Journal of Tropical Forest Science 30(3): 354–361 (2018)
https://doi.org/10.26525/jtfs2018.30.3.354361

VISITORS PREFERENCES ON FOREST CONSERVATION AND MANAGEMENT IN ENDAU–ROMPIN NATIONAL PARK

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Submitted May 2017; accepted November 2017

Endau–Rompin National Park (ERNP) is an area of mega-microbial diversity and the second largest in Malaysia after Pahang National Park. The main objective of this study was to analyse users' preferences and willingness-to-pay to enhance conservation and improve management of ERNP for sustainability. The discrete choice experiment was conducted on 350 local visitors to the national park who were purposely sampled. Results of a random parameter logit model for the choice experiment demonstrated that visitors placed highest values on the number of visitor's arrival followed by biodiversity. The welfare measure for improvement in the management of the ERNP against the status quo was estimated at about RM37. This value was greater than the currently charged entrance fee of RM5. Hence, improvement in conservation and management would result in more value allotted by the visitors to the park. This study recommended that visitor entrance fees be revised to increase revenues for sustainable financing of conservation initiatives and, possibly, reduce congestion.

Keywords: Attribute, choice experiment, entrance fee, management, willingness-to-pay

INTRODUCTION

National parks provide a number of products that underpin many rural livelihood strategies (Zapfack et al. 2016). Straddling the border between southern Pahang and northern Johor, the Endau–Rompin National Park (ERNP) is one of the few remaining expanses of lowland rainforest in Peninsular Malaysia (Davison 1988). ERNP is under the care of the Johor National Parks Corporation (JNPC) through financial support from the Johor state government. Issues in the park include insufficient staff for enforcement, monitoring and biodiversity management activities, and inadequate budget specifically for management of protected area (UNDP 2008). Other issues include illegal hunting, poaching of terrestrial animals, and extraction of agarwood. These circumstances in a national park would result in visitor dissatisfaction (Kaffashi et al. 2015).

Studies of benefits attained by the visitors from existence of the forest have used common tools for economic valuation. One example is the travel cost method (TCM) (Ahmad 1994), but this method is limited to the assessment of current use of in-situ resources using situations including travel ex-post valuation and does not take into account the non-use values (Birol et al. 2006). Another common tool is the contingent valuation method (CVM) (Ndebele 2009, Resende et al. 2017). However, this method is subjected to various biases, which constitute strategic biases (non-response bias, starting point bias, payment vehicle bias, interviewing bias, embedding bias and hypothetical bias), and are expensive (Birol et al. 2006). Unlike TCM and CVM, choice modelling method is able to determine the value of any environmental resource in the absence of actual behavioural data, determine the non-use values, and discard some of the biases in CVM (Rolfe et al. 2000). Furthermore, it can be used for both ex-post and ex-ante valuations too (Bennett & Blamey 2001).

Studies conducted in ERNP include identification of flora and fauna in the park (Zakaria et al. 2012). Few studies have been conducted on tourists' level of satisfaction towards the available facilities, services and outdoor recreational activities in the park (Sharudin

2003, Sanmargaraja & Wee 2015). There was also a study of the aborigines of Kampung Peta (Siti Aminah & Wee 2014). Unfortunately, information about visitor preferences on forest conservation and management in the ERNP is still lacking. Pertaining to this, calculating the extent of resource improvements from the current conditions and how these improvements affect visitor preferences can assist ERNP managers in their decisions to match visitor preferences with long-, medium- or short-term goals for the park (Turner 2013).

One of the weaknesses of the current condition in ERNP is the entrance fees which have not been reviewed since 2003 (JNPC 2016). Entrance fees for all parks in Malaysia follow the standard fees imposed to visitors by the Department of Wildlife and National Parks since 1980, i.e. RM5 for adult local visitor and RM20 for adult international visitor (USD1 ~ RM4.49) (Mohd Rusli et al. 2008). As a result, ERNP is unable to generate enough funds to sustain itself (JNPC 2016). Furthermore, there is no fund specifically earmarked for conservation purposes in ERNP (UNDP 2008). Therefore, it is important to review the current entrance fees. Low entrance fee results in congestion especially during the holidays and, consequently, degradation of the park (Samdin et al. 2013). On the other hand, increased visitor entrance fees can be utilised for better utilities for visitors (Samdin et al. 2013).

