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Economic Value of Recreation as an Ecosystem Service in Ayer Keroh Recreational Forest, Malaysia

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Abstract: Economic values of various ecosystem services of recreational forests are not well understood in many countries, including Malaysia. Policymakers and resource managers with a lack of such information may make inappropriate decisions to manage forest resources. To address the information problem, this study used data and estimated the economic value of recreation as a cultural ecosystem service of the Ayer Keroh Recreational Forest (AKRF) in Malaysia using the Travel Cost Method (TCM). The study estimated an economic value of USD 20,346/ha/year for cultural services, including recreation. These findings provide some useful information that might be needed for those involved in planning and management for the development of urban forest sites, especially in AKRF.

Keywords: cultural services; economic value; Travel Cost Method; urban recreational forest

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1. Introduction and Problem Statement

Forests provide a multitude of ecosystem services. The values of the services vary with local conditions. The maximum use of forest services requires policy decisionmakers and forest managers to understand the economic value of the forest services based on the market and non-market values. Such values are rarely estimated for many kinds of forests, especially in Malaysia.

Recreational forests offering recreational experiences are remarkable, especially in ASEAN countries where the demand for nature-based attractions is increasing [1,2]. This is only one of the ecosystem services provided by a recreational forest. There are many other services where values are either underestimated or have no monetary value due to the lack of an economic valuation basis [2]. Recreation may become economically sound when forests involved in the estimation are scarce or when public funds are used for recreational forest development, conservational activities, and management.

Compared to various other types of forests, a recreational forest has its own characteristics, with its official establishment purpose being for public use in terms of relaxation, picnics, and recreation [3]. Forests in protected areas, such as national parks, are zoned based on the categories of strict protection, recreation, conservation and management, and production [4]. However, out of all categories, there are also recreational forests established only for recreational purposes, with no other use-zones established. There are many single-zoned, recreational forests in Malaysia. To date, there is scant research of recreational forests.

1.1. Ecosystem Services

Ecosystems vary both in size and, arguably, complexity, and may be nested one within another [5]. Ecosystem services are benefits that people obtain from the various ecosystem

services, namely provisioning services, regulating services, habitat/supporting services, and cultural and amenity services [6]. There have been several studies on ecosystem services, as indicated in Table 1. However, such in-depth research on ecosystems services specifically for recreation is sparse in Malaysia.

Table 1. Summary of the literature on the valuation of forest ecosystem services.

Authors	Location	Type of Forests	Type of Establishment (Ownership and Protected Status)	Valuation Method	Consumer Surplus per Trip/Visitor	Analysis	Economic Value
I. Local studies							
Awang, Mohd Yusrizal, Tuan Marina and Mohd Syauki [7]	Chamang Forest Recreation Area, Pahang, Malaysia	Dipterocarp forest	State forest	TCM	RM106.40	Tobit regression	RM1.06 million/year
Nurul Shahirawati [8]	Urban Forests in Johor Bahru, Malaysia	Dipterocarp forest	State forest	TCM	RM41.75	Linear regression	No information available
Gwee, Tan and Narayanan [9]	Belum-Temengor Rainforest Complex in Perak, Malaysia	Tropical rainforests	State forest	TCM	RM654.49	Truncated Poisson regression	RM14.66 million/year
Solikin et al. [10]	Srengseng Jakarta Urban Forest, Indonesia	Tropical rainforests	State forest	TCM	RM24.32	Poisson and Negative Binomial regression	RM0.44 million/year
II. International studies							
Ezebilo [11]	Sweden recreational forests	No information available	No information available	TCM	US$72	Negative Binomial regression	US$3,406,751
Chaudhry and Tewari [12]	Urban Forestry of Chandigarh, India	No information available	No information available	TCM	Rs. 308	Linear regression	Rs. 92.4 millions
Borzykowskil, Baranzini and Maradan [13]	Swiss recreational forests	No information available	No information available	TCM	CHF112.8	Zero Truncated Negative Binomial regression	No information available
Bertram and Larondelle [14]	Urban Forest, Berlin Germany	No information available	No information available	TCM	€14.95	Negative Binomial regression	No information available
Liu, Fang and Hsieh [15]	Alishan National Forest Recreation Area, Taiwan	No information available	No information available	TCM	NTD 1703	Negative Binomial regression	(NTD 2,157,121,944–NTD 2,452,136,112)

