Tourists' Attitudinal Factor Towards Mangrove Conservation: A Case Study of Kilim Karst Geoforest Park, Langkawi, Malaysia

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ABSTRACT Kilim Karst Geoforest Park, Langkawi, is a significant spot for mangroves and geological ecotourism in Malaysia. Structured well-planned management and conservation as a tool to support sustainable ecotourism in Kilim Karst Geoforest Park are very crucial to establishing and maintaining UNESCO's Global Geopark designation. In this context, community appreciation is one of the critical approaches to the conservation of mangroves and geological areas that require address the underlying attitudes towards conservation and the needs, aspirations, history, and cultural heritage of local people. This study explores the attitudes of tourists towards mangroves conservation at Kilim Karst Geoforest Park, Langkawi. To this end, the study involved the Choice Experiments Method combined with the New Ecological Paradigm (NEP) attitude measures, and a total of 150 survey participants were assigned and interviewed using the random sampling method. Findings have shown that domestic tourists recognize other living creatures' right to control the ecosystem and have faith in human technology and innovation. Meanwhile, foreign tourists are less likely to be anthropocentric in their behaviours, explaining their hesitancy to allow human activities to alter the natural environment. Factor Analysis determined the factors in the 15 NEP statements selected by the respondents, and Principal Component Analysis (PCA) showed that the "risk of overuse" factor had the highest eigenvalues followed by the "biocentric" and the "technocentric optimist" factors. In conclusion, a proactive campaign platform could significantly increase public support for the environmental protection of mangroves in Malaysia.

KEYWORDS: attitudinal factor, mangrove conservation, Kilim Karst Geoforest Park
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INTRODUCTION

Recently, the mangrove ecosystem is well famous for offering natural resources that boost ecotourism activities worldwide. Spalding *et al*. (2010) reported that Malaysia has the fifth largest mangrove forest globally. Not surprisingly, mangrove forests have become a very significant product in developing the tourism industry in Malaysia (Musa *et al*., 2020). In this scenario, the biodiversity of flora and fauna is vital to the ecotourism sector as a tourist spot of mangroves among visitors (Ramli *et al*., 2018). In particular, Malaysia could enhance its reputation as a popular tourist destination and improving the communities' well-being due to the diversity of marine resources (Masud *et al*., 2017).

Jaafar and Maideen (2012) have discovered that ecotourism is one of the fast-moving industries recognized as contributing to Malaysia's overall economic growth. Hakim *et al*. (2017) reported that mangrove-based ecotourism embraces local communities' socio-economic development and biodiversity conservation. For example, Kilim Geoforest Park, Langkawi, is one of Malaysia's famous ecotourism mangrove destinations that have successfully generated income for local communities (Fazilah *et al*., 2013). Therefore, the United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the Global Geopark Network (GGN) established Langkawi as a Global Geopark on 1st June 2007 for its initiatives to promote and conserve outstanding natural geological features internationally (Othman & Rosli, 2011). UNESCO has identified three sites as Geoforest

Park in Langkawi, namely Dayang Bunting Geoforest Park, Machinchang Cambrian Geoforest Park, and Kilim Karst Geoforest (Jaafar *et al*., 2015).

However, the degradation of mangrove ecosystems is a critical issue in many countries. Therefore, an urgent need to protect mangrove forest ecosystems at all times because of their significant impact on ecological, biophysical, and socio-economic aspects. Understanding mangrove communities' attitudes and perceptions are crucial to the effective conservation of natural resource management (Badola *et al*., 2012). Negative public attitudes towards conservation could lead to a lack of conservation of biodiversity in many developing countries (Mbaiwa & Stronza, 2011). Thus, the future survival of the mangrove area depends on public and stakeholder attitudes. In this context, perceptions and attitudes play a significant role in conserving mangrove forests among tourists. Therefore, this study explores tourists' underlying attitudes and preferences regarding the human-nature relationship to mangrove conservation in Kilim Karst Geoforest Park, Langkawi.

