AN EXAMINATION OF THE ECONOMIC VALUE AND RECREATION DEMAND OF THE BELUM-TEMENGOR RAINFOREST COMPLEX

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LIST OF ABBREVIATIONS

ASEAN	Association of South East Asian Nations
BTRC	Belum-Temengor Rainforest Complex
CS	Consumer Surplus
CVM	Contingent Valuation Method
D_d	Labour Market Disequilibrium
D_e	Labou Market Equilibrium
DOS	Department of Statistics
ETP	Economic Transformation Programme
GDP	Gross Domestic Product
GHB	Global Biodiversity Hub
ITC	Individual Travel Cost
MNS	Malaysian Nature Society
MTPB	Malaysia Tourism Promotion Board
OLS	Ordinary Least Squares
opc	out-of-pocket cost
otc	opportunity time cost
PEMANDU	Performance Management and Delivery Unit
PSTC	Perak State Parks Corporation
TCM	Travel Cost Method
TERV	Total Economic Recreation Value
TIES	The International Ecotourism Society
TPOIS	Truncated Poisson
UNESCO	The United Nations Educational, Scientific and Cultural Organization

UNWTO	World Tourism Organization
WTP	Willingness-to-pay
WWF	World Wide Fund for Nature
ZTC	Zonal Travel Cost

PENGANGGARAN NILAI EKONOMI DAN PERMINTAAN REKREASI DI KOMPLEK HUTAN-HUJAN BELUM-TEMENGOR

ABSTRAK

Belum-Temengor Rainforest Complex (BTRC) merupakan salah satu hutan simpan yang terbesar di dunia yang kaya dengan biodiversiti dan mempunyai potensi yang amat tinggi untuk dibangunkan sebagai salah satu tapak eko pelancongan di Malaysia. Walau bagaimanapun, BTRC kini menghadapi cabaran yang serius akibat daripada aktiviti pembalakan dan pemburuan secara haram. Sehingga kini, tiada kajian dilakukan untuk menganggar nilai ekonomi BTRC dari segi eko pelancongan. Kajian ini adalah bersesuaian agar memberi panduan kepada pembuat dasar untuk membangunkan dasar-dasar untuk pemeliharaan hutan simpan ini. Kajian ini menunjukkan faedah ekonomi yang dapat diperoleh daripada penjagaan hutan BTRC berbanding dengan pulangan daripada aktiviti pemburuan haram dan pembalakan. Data dikumpul dengang menggunakan soal-selidik daripada 367 pengunjung di tapak rekreasi ini. Ukuran *nilai terus guna tak-terpakai* dianggar berdasarkan Kaedah Kos Perjalanan Individu (TCM) yang diubahsuai. Penilaian ini dijalankan dengan menggunakan model data-kira Truncated Poisson (TPOIS) memandangkan pembolehubah bersandarnya merupakan integer bukan negatif yang merupakan bilangan malam pelancong menginap di BTRC. Kaedah diskaun hiperbola diguna untuk menganggar nilai masa depan permintaan berekreasi di BTRC bagi 30, 50, dan 100 tahun yang akan datang. Di samping itu, pelbagai keanjalan permintaan terhadap eko pelancongan di BTRC juga dikira berdasarkan faktor sosio-demografi yang berhubung dengan permintaan terhadap eko pelancongan di BTRC. Hasil kajian ini menunjukkan purata kos melepas masa penginapan satu malam di BTRC adalah