Given these valuations and the incompleteness of estimating, this study aims at estimating the economic value of a forest located in an urban setting within Malaysia. The Ayer Keroh Recreational Forest (AKRF), which is situated in Melaka, Malaysia, was chosen as the research site.

1.2. Non-Market Valuation Methods

According to The National Research Council of Washington D. C., a committee for evaluating groundwater in the United States of America [16], there are several techniques for assessing and determining the value of non-market goods. The committee emphasised that the TCM was the first technique developed for valuing non-market commodities. The method, proposed by Hotelling [17], is a tool for determining the economic value of national parks in the United States of America. Eventually, more environmental valuation techniques emerged. Revealed preferences (RP) and stated preferences (SP) are types of environmental valuation techniques.

Revealed preference methods estimate the value of environmental goods or services based on an individual's actual behaviour. Conversely, stated preference determines the value of resources to users by identifying the willingness to pay for the resources available at the sites. Among the methods often employed with the RP techniques are hedonic pricing, travel cost, and market pricing methods [18]. Researchers employing the SP technique have often adopted choice modelling and contingent valuation.

The significance of identifying the values of non-market goods stemmed from the US National Park Service's intention to determine the economic values of national parks by employing economic principles [19]. Hotelling suggested that an individual's travel cost to a recreational location could be utilised as an implicit price for enjoying the site. Therefore, the travel cost is significantly influenced by the distance travelled. The greater the distance to a site, the higher the travel cost and the lower the frequency of site visits.

According to Enyew [20], the basic TCM assumptions are as follows:

- The total round-trip travel cost, which comprises the amount of money and time spent travelling to a site, serves as a WTP's proxy estimator to visit the site.
- Site visitors react similarly to the changes in entrance fees and the changes in the travel cost.
- The trip to a particular site is assumed to be the sole intention. Therefore, all travel costs are incurred solely for the purpose of visiting the site.

1.3. Multiple Destination (MDT) Visitors

The basic TCM does not consider the trip costs incurred by the multiple destination visitors (MDT) to a particular site [21]. It assumes that visitors would only visit the study site; hence, the basic TCM's finding overestimates the consumer surplus [22]. In his study on the recreational benefits for local visitors in the Kauaeranga Valley in New Zealand, Everitt [22] proposed that the travel cost started on the day the journey to the study site began, instead of on the day the journey began from their MDT visitors' respective homes. Siti Aznor [23] employed the CVM and TCM to evaluate visitors' willingness to pay an entrance fee at three popular marine parks in Malaysia: Payar, Tioman, and Redang Marine Park. However, the travel costs were calculated from the last stop instead of the site visit day, which may be from abroad for international visitors.

2. Materials and Methods

2.1. Study Site

The development of recreational forests in Peninsular Malaysia started in the earlier phase of the First Malaysia Plan (1966–1970) through the Twelfth Malaysia Plan (2021–2025), whereby the government aimed to enhance forest management and conservation [24]. In 2021, there were 114 recreational forests in Peninsular Malaysia in all 13 states [25]. Ayer Keroh Recreational Forest (AKRF), also known as Melaka Botanical Garden, is based in Ayer Keroh, Malacca. According to UNESCO World Heritage Site City, Malacca is Malaysia's third most important city [26]. AKRF is approximately 15 km away from Malacca town beyond the North-South Highway [27].

Ayer Keroh Recreational Forest (AKRF, currently known as Melaka Botanical Garden) was founded on 1 June 2006. The exact area size of AKRF is 92.5 hectares. In this forest, there are plenty of monkeys (scientifically known as *Macaca fascicularis*). In addition to the monkeys, of the forest is also home to various type of trees species. *Pterocarpus Indicus* (or local name, Pokok Sena) and *Artocarpus lanceifolius*, (or local name, Keledang-Keledang).