Hence, understanding visitors' preferences for nature appreciation, infrastructure and other attributes of protected areas is crucial (Hearne & Salinas 2002). Valuation of conservation and management-related attributes are essential in ERNP. A choice experiment (an elicitation technique for choice modelling) has the capacity to estimate values for alternative multi-attribute resource-use options. It estimates trade-offs among different attributes of the park, including price, besides the marginal changes in each individual attribute (Kaffashi et al. 2015). Information gathered will help the management of ERNP and JNPC managers gauge the relative value of each of the different attributes being evaluated.

The aim of this study was to discover how visitors might differently value and, thus, be willing to trade-off conservation and management aspects of ERNP. Attributes studied were entrance fee, number of visitor's arrival, biodiversity conservation, enforcement and monitoring, and environmental and nature education. This study used the choice experiment as a mechanism to analyse the preferences of visitors in relation to the future development of ERNP.

MATERIALS AND METHODS

Endau–Rompin National Park

ERNP (20º 34' N, 103º 11' E, 428 m above sea level) is located in the Mersing and Segamat districts of Johor, which is situated in the southern part of Peninsular Malaysia (Figure 1). ERNP is the first national park established under the National Parks Act 1980 through the Johor Corporation Enactment 1989 by the Johor state government. ERNP can be divided into Endau–Rompin Selai and Endau–Rompin Peta. The former covers 19,562 ha while the latter, 29,343 ha.

Survey design

Since the objective of this research was to estimate the value of conservation and management attributes in the ERNP, the choice modelling method was the most suitable. The choice experiment questionnaire used for data collection highlighted trip related information, choice sets, perceptions of tourists on recreational activities and facilities, and was then followed by socio-demographic information. The first step in designing the questionnaire required determining the most important attributes of conservation and management in the park. The attributes chosen were based on a decline in the number of threatened species, insufficient enforcement capacity, absence of environmental and nature education to the public and the low entrance fee. This was a crucial step in identifying the most policy-relevant attributes which had future practical influences in ERNP. These selected attributes were drawn from a synthesis of opinions based on the outcome of focus group discussions with stakeholders, including JNPC, park managers, academicians in tourism and environment, and the wildlife conservation society who were familiar with ERNP. The final decision on the attributes and levels was also based on our observation at the park. Selected attributes were those related to the conservation and management of ERNP.