RM427.92 bagi kategori pelancong yang membuat pengorbanan pendapatan semasa mengunjungi BTRC dan RM60.64 untuk kategori palancong yang tidak membuat pengorbanan pendapatan semasa mengunjungi BTRC. Kesediaan membayar setara (WTP) dan lebihan pengguna untuk setiap kali lawatan ke BTRC adalah sebanyak RM586.49 dan RM652.58 masing-masing. WTP seterusnya menghasilkan jumlah *nilai terus guna tak-terpakai* tahunan berjumlah RM14.67 juta setahun terhadap eko pelancongan di BTRC. Nilai aliran tunai masa depan eko pelancongan dianggarkan sebanyak RM0.61 billion, RM0.97 billion dan RM1.86 billion pada 30, 50, dan 100 tahun yang akan datang. Permintaan keanjalan harga, harga barang pengganti, pendapatan masing-masing adalah –0.60, 0.42, dan 0.07. Dengan itu, adalah dicadangkan bahawa eko-pelancongan di BTRC adalah tidak anjal, pengganti yang lemah, dan sebagai barang biasa. Akhir, pembolehubah kos perjalanan tapak rekreasi, kos perjalanan tapak pilihan kedua, purata pendapatan harian pelancong, kumpulan etnik (Melayu) dan taraf perkahwinan (bujang) didapati mempunyai hubungan yang signifikan dengan pembolehubah bersandar dalam fungsi permintaan rekreasi di BTRC. Dasar dicadangkan berdasarkan keputusan kajian ini adalah menghentikan aktiviti pemburuan haram dan pembalakan dengan serta-merta untuk mengelakkan kerugian dalam bentuk pendapatan tahunan daripada industri eko pelancongan dan perubahan dalam strategi harga terhadap produk-produk yang berkaitan di tapak berekreasi ini. Garis-garis panduan lain yang dicadangkan termasuk strategi pengembangan/penerusan pasaran yang bersasarkan kepada golongan bukan Melayu dan pelancongan-pelancongan bukan bujang.

AN EXAMINATION OF THE ECONOMIC VALUE

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ABSTRACT

The Belum-Temengor Rainforest Complex (BTRC) is one of the largest forest reserves in the world. It is rich in biodiversity and has great potential for ecotourism in Malaysia. However, the ecotourism industry at BTRC is currently facing serious challenges arising from poaching and logging activities. To date, no research has been conducted to estimate the economic values of ecotourism at BTRC. This is relevant in order to guide policymakers in developing policies towards the protection of the forest reserve. This study highlights the economic benefits that can be derived from protecting BTRC in comparison to the returns from poaching and logging activities. Data is obtained from a primary on-site survey of 367 visitors to the recreational site. The direct non-consumptive use value of ecotourism visitors is estimated based on a modified individual Travel Cost Method (TCM). These values are estimated using the Truncated Poisson (TPOIS) count data model as the dependent variable used to measure recreation demand is the non-negative integer of number of nights spent at the location. The hyperbolic discounting method is also used to estimate future values of ecotourism based on 30-, 50-, and 100-years projection into the future. Additionally, the various price, cross-price, and income elasticities of demand are enumerated, along with identification of the socio-demographic factors associated with ecotourism demand at BTRC. Results from the study indicate that the average nightly opportunity time cost of visitors who incur and do not incur income losses during the BTRC visit is RM427.92 and RM60.64, respectively. The willingness to pay (WTP) and consumer surplus per visit to BTRC are RM586.49 and RM652.58, respectively. This yields an annual direct non-consumptive use value of RM14.67 million among BTRC ecotourism visitors. The future cash flow of ecotourism at BTRC is estimated to be RM0.61 billion, RM0.97 billion and RM1.86 billion for the next 30-, 50-, and 100-years, respectively. The price, cross-price, and income elasticities of demand are computed as –0.60, 0.42, and 0.07, respectively, thus suggesting that BTRC ecotourism is price inelastic, a weak substitute, and a normal good. Last, the variables visitors' on-site travel cost, alternative-site travel cost, average daily income, ethnicity (Malay), and gender (Male) are significantly associated with recreation demand at BTRC. Policy recommendations arising from results of this study include an immediate halt to the poaching and logging activities to prevent vast losses in annual income to the ecotourism industry and changes in pricing strategies of related products at the recreational site. Other suggested guidelines include specific market penetration/expansion strategies targeted at non-Malay, and non-single visitors.