There are different of facilities available at AKRF, such as accommodations, camping sites, and jungle trekking. Recently, AKRF began offering an adventure park, Skytrex Adventure. The visitors can carry out various recreational activities at AKRF, such as picnic or bicycling. In addition, AKRF is an ideal place for jogging lovers.

AKRF, as shown in Figure 1, was chosen as the study site since it is one of the most popular recreational areas among the four recreational forests located in Melaka. The other three are Bukit Batu Lebah Recreational Forest, Sungai Udang Recreational Forest, and Tanjung Tuan Recreational Forest. One of AKRF's popularities is its easy accessibility, because it is connected to the North-South highway of Peninsular Malaysia. Despites its popularity, the park has been vulnerable to development pressure due to being in an urban area. To keep it protected from development pressure, findings from an economic valuation of the park would be beneficial for justifications on its importance.

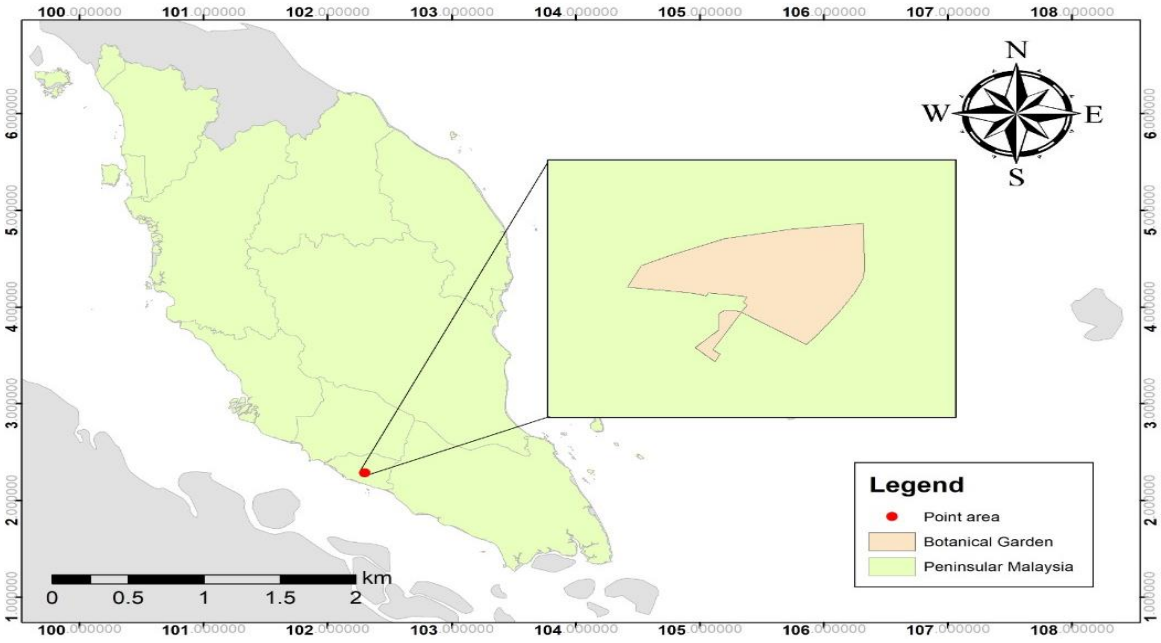

Figure 1. The map of Ayer Keroh Recreational Forest (AKRF).

There are no recent studies related to identifying the economic value of recreation as an ecosystem service in AKRF.

2.2. Land use Changes

Land use changes have reduced the recreational forests' coverage despite its advantages (please see Table 2). Land use classifications include water streams, lakes, buildings, open area/bare land, PLKN camps (national service camp areas), and forested areas. The recreational forest is approximately 92.5 ha. In this study per se, we concentrated only on the forested areas, amounting to 78.10 ha.