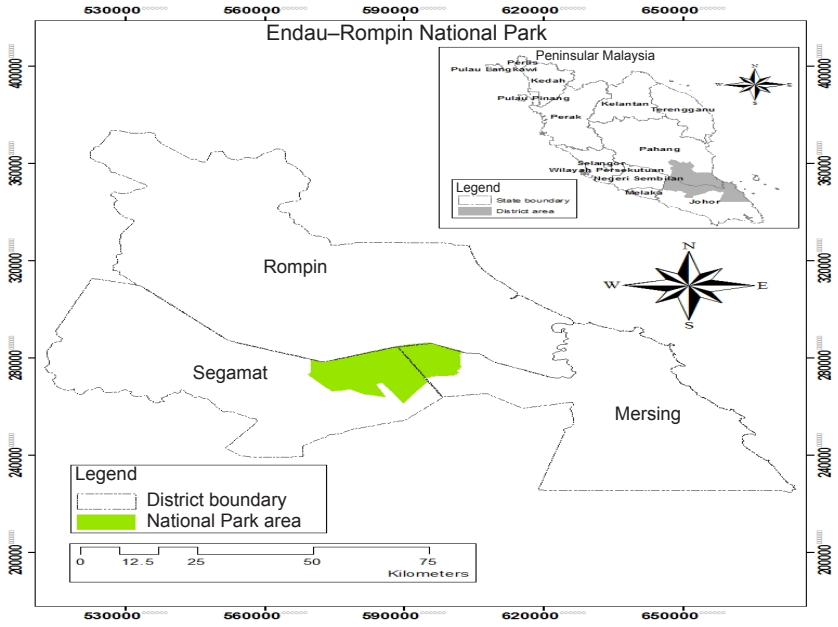

Figure1 Location map of the Endau–Rompin National Park, Johor

Attributes and levels

There were five attributes considered for the assessment of the visitor preferences, which included the number of visitor arrivals (NOV), biodiversity (BIO), enforcement and monitoring (EAM), environmental and nature education (EAN), and entrance fee (Table 1). Entrance fee was treated as cost, while number of visitor arrivals, biodiversity, environmental and nature education represented the improvement in conservation, and EAM represented the improvement in management.

Choice sets design

Applying the full factorial design from the original set of attributes and levels allowed 324 (i.e. 3 × 3 × 3 × 3 × 4) combinations of choice sets. Implementing the full factorial design was difficult because it contained so many combinations. This would not be suitable to be included into the questionnaire as it would have been strenuous for the respondents. In addition, large number of choice tasks would have had too many responses. Instead of the common technique used to design choice sets, which was by using the orthogonal design in SPSS software, this study used Ngene software.

In the final design, there were two blocks of six choice sets each. There were three alternatives in each choice set. Alternative 1 always represented the current situation (i.e. status quo). Alternatives 2 and 3 provided various combinations of suggested conservation and management policy attributes. This application of combining two alternatives and one current situation has been used in many studies of the choice experiment (Juutinen et al. 2011). The choice of alternative 1, 2 or 3 to each question yielded information about the selected scenario for a given respondent (Table 2).

Once the sets of attributes and levels were defined and the choice sets were developed, a pilot study was conducted. Using these outcomes, a final version of the questionnaire was prepared. The survey was conducted in the ERNP from May through June 2016. The study deployed the interviewer-administered survey since it had more advantages in gaining information from respondents. This is especially from those who were unfamiliar with answering choice sets questionnaire (Garrod & Willis 1999).

Sampling and data collection

A purposive sampling technique was employed since only local visitors were chosen as respondents. International visitors were excluded because from 2008 till 2015, they comprised only a small proportion of visitors compared with the locals (0.17:1). Only individuals of at least

Table 1 Attributes and levels selected for Endau–Rompin National Park (ERNP)

Management practice	Detail	Current condition	Future condition	Policy tool
Entrance permit	Access fee to ERNP	Local: RM5 (adult)	1. No increase 2. Additional increment of RM5 (RM10) 3. Additional increment of RM10 (RM15) 4. Additional increment of RM15 (RM20)	Fees may be raised to increase conservation and preservation efforts at ERNP.
Number of visitors	Number of visitors visiting ERNP	6500 visitors year^{-1}	1. No change- 2. Increment of 10% (7150) visitors year^{-1}) 3. Increment of 20% (7800 visitors year^{-1})	The number of tourists may be increased. However, it should not exceed 150 tourists per entry to minimise effects on the environment while catering for the need for income.
Biodiversity	Number of threatened species of plants and animals in the forests of ERNP	Present state: fauna =18, flora = 34	1. No change 2. 20% improvement in the number of threatened species: 42 (fauna = 14, flora = 28) 3. 40% improvement in the number of threatened species: 32 (fauna = 11, flora = 21)	Conservation of flora and fauna are important to keep them from extinction. Funds from entrance permit can be used to enhance conservation efforts.
Enforcement and monitoring	Number of staff allocated for enforcement and monitoring at ERNP	Insufficient workforce for enforcement: 10 staff for monitoring	1. No change 2. Increment of 40% (14 people) 3. Increment of 80% (18 people)	Additional funds from entrance fee would finance the recruitment of more staff to help enforcement and management of ERNP.
Environmental and nature education	Number of institutions visiting ERNP	14 institutions, including schools, universities, private companies and government agencies	1. No change 2. Increment of 40% (20 institutions) 3. Increment of 80% (25 institutions)	To attract more schools, colleges and universities to promote awareness of biodiversity conservation