CHAPTER 1

INTRODUCTION

1.1 An Overview of Ecotourism

Tourism has become an increasingly important industry worldwide. It is an important sector in contributing to a nation's economic development in terms of employment creation, income generation, poverty reduction, economic diversification, human development, environment protection, and cross-cultural awareness promotion (Honey & Gilpin, 2009). In 2012, a total of one billion international tourists (overnight visitors) were recorded for the first time in history with a global growth of over 4%. Between 2013–2014, the number of international tourists grew by 4.7% and reached 1.14 billion, with a global economic contribution of about US$7 trillion [1] (World Tourism Organization [UNWTO], 2015). During this period, both Asia and the Pacific regions recorded the strongest growth compared to other parts of the world (UNWTO, 2013a; UNWTO, 2013b). Meanwhile, the outlook for 2015 and beyond is encouraging as the travel and tourism industry is expected to continue its 3–4% upward growth trend boosted by a strengthening global economy (UNWTO, 2015).

Notwithstanding tourism's significant contribution to the world economy, ecotourism is credited as being the fastest growing segment in the travel industry (The

[1] Currency conversion of US$1.00 = RM3.57 (28 April 2015).

Nature Conservancy, 2015).[2] Widely considered as a specialty segment of the larger nature-tourism market, ecotourism is viewed as being able to generate unlimited socio-economic benefits to the country and the local community in terms of generating foreign exchange, creating employment, stimulating national and local economies, and fostering international relationships as well as increase environmental awareness and education (The International Ecotourism Society [TIES], 2000; World Wide Fund for Nature [WWF]-Malaysia, 1996).

1.2 Ecotourism in Malaysia

Until the 1970s, the tourism sector in Malaysia was not regarded as an important industry in the nation's economic development (WWF-Malaysia, 1996). Malaysia lagged behind and was poorly known as a tourism destination compared to other Association of South East Asian Nations (ASEAN) countries such as Singapore, Thailand, or Indonesia (Bali). It was only in the 1980s that the Malaysian government realised the importance and significance of the tourism industry to the country's economic contribution and embarked on various initiatives to promote Malaysian tourism. This included the establishment of the Ministry of Culture and Tourism in 1987 (Ministry of Culture, Arts and Tourism in 1990), Tourism Industry Act in 1992, and Malaysia Tourism Promotion Board (MTPB) (or Tourism Malaysia) in 1992 (WWF-

[2] Ecotourism is broadly defined by The International Ecotourism Society (TIES) as nature-based travel to natural habitats. The purpose is to understand the cultural and natural history pertaining to the environment, whilst emphasising care so as not to alter the integrity of the ecosystem. It is expected that ecotourism activities produce economic and monetary benefits, while simultaneously encouraging the preservation of the inherent resources of the environment (Wood, 2002).

Malaysia, 1996). Since the 1980s tourism has become the second most important economic contributor to the Malaysian gross domestic product (GDP) and its contribution to nation's GDP has increased steadily over time (Badaruddin, 2002); it is estimated that the tourism sector contributed as much as 13.1% to the nation's GDP in 2013 compared to 12.5% in 2012 (Department of Statistics [DOS], 2014).

Ecotourism in Malaysia has been gaining immense popularity since the 1990s. In 1996, the Malaysian government enacted the National Ecotourism Plan (NEP) as part of efforts to introduce new tourism products in Malaysia (Marker, Blanco, Lokanathan, & Verma, 2008). Other plans to foster ecotourism in Malaysia include the federal government's New Economic Model which highlights the potential of Malaysia's rich biodiversity to contribute significant revenue to the growing industry (National Economic Advisory Council, 2009).

In Malaysia, ecotourism covers a wide range of natural assets that makes it a highly beneficial, feasible, and sustainable sector in the overall tourism landscape (MTPB, 2008). The various ecotourism sites in Malaysia include wildlife reserves, forest reserves, national and state parks, marine parks, lakes, mangroves and limestone caves, all with a bountiful array of flora and fauna (Ministry of Natural Resources and Environment, 2014). Additionally, there are 54 protected areas in Malaysia with a minimum size of about 3.3 hectares which have been gazetted as protected areas. These areas consist of wildlife sanctuaries, national and state parks, wildlife reserves, and marine parks all over the country (Ahmad Puad, Badaruddin, & Wong, 2006).

In terms of preferred sites, the 130 million-year old tropical forest at the Taman Negara National Park in the state of Pahang (MTPB, 2013; Teh & Norma, 2015) is listed as one of the top ecotourism sites in Malaysia (Tam, 2014). Tourists also visit the state of Sabah to view the world's largest flower, the Rafflesia as well as the limestone system in the state of Sarawak (Sarawak Tourism, 2012).