METHODOLOGY

Study Area

This study was conducted at Kilim Karst Geoforest Park located in Langkawi, Kedah (6° 24' 15.84' N latitude, 99° 51' 24.48' E longitude). It has recorded a diverse range of natural heritage assets in both geological and biological components (Fauzi *et al*., 2017). Kilim's mangrove forest covers 8, 261 ha from the total area of Langkawi, 47, 837 ha (LADA, 2016). Geopark Division, Langkawi Development Authority (LADA), and *Koperasi Komuniti Kampung Kilim Langkawi Berhad* manage Kilim Karst Geoforest Park, while *Universiti Kebangsaan Malaysia (UKM)* provides intellectual output into the implementation of the Langkawi Geopark (Matthew *et al*., 2013).

Data Collection

Data collection was carried out using the Choice Experiment (CE). The CE has recently been increasingly applied (Suziana *et al*., 2016) because of its reliability and accuracy in determining the respondents' preferences. Apart from that, the CE approach depends on representing a choice situation using various attributes (Boxall *et al*., 1996). Therefore, the selection of attributes and levels is critical to developing that the attributes are relevant to the preferences of the target population, acceptable for policy, and quantified and observed (Do & Bennett, 2009; Morrison *et al*., 2002).

The CE study was conducted by distributing a survey questionnaire directly to selected domestic and international tourists from Kilim Karst Geoforest. Solvin's formula was used to determine the targeted respondents' sample size depending on the study area's population (Tejada & Punzalan, 2012) at a 90 % confidence level. Questionnaires were written in the English and Malay languages and distributed to 150 respondents in July 2017, who were identified using a random sampling method. The questionnaire was developed to collect information on environmental involvement and awareness. Respondents were randomly approached using the CE measures adopted by Suziana *et al*. (2016) associated with the New Ecological Paradigm (NEP) approach. This NEP, consisting of 15 Likert-scale statements, was intended to determine five key aspects of individual environmental attitudes.

Data Analysis

The data collected were analyzed using IBM SPSS Statistics Software Version 20 based on descriptive and statistical analysis. The descriptive analysis involved the New Ecological Paradigm (NEP) statement to measure tourists' attitudes towards the environment and reported that it was

useful in understanding the significance platforms of environmental issue (Pienaar *et al*., 2015; Suziana *et al*., 2016). Previous research has shown that NEP Scale has integrated highly advanced socio-psychological models of environmental concern and attitudes (Dunlap, 2008) into the Choice Experiment to understand better how respondents' environmental assessments relate to underlying attitudes (Suziana *et al*., 2016).

The Factor Analysis was also used in this study as a NEP items analysis technique for an attitudinal index to explore the awareness and perception of tourists to the environment. The Principal Component Analysis (PCA) was used as a factor extraction method to identify the eigenvectors extracted factor that attributed most to the contributing factors in the 15 NEP items in this study. Based on the relative factor loading of the items, the attitudinal concept's score could be determined when the items fall under the factor with the highest eigenvalue, which is usually greater than 1.0. In this context, the 15 NEP items contributed significantly to the total score of the factor when the factor loading had a higher value.

RESULT AND DISCUSSION

Attitudinal Factor

Attitudinal factors for this study were measured using a scale of 15 New Ecological Paradigm (NEP) (Table 1) adopted by Suziana *et al*. (2016). The NEP does not embrace the notion that individuals have the freedom to alter the natural ecosystem to satisfy the needs (NEP 2) and that nature exists intended for human use and therefore has no economic value (NEP 12). However, the results indicate differences in the level of agreement among tourists towards NEP statements (Table 2), which are mostly domestic respondents strongly agreed (34.6%, 38.5%), while international respondents are vehemently opposed (54.8%, 58.9%) to NEP 2 and NEP 12, respectively. Domestic respondents perceived that human beings have a significant role in controlling nature, making them feel privileged to transform the natural environment to address the needs and wants of this earth. On the contrary, international respondents believe that natural resources should be used wisely and that significant consequences should be considered in the absence of proper management.