Table 2. Land use type in the Botanical Garden area in the years 2010, 2015, and 2020.

No.	Types	2010	2015	2020
		Length (m)/Area (ha)		
1.	Water stream	2861.30 m	2861.30 m	2861.30 m
2.	Forest	78.94 ha	78.31 ha	78.10 ha
3.	Buildings	0.65 ha	1.51 ha	1.63 ha
4.	Open area/bare land	2.95 ha	3.08 ha	3.53 ha
5.	Lakes	1.47 ha	1.11 ha	0.75 ha
6.	PLKN camp	8.49 ha	8.49 ha	8.49 ha

2.3. Calculation of the Economic Values of Ecosystem Services

Recreational Value

i. Individual Travel Cost Model (ITCM)

In this study, the Travel Cost Method (TCM) was used to estimate recreation as a cultural ecosystem service. TCM belongs to the revealed preference technique, commonly used to estimate recreational values, such as the price paid by the resource user (visitors) as represented by the travel cost to visit a recreation site [28]. Similarly, the ITCM, as shown in Equation (1), was accessed in this study to estimate the economic values of AKRF.

Model specification

$$Visit = \beta 0 + \beta 1 RITCij + \beta 2 FS + \beta 3 QPS + \beta 4 Age + \beta 5\ Edu + \varepsilon \quad (1)$$

where

Visit = The individual's number of visits in 2020
RITC = The individuals total round trip cost
FS = Facilities of the place, AKRF as measured by mean satisfaction
QPS = Quality of the place, AKRF as measured by mean satisfaction
Age = Age of individuals
Edu = Education level of individuals
$\beta 0$–$\beta 5$ = Coefficients to be estimated
ε = Random error

2.4. Sampling Procedures

Respondents were limited to those who had visited the park. Only the group's head was chosen as a respondent. Likewise, Syamsul Herman [29] suggested that if the visitors were group members, then the group's head should be selected as the respondent, as data obtained from the group's leader would accurately reflect and represent the group members [30]. Furthermore, if it was a family, the respondent was either the father or mother; however, if the parents were not present, the eldest family member was chosen as the respondent [29]. On the other hand, if the visitors arrived in a group of friends, the individual who arranged the trip or the trip's leader was chosen as the respondent [30]. These guidelines are beneficial in preventing data redundancy in which respondents are counted twice.

2.5. Questionnaire Design

A face-to-face survey was conducted using the adapted questionnaires to ensure all the questions were interpreted correctly and answered rationally in this study. There were four sections in the questionnaire. The first section included general questions about the visitors, such as the departure point, visitation rate, and satisfaction questions regarding park management. The second section (Section B) consisted of five-point Likert scale questions ranging from "strongly disagree to strongly agree" about the respondents' satisfaction, such as basic resources, facilities, local quality, and brand effect in AKRF. The third section addressed the TCM and included accommodation, food, toll or fuel costs, consumption in the park, and other essential components. The final section focused more on demographic background details, such as occupation, age, gender, ethnicity, level of education, marital status, and income, among the study's variables.

i. Section C. Travel Cost Information

Expenditure for the travel purposes of AKRF was obtained by asking respondents to specify the estimated amount of their expenses according to each item in Table 3 below.

Table 3. The travel cost information of visitors in AKRF.

Item (During the Trip)	Total Expenditure (RM) (Each Person)
1. Food	
2. Fuel	
3. Toll	
4. Other expenditures	
In the AKRF	
5. Food	
6. Souvenir	
7. Lodging	
8. Other expenditures	
Total	

ii. Total Round-trip Cost

In the questionnaire, respondents were asked to fill in all the expenditures on the trip and in AKRF. Travel costs during the trip included food, fuel, tolls, and other expenses. These items produced the total cost per one-way trip to the AKRF, including food, souvenirs, lodging, and other expenses. It is necessary to assume that fuel and food are approximately equal to the departure cost when considering the round-trip cost of visitors. In addition, in line with Siti Aznor [23], travel costs were determined from the previous destination to the park. Therefore, to obtain the total round-trip cost, the cost of the trip was multiplied by 2, as shown in Equation (2).