Malaysia's natural heritage has been honoured with a number of awards and recognitions in the international ecotourism platform. These accolades include *The Best Ecotourism Destination Award* at the Travel Weekly (Asia) Industry Award 2008 for the second time in a row. This award is given to Malaysia in honour of its overall natural and unique geographical layout[3] (Ministry of Tourism and Culture [MOTAC], 2012). Other Malaysian destinations, such as the Gunung Mulu National Park and Kinabalu Park as well as Langkawi Island have been recognised as a The United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site and a UNESCO geopark, respectively (Unjah, Leman, & Komoo, 2013; World Heritage Centre, 2012). The Sukau Rainforest Lodge in Sabah was awarded the *2013 Wild Asia Responsible Tourism Awards Finalist* for its key principles of "responsible" tourism (Wild Asia, 2013). In addition, Malaysia has consistently obtained higher international ratings in terms of ecotourism experience compared to other ASEAN countries, such as Thailand and Indonesia (Marker et al., 2008).

About 60% of the country is covered by tropical rainforest, whilst surrounded by seas sheltering a multitude of marine life (MTPB, 2008). For these reasons, the

[3] Consist of landforms and ecosystem (Holt, 2012).

Malaysian government is embarking on various plans under the latest Economic Transformation Programme to obtain world recognition for different biodiversity sites. These sites will then be developed or rehabilitated to allow tourists to participate in ecotourism activities (Performance Management and Delivery Unit [PEMANDU], 2013). On top of that, Malaysia is planning to establish itself as a Global Biodiversity Hub (GBH). The various objectives of the GBH includes drawing international attention to Malaysia's rich biodiversity resources, promoting responsible ecotourism, fostering sustainable management of the nation's natural heritage, and developing the country as one of the world's premium ecotourism destinations (PEMANDU, 2013).

1.3 The Belum-Temengor Rainforest Complex

As one of the world's oldest tropical rainforests (over 130 million years in age), the Belum-Temengor Rainforest Complex (BTRC) is located in the northern state of Perak, Malaysia (Appendix I). It consists of over 300,000 hectares of tropical rainforest surrounded by multi-tiered tree canopies, rivers, and lakes. The BTRC comprises the Royal Belum State Park (117,500 hectares)[4], Gerik Forest Reserve (34,995 hectares), Temengor Forest Reserve (147,505 hectares) and 45,000 hectares of water bodies which is under the management of Tenaga Nasional Berhad (Kaur, 2008).

[4] The Royal Belum State Park ranks as the second largest protected area in Peninsular Malaysia after Taman Negara (431,435 hectares) (Schwabe et al., 2014).

According to H. Zulkarnain[5] (personal communication, 10 May, 2015), the average total number of visitors to BTRC was estimated at 25,000 per annum. While the government hopes to attract foreign tourists from Europe and North America, the majority of current tourists to BTRC consist of Malaysians (Schwabe et al., 2014; WWF-Malaysia and Perak State Park Corporation [PSPC], 2011). Even so, the Royal Belum State Park experienced growth in visitor arrivals of about 127% as it welcomed over 15,888 visitors in 2014 compared to 7,000 in 2008 (PSPC, 2009; 2015). Among the activities that these nature-based visitors are able to participate are bird watching, hiking, jungle trekking, boating, fishing, canoeing, rafting, caves excursion, waterfalls dipping, Rafflesia sighting, fish farm visit, tribal village visit, wild life spotting or relaxing at the lake side or rainforest (Belum Rainforest Resort, 2014).

Given its status as one of the largest untouched forest reserves in the world, BTRC is estimated to be older than the Amazon and Congo basins (Schwabe et al., 2014). Being rich in biodiversity, BTRC is inhabited by over 67% of all living animals and plants on earth. In fact, BTRC houses over 100 species of mammals, including 14 of the world's reported most threatened mammals, such as the Malayan Tiger, Asiatic elephant, Sumatran rhinoceros, Malayan tapir, leopard, *seladang*, sun bear, gibbons, and a large variety of deer species (BirdLife International, 2006; Malaysian Nature Society [MNS], 2006). At least 7 species of turtles, 13 species of amphibians, 29 species of fishes, 95 species of leaf-beetles, 168 species of butterflies, and 252 species of moths can be found at BTRC (Schwabe et al., 2014).