Target population included only domestic visitors

Table 2 Sample of choice sets

Attribute	Alternative 1 (current status)	Alternative 2	Alternative 3
Number of visitors	Less	Less	High
Biodiversity	Threatened	Less threatened	Less threatened
Enforcement and monitoring	Insufficient	Insufficient	Sufficient
Environmental and nature education	Less	Moderate	Moderate
Entrance permit fee	RM5	RM10	RM15
Your choice	1	2	3

18 years old were chosen because we assumed they would be able to understand the questions posed to them (Do & Bennett 2009). If the visitors were in a group, only a proportion of them were chosen as respondents to allow for more variations in sample (i.e. state of origin/age/education). The survey was carried out simultaneously at Endau–Rompin Peta and Endau–Rompin Selai. A total of 10 enumerators were placed at each site.

The sample size was determined based on Zikmund (2010). Since the total visitor arrivals in 2015 was 5465, the suggested sample size was 303. However, to avoid uncertainties (in terms of unusable questionnaires, irrelevant answers) this study decided to collect 350 questionnaires. The descriptive statistical analyses have been conducted using SPSS (version 24). For choice modelling, multinomial logit (MNL) and random parameter logit (RPL) model regressions analysis were conducted using NLogit 4.

Econometric models

RPL explicitly accounts for unobserved preference heterogeneity across respondents; and assumes that the alternatives are not independent (Hensher et al. 2005). Thus, it has an advantage of relaxing the assumptions of the independence of irrelevant alternatives. This is due to the fact that MNL assumes that preferences are homogeneous across respondents. The RPL relies on the random utility (Hanley et al. 2001) and welfare (McConell et al. 2012) theories.

MNL and RPL interaction models

MNL and RPL interaction models used the same variables as shown in equation 1:

$$\text{Utility} = \text{NOV2} + \text{NOV3} + \text{BIO2} + \text{BIO3} + \text{EAM2} + \text{EAM3} + \text{EAN2} + \text{EAN3} + \text{entrance fee} + \text{PRICE\_EDU} + \text{PRICE\_GEN} + \text{BIO3\_MAC} + \text{NOV2\_MS} + \text{EAN2\_NGO} \quad (1)$$

where, NOV = visitor arrivals, BIO = biodiversity, EAM = enforcement and monitoring, EAN = environmental and nature education, PRICE_EDU = interaction between entrance fee and education level of respondents, PRICE_GEN = interaction between entrance fee and gender of respondents, BIO3_MAC = interaction between biodiversity improvement level 3 and perception of visitors on the recreational activities, NOV2_MS = interaction between number of visitors improvement level 2 and marital status, EAN2_NGO = interaction between environmental and nature education improvement level 2 and membership with non-governmental organizations (NGO); numbers 2 and 3 for each attribute indicate the improvement levels (see Table 1)

The five variables used as interactions were socio-demographic (gender, education and marital status) and environmental-related (membership with NGOs), variables. Interaction also included the perception of the visitor about the recreational activities (MAC). These interaction variables were indirectly (to avoid singularities because they did not vary across decisions) included to improve the model fit (Thalany 2014).

In the choice experiment, marginal willingness-to-pay (MWTP) was calculated as follows:

$$\text{MWTP} = \frac{-bc_a}{b_p} \quad (2)$$

where, b_c= coefficient of the attribute a and b_p= coefficient of the monetary attribute. This ratio for a particular attribute known as implicit price represents the marginal rate of substitution between changes in the monetary value in relation to the attributes linked to the environment (Bennet & Blamey 2001). In terms of consumer welfare, compensating variation (CpV) was calculated based on the marginal rate of substitution value change based on the positive values as well as higher t-values with higher significance levels. Thus, for each of the key attributes, only one of the improvements was chosen (Thalany 2014).