$$\text{Total round-trip cost} = (\text{expenditures during the trips} + \text{expenses in AKRF}) \times 2 \quad (2)$$

2.6. Consumer Surplus Estimation

The consumer surplus (CS) was determined using Equation (3) [31].

$$(1/b_{tc}) \quad (3)$$

The coefficient of the total round-trip cost variable (b_{tc})

2.7. Data Collection

Convenience sampling was used to select readily available visitors in AKRF. The questionnaire was distributed in late September 2020. The visitor concentration point is in the open space at the entrance of AKRF. The period for collecting data samples was from 8 am to 11 am and from 4 pm to 6 pm, respectively. During the two selected time periods, there were more opportunities to conduct the self-administered survey. However, upon the respondent's request, a face-to-face survey was conducted.

In 2018, there were a total of 92,318 visits to AKRF. The sample size was determined using the formula provided by Krejcie and Morgan [32]. Therefore, using the formula provided in Equation (4), the recommended sample size was equal to 383 people, where the maximum consideration of sample differences and conservativeness was included.

$$\textit{Formula: } n = [z^2 * p * (1 - p)/e^2]/[1 + (z^2 * p * (1 - p)/(e^2 * N))] \quad (4)$$

$$n = [1.96^{\,2} * 0.5 * (1 - 0.5)/0.05^2]/[1 + (1.96^2 * 0.5 * (1 - 0.5)/(0.05^2 * 92{,}318))]$$

$$n = 384.16/1.00s42 = 382.568$$

$$n \approx 383$$

where

z = 1.96 for a confidence level (α) of 95% (1.96)
p = proportion (expressed as a decimal) (0.5)
N = population size (92,318)
E = margin of error (0.05)

Although the required sample size was 383, the research could not attain that ideal amount during data collection due to the COVID-19 pandemic, resulting in a final sample size of 250.

2.8. Reliability and Validity

The questionnaire was validated by a panel of five experts from the field. Validation was assessed based on the survey format and contents to verify external and internal consistencies. Pre-testing was conducted on 38 respondents in AKRF to identify whether the questions and responses were valid. From the pre-testing, the questionnaire was modified based on the feedback obtained. A pre-test was then conducted using an interview questionnaire. Subsequently, a pilot survey was conducted to test the questionnaire's efficiency and validity. Following Connelly [33], the literature in recent years indicates that

the sample of the preliminary research should be 10% of the larger parent research plan sample. In addition, the reliability test by SPSS was utilised for the Likert scale only.

Based on the results, the value of Cronbach's Alpha for the overall Section B (B1, B2, B3, B4) was 0.963. For B1 about basic resources, the alpha score was 0.899; for B2 about facilities, 0.887; for B3 about the quality of the place, 0.929; and for B4 about the brand effect, 0.934. According to Pallant [34], a value above 0.8 is preferable. Therefore, the scale items in the current study were accepted.

2.9. Data Analysis

The descriptive analyses consisted of frequency distributions and cross-tabulations, while the central tendency comprised mean, median, mode, and standard deviations. Descriptive statistics and inferential statistics were also used in this study for the TCM. The descriptive statistics were performed using the Statistical Package of Social Sciences version 25 (SPSS). This study determined the causal relationship between dependent and independent variables using truncated negative binomial regression for the TCM. It was chosen because the dependent variable was the number of visits in 2020. Next, since the variance of the number of visits was greater than the mean, the negative binomial model was used. In addition, the data suffered from truncation and endogenous stratification [35].

The truncation problem occurred when only people who visited the site were used as variables. Many potential users did not visit the site. This situation created data with truncated problems. Endogenous stratification happens due to a higher tendency to select frequent visitors to a location than those who seldom use it [36]. Therefore, the truncated negative binomial regression method better estimated the coefficients of costs and other factors determining the number of forest users. There is significant online literature about the truncated negative binomial regression method.