[5] Vice-president of Banding Island Tourist Guide Association, 2012/2013.

BTRC is also recognised by BirdLife International as an important bird area (BirdLife International, 2015) and internationally renowned bird watching area, with 274 species of birds (including all 10 hornbill species that are found in Malaysia). It also boasts a rich diversity of flora and fauna, including 3 species of the Rafflesia (the world's largest flower), 30 ginger species, and 46 palm species, of which 15 of these palm species cannot be found elsewhere in the world (Gregory, 2007; Schwabe et al., 2014). In addition, BTRC is home to two indigenous (*Orang Asli*) tribes, the Temiar and the Jahai, comprising about 2300 indigenous people located over 18 villages (Khairil, Suhaini, & Hairani, 2013; MNS, 2008; Nicholas & Kamal, 2012).

BTRC offers many long-term benefits and value to the local, national, and international communities. First, as alluded to earlier, BTRC is valued for its vast biodiversity of flora and fauna, making it one of the richest and most ancient rainforests in the world (MNS, 2014). Second, BTRC's economic value arises from the public good nature of the site, particularly in terms of its potential for ecotourism development. In fact, the 1996 NEP recognised BTRC as having "tremendous ecotourism potential" (Suksuwan & Kumaran, 2003). This is important as ecotourism is perceived to emerge as a major revenue contributory sector in the Malaysian tourism industry in future years (Tengku Noor Shamsiah, 2009), while an expanding ecotourism industry in BTRC would also serve as a new source of revenue (and jobs) to the state of Perak in particular (Schwabe et al., 2014). Furthermore, there exists public demand for BTRC either in terms of direct or indirect use values.[6] Third, BTRC provides indirect or use values to local, regional and global ecosystem services, such as carbon storage and water

[6] Definitions of use and non-use values are discussed in greater detail in Chapter 2.

catchment areas, whilst regulating the environment. Fourth, BTRC is an ideal site for many biological and forest research studies. These studies hold immense promise in the scientific areas of biotechnology and pharmacology (MNS, 2005). Based on these reasons, conservation efforts of the BTRC is of utmost relevance in order to realise its potential benefits.

Despite its immense value, BTRC is currently facing serious challenges arising from poaching and logging activities (Schwabe et al., 2014) (Appendix II & III). However, the Perak state government, which has jurisdiction over the area under the Malaysian constitution, is protecting only a third of BTRC by gazetting the Royal Belum as a state park under the Perak State Corporation in April 2007. In doing so, the Perak state government is essentially forgoing vast amounts of state-level revenue from royalty fees which are assessed on the volume of timber harvested as well as premiums which are assessed on the area harvested (Schwabe et al., 2014). Nevertheless, while logging is currently prohibited at the Royal Belum, under current Perak state laws, its status is not fully secured as it could still be re-opened for logging (Suksuwan & Kumaran, 2003). Meanwhile, the rest of the areas at BTRC, such as the Gerik and Temengor Forest Reserve, are not currently protected and are now under pressure from rampant commercial logging activities (legal and illegal) that are occurring on a daily basis (Lim, 2010; Vincent, Carson, DeShazo, & Schwabe, 2012).

Despite the fact that the Royal Belum State Park is a designated protected area, logging activities in adjacent forest reserves may also result in dire consequences on BTRC on the whole. Koh (2008) notes that extended logging activities in BTRC cut off the access of thousands of endangered animal species to their feeding or nesting grounds and their free migration across the reserve borders, thus hastening their extinction. Along the same lines, the rare Rafflesia is under threat, while the quality of other nature activities which can be found in BTRC (e.g., nature camping, vegetation species appreciation, *Orang Asli* (indigenous people) settlement visitation and experience, bird watching, wildlife spotting, waterfall and limestone hills excursions) are also adversely affected due to continued logging activities. As noted by Gregory (2007), eventual loss of ecotourism benefits and value would result if immediate measures are not undertaken to mitigate these uncontrolled deforestation practices. Gibson et al. (2011) further asserts that the current unhealthy state of the Temengor forest may even affect the ecosystem conditions of the Royal Belum State Park as a biological hot spot and the Temengor Lake as a fisheries site. In short, the potential consequences of inaction and allowing conditions in BTRC to deteriorate may result in the complete destruction of the site.