RESULTS AND DISCUSSION

MNL and RPL interaction models

The final model selected after 150 iterations is shown in Table 3. The model was chosen based on the majority of significant key variables (Thalany 2014). For the MNL, there were eight variables that were significant at either 90 or 95% level of confidence. For RPL model which had 14 variables, all 9 key variables were significant at least at the 90% level of confidence. These key variables were also significant in studies reported by Kaffashi et al. (2015) and Thalany (2014).

Table 3 Comparing the multinomial logit (MNL) and random parameter logit model (RPL) interaction models

Variable	MNL				RPL			
	Coefficient	Standard error	t-value	Marginal value (RM)	Coefficient	Standard error	t-value	Marginal value (RM)
ASC	0.79443	0.16271	4.88**	16.56	0.85083	0.18111	4.70**	8.71
Price	-0.04797	0.02342	-2.05**	-	-0.09772	0.03976	-2.46**	-
NOV2	0.88221	0.74263	1.19	18.39	1.88016	0.93213	2.02**	19.24
NOV3	-0.12896	0.07466	-1.73*	-2.69	-0.28284	0.12324	-2.30**	-2.89
BIO2	0.32349	0.16242	1.99**	6.74	1.04039	0.37481	2.78**	10.65
BIO3	0.99129	0.35176	2.82**	20.66	1.67126	0.76030	2.20**	17.10
EAM2	-0.16332	0.15072	-1.08	-3.40	-0.35008	0.16489	-2.12**	-3.58
EAM3	0.28482	0.07508	3.79**	5.94	0.28213	0.11691	2.41**	2.89
EAN2	0.12600	0.13862	0.91	2.63	0.34126	0.19664	1.74*	3.49
EAN3	0.36367	0.08581	4.24**	7.58	0.37035	0.12601	2.94**	3.79
PRICE_EDU	-0.00071	0.00067	-1.06	-0.01	0.00875	0.00984	0.89	0.09
PRICE_GEN	0.00726	0.01223	0.59	0.15	-0.01841	0.01438	-1.28	-0.19
BIO3_MAC	-0.21703	0.09489	-2.29**	-4.52	-0.39768	0.21176	-1.88*	-4.07
NOV2_MS	-0.25339	0.17355	-1.46	-5.28	-0.41088	0.21654	-1.90*	-4.20
EAN2_NGO	0.66891	0.31254	2.14**	13.94	1.38972	0.54976	2.53**	14.22
Number of observations	1800				1800			
Log likelihood function	-1726				-1622			
Pseudo-R^2	0 074				0.19			
χ^2					730			
Prob[χ^2]					0.000***			

**and * = significant at 5 and 10% levels respectively; USD1= RM4.49; NOV2 and NOV3 = increment in visitor arrival year^{-1}, ASC = alternative specific constant, BIO = biodiversity: BIO2 and BIO3 = biodiversity improvement levels as measured by the improvement in the number of threatened species, EAM2 and EAM3 = increment in workforce enforcement and monitoring, EAN2 = increment in institutions visiting, EDU = education, GEN = gender, MAC = level of satisfaction with the recreational activities, MS = marital status, NGO = membership with non-governmental organisation

With 12 significant variables the RPL model was superior compared with the MNL model. The pseudo-R^2 value for the RPL model was approximately twice (0.19 or 19%) that of the MNL model (0.074 or 7.4%). This indicated that the attributes and levels included in this RPL model explained a much higher proportion of choices than those in the MNL model. On the other hand, the RPL model fit was considered good following the acceptable range for pseudo-R^2 between 0.1 and 0.4 as suggested by Domencich and McFadden (1975). The log likelihood function value for the RPL model (-1726) was lower compared with the MNL model (-1622), suggesting the former to be a better model.