Factor Analysis of Attitudinal Factor

This study used the New Ecological Paradigm (NEP) Scale by Dunlap *et al*. (2000) to measure respondents' attitudes towards environmental awareness through Factor Analysis. Principal Component Analysis (PCA) showed that "risk of overuse" factors had the highest eigenvalues, 4.11, followed by "biocentric" factors (2.98) and "technocentric optimists" factors (1.29) (Table 1). The type of factor chosen is based on most behaviours found in each section (Suziana, 2017). This study found that the "risk of overuse" factors of environmental fragility and environmental risks, the "biocentric" factors of protection of non-human organisms and nature as a whole, and the "technocentric optimists" factors of belief in technology and human ingenuity to control the environment, were consistent with previous studies. According to Choi and Fielding (2013), human attitudinal factors may contribute to developing effective environmental policies for conservation of mangrove forests. This finding has shown that human concerns about the environment have always preferred appreciative rather than consumptive activities (Suziana, 2017).

Table 1. Factor analysis of attitudinal factor

NEP Items	Factor Loadings	Mean	SD	Eigenvalue	Variance	Cronbach's Alpha
Factor 1: Risk of Overuse				4.11	27.38	0.78
NEP 15: We will experience a major catastrophe	0.73	4.93	0.29			
NEP 11: The Earth has very limited resources	0.71	4.67	0.74			
NEP 13: Nature is very delicate and easily upset	0.68	4.75	0.70			
NEP 7: Plants and animals have equal rights	0.68	4.88	0.48			
NEP 1: Approaching limits of the Earth	0.64	4.75	0.72			
NEP 5: Human abuse the environment	0.61	4.70	0.66			
NEP 9: Human is subject to the laws of nature	0.55	4.75	0.67			
NEP 3: Human interfere is disastrous	0.54	4.87	0.38			
Factor 2: Biocentric				2.98	19.89	0.85
NEP 8: The balance of nature is strong enough	0.84	3.99	1.45			
NEP 6: The Earth has plenty of resources	0.82	4.48	0.95			
NEP 4: Human ingenuity is sufficient	0.81	4.19	1.27			
NEP 14: Humans will control nature	0.69	4.21	1.17			
NEP 10: "Ecological crisis" has been exaggerated	0.68	4.38	1.07			
Factor 3: Technocentric optimists				1.29	8.58	0.76
NEP 2: Humans can modify environment	0.85	2.64	1.81			
NEP 12: Humans were meant to rule over the nature	0.75	2.58	1.80			

Table 2. The degree of agreement among international and domestic respondents is based on NEP statements

NEP Statements	Degree of Agreement (percentage of respondents, %)									
	SD		MD		U		MA		SA	
	I	D	I	D	I	D	I	D	I	D
NEP 1	—	3.8	1.6	7.7	2.4	11.5	3.2	23.1	92.7	53.8
NEP 2	54.8	30.8	4.8	7.7	1.6	11.5	9.7	15.4	29	34.6
NEP 3	—	-	—	-	1.6	-	8.9	19.2	89.5	80.8
NEP 4	12.1	-	—	7.7	6.5	15.4	21.8	15.4	59.7	61.5
NEP 5	—	3.8	0.8	3.8	1.6	11.5	15.3	23.1	82.3	57.7
NEP 6	3.2	-	3.2	-	9.7	3.8	12.9	30.8	71	65.4
NEP 7	0.8	-	0.8	-	—	-	4.0	23.1	94.9	76.9
NEP 8	16.1	3.8	2.4	3.8	12.1	19.2	8.1	23.1	61.3	50
NEP 9	1.6	-	—	3.8	3.2	-	8.1	34.6	87.1	61.5
NEP 10	3.2	-	2.4	-	16.9	15.4	9.7	23.1	67.7	61.5
NEP 11	0.8	-	0.8	7.7	3.2	19.2	9.7	26.9	85.5	46.2
NEP 12	58.9	15.4	4.8	15.4	3.2	15.4	4.0	15.4	29	38.5
NEP 13	0.8	3.8	0.8	3.8	0.8	15.4	5.6	23.1	91.9	53.8
NEP 14	7.3	3.8	4.0	-	11.3	-	22.6	26.9	54.8	69.2
NEP 15	—	-	—	-	—	3.8	3.2	19.2	96.8	76.9

