3 shows the result of the parameter estimates of the linear logit.

Table 3. Result of Logit Regression

Variable	Coefficient	T- ratio	Significant Value
Constant	-14.9996	- 1.792	
Bid Price	-1.8663	- 4.856	0.0000***
Education	2.0161	2.525	0.0009***
Income	2.1161	3.954	0.0001***
Pseudo R^2	0.2590		
Log-Likelihood	-103.0829		
Percentage of Right Prediction	75.12		

Note: *** significant at 1% level

Based on the results summarized in Table 3, variables that are statistically significant are calculated from single bounded analysis that is price, education and income respect on visitor's willingness to pay for conservation of UMK Gelam forest. All the parameters statistically show significant value with p-value below than 1 percent. Thus, the result indicates that all the variables are significant at 1 percent level. The goodness of fit test for the regression is indicated by Pseudo-R2 with 0.2590 while the percentage of correct prediction is 75.12%. This analysis shows that the results are satisfactory. As expected, the coefficient for price is negative which it implies that higher bid results to less probability of respondents that are willing to pay at the level of bid.

According to the logit regression results, income indicated as a significant variable at 1 percent in this analysis with the value at 0.0001. It stated that, the higher level of respondent's income, the more ability of willingness to pay a higher amount than a low income level. Moreover, several studies have showed positive relationship between income and level of willingness to pay, whereby respondents with lower income are less willing to pay and vice versa [24,25]. However, a study by Dong *et al*. [26] reported a negative relationship between income level and the WTP respondents.

In addition, the education level coefficient illustrated a positive value with 2.0161 and significant at 1 percent level of confidence. Thus, as expected, with higher-level of education, the probability of accepting the bid price increases compared to low level of education. A study by Asenso-Okyere *et al*. [27] indicates that a higher educated person is more likely to pay compared to a non-university

education level. Normally, a higher educational level is linked with better employment and higher income, thus will increase the probability of respondents toward willingness to pay [28]. Thus, the results regression analysis shows that WTP for protection of ecotourism resources at Gelam Forest is RM 4.20 per head per year.

4. Conclusion

The aim of this paper is to estimate the local community's willingness to pay for the conservation of ecotourism resources in Gelam Forest using the contingent valuation method. The results discovered that it can be successfully applied on economic valuation of conservation for ecotourism resources in Gelam Forest. The higher influence of income and education on willingness to pay for conservation effort conforms to Economic Theory and typical findings in the economic valuation literatures. It was concluded that Gelam Forest conservation initiatives nearby UMK were feasible for ecotourism development in future. Hence, the financial resources obtained from the amount of WTP might be used for conservation and as a fund for maintenances purpose regarding to the ecotourism activities provided. The findings in this study - contributed to the land use planning and design of nature-based recreation that meets societal demands.

Acknowledgements

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