The long-term benefits to be gained from BTRC conservation against the benefits accruing from logging (both legal and illegal) has been studied in the literature. Vincent et al. (2014) and Schwabe et al. (2014) concluded that protection or conservation management of BTRC provides more value and higher benefits compared to having it converted to other uses or developing it with the primary purpose of natural resources extraction. However, Vincent et al. (2014) used choice based experiments of respondents from the state of Selangor and city of Kuala Lumpur to obtain existence, option and bequest values but does not take into account the recreation-related direct (active) non-consumptive use values of ecotourists visiting BTRC. More importantly, Vincent et al. (2014) assert that although studies utilising survey-based data on the protection of BTRC are scant, there exists an urgent need to provide policymakers with better information on public preferences for environmental and non-environmental decision making.

1.4 Problem Statement

Against the backdrop of potential losses resulting from poaching and logging activities relative to the gains of protecting BTRC for its many benefits, it is important to gain a better perspective on the economic benefits that the recreational site may confer. While protection of the BTRC serves as a public good to society, measures in terms of its direct non-consumptive use values among ecotourism visitors is relevant. To date, no research has been conducted to enumerate the economic values of ecotourism and the recreation demand at BTRC. Failure to account these issues may result in unidentification of:

i. the time values (opportunity costs) and direct non-consumptive use values of BTRC;

ii. the economic losses at BTRC due to deforestation;

iii. the direct-price, cross-price, and income-elasticities of demand for ecotourism at BTRC;

iv. the socio-demographic characteristics of visitors which are associated with the demand for ecotourism at BTRC.

Answers to time and direct non-consumptive use values are relevant to guide policymakers in developing informed legislative policies towards the protection of the Royal Belum State Park as well as the rest of the BTRC. Additionally, knowledge on the various elasticities of demand as well as socio-economic and demographic factors associated with recreation demand at BTRC will provide policymakers with better understanding on public preferences whilst formulating more accurate and effective marketing plans.

1.5 Objectives of the Study

It is the primary objective of this study to conduct a comprehensive economic valuation of recreational activities at BTRC. The specific objectives are to:

i. Calculate the time value (opportunity costs) of BTRC visitors;

ii. Provide an economic valuation based on the direct non-consumptive use values of recreation at BTRC;

iii. Enumerate the future values of ecotourism in BTRC based on projections of 30, 50 and 100 years into the future;

iv. Estimate the own-price, cross-price, and income elasticities of demand of BTRC visitors; and

v. Identify the socio-economic and demographic characteristics associated with the demand for recreation at BTRC.

1.6 Methodology

A survey was conducted from December 2013 to April 2014 among visitors to BTRC to collect data for this study. The random on-site survey was carried out at the exit of the complex just as visitors concluded their stay. Respondents were surveyed on their length of stay at BTRC, direct (explicit) out-of-pocket monetary costs incurred during their visit (e.g., expenses for food, lodging, fuel, highway toll, entrance fees, accommodation, and so forth), and indirect (implicit) monetary costs (e.g., total amount of income forgone during the visit to BTRC), as well as alternative site out-of-pocket costs. Socio-economic and demographic information (e.g., age, ethnicity, gender, income, employment status and occupation) were also solicited.

A modified individual Travel Cost Model (TCM) is applied to estimate the direct non-consumptive use values of ecotourism visitors to BTRC. These values are estimated using the truncated Poisson (TPOIS) count data model given that the dependent variable used to measure recreation demand is the non-negative integers of number of nights stayed at the location. Visitors are categorised into two categories, i.e., those who forgo and do not forgo monetary income during the trip to BTRC. Thus, the opportunity time cost of visitors can be estimated. From the estimated recreation demand model, future values of ecotourism based on 30, 50, and 100 years extrapolation into the future are calculated using the hyperbolic discounting method. Similarly, the various elasticities of demand and socio-economic and demographic factors associated with the demand for ecotourism at BTRC are obtained based on the constructed recreation demand model of this study.