Note:

- SD = Strongly disagree, MD = Mildly disagree, U = Unsure, MA = Mildly agree, SA = Strongly Agree
- I = International (124 respondents), D = Domestic (26 respondents)
- The rows highlighted with grey colors indicate the differences in the agreement level that reflects the attitudes between international and domestic tourists.

CONCLUSION

Mangrove forests contribute to the public's environmental, economic, and social benefits. These studies discover the tourist preferences and attitudes towards the conservation of mangroves. From an attitudinal point of view, the findings show that domestic tourists (strongly agree) have different perceptions from international tourists (strongly disagree) that they relate to NEP 2 (humans can change the environment) and NEP 12 (humans were meant to rule over nature). Factors Analysis of the human-nature relationship measurement shows that the "risk of overuse" factor had the highest eigenvalues compared to the "biocentric" and "technocentric optimist" factors. This study on mangrove conservation is not only government-dependent but is also subject to public support and awareness of biodiversity conservation measures. Knowledge of mangrove conservation measures' public attitudinal factor could provide vital information to resource managers, greatly complementing government initiatives. This research's involvement may help the Langkawi Development Authority justify the forest mangrove program's future investment planning for conservation purposes in Kilim Karst Geoforest Park. Other than that, this research may provide information and knowledge to provide additional funds or public funds to the conservation of mangrove forests for well-managed mangrove forest management in Malaysia.

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REFERENCES

[1] Badola, R., Barthwal, S. & Hussain, S. A. 2012. Attitudes of local communities towards conservation of mangrove forests: A case study from the east coast of India. *Estuarine, Coastal and Shelf Science*, 96, 188-196.

[2] Boxall, P. C., Adamowicz, W. L., Swait, J., Williams, M. & Louviere, J. 1996. A comparison of stated preference methods for environmental valuation. *Ecological economics*, 18(3), 243-253.

[3] Choi, A. S. & Fielding, K. S. 2013. Environmental attitudes as WTP predictors: A case study involving endangered species. *Ecological Economics*, 89, 24-32.

[4] Do, T. N. & Bennett, J. 2009. Estimating wetland biodiversity values: a choice modelling application in Vietnam's Mekong River Delta. *Environment and Development Economics*, 14(2), 163-186.

[5] Dunlap, R. E. 2008. The new environmental paradigm scale: From marginality to worldwide use. *The Journal of Environmental Education*, 40(1), 3-18.

[6] Dunlap, R. E., Van Liere, K. D., Mertig, A. G. & Jones, R. E. 2000. New trends in measuring environmental attitudes: measuring endorsement of the new ecological paradigm: a revised NEP scale. *Journal of Social Issues*, 56(3): 425-442.

[7] Fauzi, N. S. M., Misni, A., Kamaruddin, S. M. & Ahmad, P. 2017. The Content Analysis Study of Geo-Heritage Conservation: Kilim Karst Geoforest Park, Langkawi. *Environment-Behaviour Proceedings Journal*, *2*(5), 255-262.