Result for the price attribute was consistent with the underlying economic demand theory, whereby price measured willingness-to-pay. Price increase indicated higher satisfaction (or utility). Similarly, price decrease (which was indicated by the decrease in entrance fee) implied reduction in satisfaction. Hence, the determination of the appropriate entrance fee based on the consumer welfare was important. The respondents were keen towards an increment of 10% in the visitor arrivals to the park (NOV2) and rejected the suggested increment of 20% (NOV3). Respondents were concerned about congestion in the park. Such finding was also reported by (Juutinen et al. 2011). Visitors were supportive towards the efforts to conserve biodiversity

(BIO2, BIO3) in ERNP. Such findings were also observed in Sarawak and Penang national parks (Thalany 2014, Kaffashi et al. 2015 respectively). The respondents understood the need for additional number of workers required for the monitoring and conservation activities in the park (EAM2, EAM3). In terms of the environmental and nature education variables (EAN2, EAN3), the respondents supported additional efforts to nurture the public on the importance of biodiversity conservation in the national park. Similar findings were reported by Hearne and Salinas (2002) and Thalany (2014).

Interaction between biodiversity improvement level 3 and perception of visitors on recreational activities (BIO3_MAC), showed that respondents who were less satisfied with the recreational activities wanted 40% improvement in the number of threatened species. NOV2_MS showed that respondents who were married preferred 10% increment in visitor arrivals compared with those who were unmarried. Respondents who were members of NGOs preferred an increase up to 40% of institutions visiting the park compared with those who were non-members. Hence, in this study, for RPL, consumer welfare was calculated based on the MWTP for the eight key variables not on the MWTP for interaction variables as done by Thalany (2014).

Estimation of willingness-to-pay

Consumer welfare

From the RPL interaction model, CpV for ERNP was calculated based on the MWTP for key attributes only following Thalany (2014). Hence, NOV2 + BIO2 + EAM3 + EAN3 = RM19.24 + RM10.65 + RM2.89 + RM3.79) = RM36.57. The finding is higher compared with RM30.80 for local visitors at the Bako National Park, Sarawak (Thalany 2014). This implied that visitors to ERNP put higher value towards the environmental resources in the national park. With 5465 number of visitors in 2015, the compensating surplus value was RM199,860 or USD44,510.

CONCLUSIONS

The present study utilised a choice experiment as a feasible approach to analyse users' preferences for improving the conservation and management of ERNP (dual purposes—conservation and management). The results of this study can contribute to better informed decisions for the park managers, i.e. JNPC as well as the policy makers towards a sustainable development of the park. The MWTP value for each variable indicated trade-off between the proposed improvement levels and the current situation (i.e. status quo). Visitors felt a 20% increase in the number of visitor arrivals might make the park too crowded but a 10% increase was acceptable. Hence, the park management should consider keeping track on the number of visitor arrivals to the park, e.g. by setting a baseline on the maximum number of visitors to be allowed to enter the park at a particular period.

For the biodiversity attribute, the management of the park should enhance the efforts to ensure that there is no further decline in the number of flora and fauna in ERNP. The management should increase the number of workers, particularly for enforcement and monitoring purposes. Respondents would like if the number of institutions and schools visiting the park for environmental and nature education was increased compared with the present level. The findings also suggested that the park authority should consider reviewing the present entrance fees for a more efficient pricing mechanism in the park.

JNPC may consider using the term 'conservation fee' in addition to the 'entrance fee collected in the park. For example, JNPC may retain the current entrance fee of RM5 for local visitors and the difference with the MWTP, i.e. RM31.57 could be the conservation fee to be collected from each family or group for each visit. For those who visit the park alone, they could be given a choice to donate any amount for conservation fee.

ACKNOWLEDGEMENT

This research was funded by the Research Management Centre, Universiti Putra Malaysia, Serdang.

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