3. Results and Discussion

3.1. Travel Cost Method

Descriptive Statistics of Variables

i. Demographic information

According to Table 4, the gender distribution of males and females is representative in contrast to the respondents' age or education level. Women accounted for 54.4% of respondents, while men accounted for 45.6%. The age group below 30 years old represented the majority (54.4%), followed by respondents aged 31–40 years (21.2%). In terms of respondents' education levels, more than half of respondents (59.6%) were diploma- and degree-holders. Finally, the proportions of single and married respondents were almost identical.

ii. Respondent general information

According to Table 5, 76% of respondents had previously visited AKRF, whereas only 24% of respondents visited AKRF for the first time. In total, 64.8% of respondents stated that visiting AKRF was the primary trip purpose.

Moreover, 63.6% of respondents made less than ten visits in the last 12 months. In terms of distance, 81.6% of respondents travelled less than 51 km. Most respondents arrived at AKRF by car (70.8%), followed by motorcycle (21.2%).

iii. Satisfaction level with the facilities

The visitors' satisfaction with a protected area or national park can be indirectly measured by the content feeling they acquire from the environment, as well as the their experiences with facilities and with the collection of natural qualities that define the park's identity and character [37].

Table 4. Demographic profile of respondents.

Demographic Profile	N	%
Gender		
Male	114	45.6
Female	136	54.4
Age		
Less than 30	136	54.4
31–40	53	21.2
41–50	33	13.2
More than 50	28	11.2
Education		
No formal education	1	0.4
Primary school	9	3.6
Secondary school	57	22.8
Pre-university	34	13.6
Diploma and degree	130	52.0
Master/PhD	19	7.6
Married status		
Single	118	47.2
Married	125	50.0
Divorced	7	2.8

Table 5. General information of respondents.

	Frequency	Percent %
A1. Have you ever visited the AKRF before?		
Yes	190	76.0
No	60	24.0
A2. Is your visit to the AKRF your primary purpose of a trip to Melaka?		
Yes	88	35.2
No	162	64.8
A3. How often do you visit the AKRF in the last 12 months, including your current visit?		
First time (1)	60	24
2–10	97	39.6
11–20	44	17.6
21–30	16	6.4
31–40	7	2.8
41–50	4	1.6
More than 50	20	8
A4. Please state the approximate distance between your starting point to AKRF.		
Less than 51 km	204	81.6
51 km–100 km	14	5.6
101 km–150 km	13	5.2
151 km–200 km	14	5.6
More than 200 km	5	2.0
A5. How did you come to AKRF?		
Car	177	70.8
Taxi/e-hailing services	10	4.0
Public transport	10	4.0
Motorcycle	53	21.2

Therefore, it is critical to quantify visitors' satisfaction, defined as a tourist destination's potential needs for facilities, to meet visitors' recreational and leisure time needs. Tourist destinations are objectively perceived as entities with a set of quantifiable properties.

Respondents are required to rate their satisfaction level with certain facilities, as well as specific qualities or attributes of the natural environment [38]. These attributes can be quantified at various levels utilising specific criteria in order to determine visitors' overall happiness.

The respondent's overall mean satisfaction with the facility was 3.56, indicating a medium satisfaction level of 2 (please see Table 6). Most respondents were satisfied with the park's facilities.

Table 6. Section B-2: Satisfaction level with the facilities.