[8] Fazilah, M., Awang Noor, A. G. & Abdullah, M. 2013. Enhancing the Quality of Life of Coastal Community through Ecotourism Development in Kota Marudu, Sabah. *Prosiding Persidangan Kebangsaan Pertama Program Pemindahan Ilmu (KTP 01)* 21- 23 Ogos 2013 Bangi, Selangor (Program Pemindahan Ilmu - Kementerian Pendidikan Malaysia). p 948-957.

[9] Hakim, L., Siswanto, D. & Makagoshi, N. 2017. Mangrove conservation in East Java: The ecotourism development perspective. *Journal of Tropical Life Science*, 7(3), 277- 285.

[10] Jaafar, M. & Maideen, S. A. 2012. Ecotourism-related products and activities, and the economic sustainability of small and medium island chalets. *Tourism Management*, 33(3), 683-691.

[11] Jaafar, M., Nordin, A. O. S., Marzuki, A. & Abdullah, S. 2015. Development of ecotourism products in Kilim Geopark based on tourist perceptions. *Journal of Sustainability Science and Management*, 10(1), 1-18.

[12] LADA (Langkawi Development Authority). 2016. More than just rocks (Unpublished).

[13] Masud, M. M., Aldakhil, A. M., Nassani, A. A. & Azam, M. N. 2017. Community-based ecotourism management for sustainable development of marine protected areas in Malaysia. *Ocean & Coastal Management*, 136, 104-112.

[14] Matthew, N. K., Ahmad, S., Ramachandran, S. & Syamsul, H. M. A. 2013. Demand model of international visitors to the Kilim Karst Geoforest Park, Langkawi: application of ITCM model. *Journal of Applied Economics and Business*, 1(4), 51-66.

[15] Mbaiwa, J. E. & Stronza, A. L. 2011. Changes in resident attitudes towards tourism development and conservation in the Okavango Delta, Botswana. *Journal of Environmental Management*, 92(8), 1950-1959.

[16] Morrison, M., Bennett, J., Blamey, R. & Louviere, J. 2002. Choice modeling and tests of benefit transfer. *American Journal of Agricultural Economics*, 84(1), 161-170.

[17] Musa, F., Fozi, N. M. & Mohd, D. D. 2020. Coastal communities' willingness to pay for mangrove ecotourism in Marudu Bay, Sabah, Malaysia. *Journal of Sustainability Science and Management*, 15(4), 130-140.

[18] Othman, P. & Rosli, M. M. 2011. The impact of tourism on small business performance: Empirical evidence from Malaysian islands. *International Journal of Business and Social Science*, 2(1), 11-21.

[19] Pienaar, E. F., Lew, D. K. & Wallmo, K. 2015. The importance of survey content: Testing for the context dependency of the new ecological paradigm scale. *Social Science Research*, 51, 338-349.

[20] Ramli, F., Samdin, Z., Abd Ghani, A. N. & Mohamad Kassim, M. R. 2018. Factors affecting user's perception towards conservation of biodiversity in Matang Mangrove Forest Reserve (MMFR), Perak, Malaysia. *International Journal of Business and Society*, 19(SI), 26-36.

[21] Spalding, M., Kainuma, M. & Collins, L. 2010. World atlas of mangroves. ITTO, ISME, FAO, UNEP-WCMC. *UNESCO- MAB and UNUINWEH. London: Earthscan Publications Ltd. doi*, *10*(97818497), 76608.

[22] Suziana, H. 2017. Environmental attitudes and preference for wetland conservation in Malaysia. *Journal of Nature Conservation*, *37*, 133-145.

[23] Suziana, H., Olsen, S. B., Afandi, S. H. M. & Thorsen, B. J. 2016. Measuring the Rural and Urban Attitudes towards Wetlands Using the New Ecological Paradigm: Setiu Wetlands, Malaysia. *Environment-Behaviour Proceedings Journal*, 1(2), 132-142.

[24] Tejada, J. J. & Punzalan, J. R. B. 2012. On the misuse of Slovin's formula. *The Philippine Statistician*, 61(1), 129-136.