Item	Frequency						
	1 (%)	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	**Mean**	**Level**
Sufficient facilities provided	13 (5.2)	22 (8.8)	109 (43.6)	79 (31.6)	27 (10.8)	3.34	2
Reasonably placed facilities	12 (4.8)	16 (6.4)	95 (38.0)	105 (42.0)	22 (8.8)	3.44	2
The facilities provided are in good condition	12 (4.8)	37 (14.8)	83 (33.2)	99 (39.6)	19 (7.6)	3.30	2
The functional performance of the facility meets the needs of tourist	11 (4.4)	35 (14.0)	93 (37.2)	91 (36.4)	20 (8.0)	3.30	2
The cleanliness of the AKRF is good	11 (4.4)	29 (11.6)	80 (32.0)	94 (37.6)	36 (14.4)	3.46	2
Number of the trash bin are enough in the forest	16 (6.4)	42 (16.8)	82 (32.8)	72 (28.8)	38 (15.2)	3.30	2
Overall mean						3.56	

(1)–(5) Five-point Likert scale questions ranging from "strongly disagree to strongly agree; Low (1) started from (1 + 1.333) 1–2.339, medium (2): 2.34–3.669, and high (3): 3.67–5.00.

iv Satisfaction level with place quality.

According to Table 7, the overall mean satisfaction with the place quality was 3.74, indicating a high satisfaction level. Most AKRF visitors were highly satisfied with the place quality.

Table 7. Satisfaction level with the place quality.

Item	Frequency						
	1 (%)	**2 (%)**	**3 (%)**	**4 (%)**	**5 (%)**	**Mean**	**Level**
The environment in this place brings me a sense of calmness	12 (4.8)	17 (6.8)	52 (20.8)	97 (38.8)	72 (28.8)	3.80	3
The environment here makes me want to come again	8 (3.2)	15 (6.0)	68 (27.2)	95 (38.0)	64 (25.6)	3.77	3
The maintenance of nature in AKRF is good	8 (3.2)	21 (8.4)	73 (29.2)	92 (36.8)	56 (22.4)	3.67	3
AKRF has a strong image to attract me to come	7 (2.8)	25 (10.0)	55 (22.0)	99 (39.6)	64 (25.6)	3.75	3
Travel to this place is enjoyable to me	5 (2.0)	19 (7.6)	64 (25.6)	97 (38.8)	66 (26.4)	3.80	3
Travel to this place is an achievement for me	7 (2.8)	19 (7.6)	72 (28.8)	105 (42.0)	47 (18.8)	3.66	2
I am feeling happy being close to nature	6 (2.4)	19 (7.6)	58 (23.2)	109 (43.6)	58 (23.2)	3.78	3
I feel comfortable being here	13 (5.2)	11 (4.4)	71 (28.4)	93 (37.2)	62 (24.8)	3.72	3
Overall mean						3.74	3

(1)–(5) Five-point Likert scale questions ranging from "strongly disagree to strongly agree; Low (1) started from (1 + 1.333) 1–2.339, medium (2): 2.34–3.669, and high (3): 3.67–5.00.

Satisfaction with the place quality ranged between 3.66 and 3.80, indicating a satisfactory overall satisfaction level. Previous research on visitor satisfaction with natural

ecosystems employed a direct approach to measure visitor satisfaction with the environment [39]. Despite the fact that visitor satisfaction levels may vary according to parameters, such as the landscape or the services examined, the results provided insight into the factors affecting satisfaction and the ability to determine whether these levels were related or unrelated to the visitors' perceptions of the characteristics of each place visited [39,40]. Thus, it can be argued that visitors' experiences and satisfaction level with their visit to a national natural park are influenced by their perception of the overall characteristics of the national park or protected areas, perception of the space, and experiences associated with the visited area's facilities.

As shown in Table 8, a truncated negative binomial regression analysis was conducted to identify the relationship between the independent and dependent variables.

Table 8. Results for the truncated negative binomial regression.

Dependent Variable: Number of Visits in 2020	Negative Binomial (NB)
Constant	2.716 (0.685) ***
RITC	−0.014 (0.004) ***
Age	0.030 (0.006) ***
Edu	−0.206 (0.967) **
FS	−0.435 (0.170) ***
QPS	0.308 (0.180) *
/lndelta	2.848
delta	17.259
LR: chibar2(01)	2332.58 (Prob ≥ chibar2 = 0.000)

Note: Standard errors in parenthesis (* significant at 10% level, ** significant at 5% level, *** significant at 1% level).

The total round-trip cost was found to have a negative beta coefficient and was statistically significant. This is consistent with demand theory. Similarly, Matthew et al. [41] attained a negative coefficient with significance at a 99% confidence level using Poisson regression analysis for ITCM. Next, age was significant at 99%, with a positive beta coefficient in this study. A positive coefficient means that the higher the age, the higher the number of visits to AKRF. Attractions such as jogging tracks, jungle trekking, and camping will surely fascinate those adults who love to be inspired by nature [27]. This finding is consistent with a study in Srengseng Urban Forest that age has a positive coefficient [10].

The level of education was significant at a 99% level of confidence with a negative coefficient. This indicated an inverse relationship between the level of education among visitors and recreational site demand. However, for the Shahid Zare Forest, Pirikiya et al. [42] found that people with higher education tended to spend more time in forest parks, thus helping to boost the tourism industry.

Next, the satisfaction with facilities at the site was found significant at a 99% confidence level with a negative coefficient. As stated by Leh et al. [43], the implication of a negative coefficient possibly shifts the demand for goods inward due to lower satisfaction levels. These results are consistent with Clawson and Knetsch [44], who stated that congestion due to inadequate facilities might influence visitors' demand at the recreational site. Lastly, a positive coefficient was attained for the satisfaction gained on the quality of the place which was significant at a 99% level of confidence. Sustainable tourism that respects the region's ecological appeal will attract numerous visitors [45]. The improvement of

landscape maintenance and management will increase tourist satisfaction where they will be keener to visit [46]. Following that, the higher the quality of the place, the higher the number of visits due to a better impression.

3.2. Consumer Surplus Estimation

The coefficient of the total round trip cost variable (b_{Ttc}) was 0.014. Hence, the consumer surplus (CS) was determined using the formula by Creel and Loomis [31] ($1/b_{Ttc}$), which was estimated to be RM 71.43 (USD 17.21) in this study.

Thus, the economic value or total consumer surplus was estimated as:

$$\begin{aligned} \text{Numberofvisits}\ (2020)\ \text{travelcostpertrip} & \\ &= \text{TotalConsumerSurplusValueofAKRF} \\ &= 92,318 \times \text{RM}\ 71.43 \\ &= \text{RM}\ 6,594,275 (\text{USD}1,588,982) \end{aligned}$$

Next, the per ha value was estimated, assuming that economic value is accrued for the total 78.10 ha forested area of the park. Hence, the per ha value amounted to USD 20,346.

4. Conclusions

The current study focused on the ecosystem services in an urban recreational forest. This study assessed the recreational value of the recreational forest. The valuation was determined using the Travel Cost Method. The cultural services (comprising the Recreational Value) amounted at USD 20,346/ha/year. However, this study did not estimate the value of provisioning, regulating, and habitat/supporting services.

5. Discussion on the Contribution

This research will assist authorities in comprehending the economic value of recreation as an ecosystem service, and persuade them to appreciate and conserve forests in Malaysia. The findings of this study contribute to providing significant guidelines and importance to the Ministry of Energy and Natural Resources (KeTSA), forestry department, and state authorities, all of which play a critical role as policymakers in forest preservation. In addition, this study may shed light on the future scientific evaluation of cultural ecosystem services, specifically on recreational forests, in other countries. The data and results can be an effective tool for providing more precise information on ecosystem services to decisionmakers, enabling them to make amendments, and improve management and governance aimed at conserving AKRF. For future research, we recommend that other local research of recreational forests be integrated to correlate and assist in identifying the exact number of recreational forests nationwide. The limitation of the present study is that it did not consider components such as carbon sequestration, soil erosion, the option value of pharmaceuticals, nutrient cycling, genetic resources, seed dispersal and pollination, food/fruit value, medicinal value, and habitat services. In addition, the provisioning services were not taken into consideration, as there were no logging activities in AKRF. The constraints included data limitations and the lack of data.

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