1.7 Significance of the Study

It is important to conduct a comprehensive evaluation of the BTRC based on its total use values. While logging companies and the Malaysian government authorities have enjoyed the revenue generated from logging (Heng, 2013; Vincent et al., 2012), it is crucial to account for both the recreation-related direct non-consumptive use values from the ecotourism industry as well as the passive use values as computed by Vincent et al. (2012).

To this effect, similar valuations have been conducted on estimating the values of various ecotourism destinations in Malaysia, including the mangroves in Sarawak (Bennett & Reynolds, 1993), Taman Negara in Pahang (Zaiton, Yuhanis, Alias, & Mohd. Rusli (2010), firefly sanctuary in Kuala Selangor (Rajah, 2004), Bako National Park in Sarawak (Dayang Affizzah, Alias, & Siti Baizura, 2007) and marine parks in Payar Island, Tioman Island and Redang Island (Siti Aznor, 2009).

However, an extensive review of the extant literature indicates that no current study has attempted to enumerate the direct non-consumptive use values of the BTRC as a recreational site. The socio-demographic characteristics associated with the consumer recreation demand of BTRC, the amount of benefits from recreation, as well as the estimated recreation use values of BTRC remain unknown. A careful examination of such values may help in developing a better understanding of the feasibility of sustainable ecotourism at BTRC with respect to a full ecosystem conservation.

This study is also timely given current plans by the Malaysian government to promote the ecotourism industry in an extensive manner. The outcomes of this study will thus be helpful to policymakers interested in measures aimed at promoting the feasibility of long term sustainability of BTRC. Findings of this study may also be beneficial to tourism stakeholders (e.g., Tourism Malaysia, tour operators/agencies) to gain better insights of the socio-demographic characteristics associated with the demand for ecotourism at BTRC. These stakeholders could utilise results of the study as a starting point to map out more comprehensive tourist segmentation or expansion policies in their marketing plans. In particular, the results of price and income elasticities may be relevant for future pricing strategies.

CHAPTER 2

LITERATURE REVIEW

This chapter reviews existing literature from the perspective of natural resource economics valuation. The theoretical framework of recreation demand and statistical recreation demand models that underpin this study are discussed. Previous studies on environmental resource evaluation and the various socio-economic and demographic variables hypothesised to affect recreational demand are also considered.

2.1 Overview of Natural Resource Valuation

2.1.1 Types of Values

In valuing environmental resources, it is important to distinguish the different types of values. Total economic value is defined as the sum of use value and non-use value of resources (Figure 2.1). It is what a good or resource is worth, as reflected in market transactions or, indirectly, through its use. Use value can be decomposed into direct use and indirect use values of the environmental resource. First, direct use value refers to values either under direct consumptive usage (e.g., timber harvested from forest, water extracted from a stream for irrigation purposes) or non-consumptive usage (e.g., recreation and ecotourism, educational and scientific values). Values from consumptive usage are those that may be obtained via resource depletion (e.g., logging a forest or fishing from pond) as opposed to non-consumptive usage which is obtained without depleting the resource (e.g., recreational or tourist use of a forest or lake). Second, indirect use values comprise of forest and ecosystem services, such as providing habitat, pollination and breeding for flora and fauna, sustaining food chain, flood and climate control, and so forth.

On the other hand, non-use value refers to the passive usage of the environmental resource and comprises option value, bequest value and existence value (Freeman III, 2003; Greenley, Walsh, & Young, 1981; Griebler & Avramov, 2015). In this case, option value is the potential benefits of the environment not derived from actual use but preserved for personal future use. This expresses the preference or willingness-to-pay (WTP) for the preservation of an environment against some probability that the individual will make use of it in the future; bequest value is the value that people place on knowing that future generations (next-of-kin) will have the opportunity to enjoy a particular environmental asset (Sharp & Kerr, 2005); whereas existence value is derived from the satisfaction felt by an individual just knowing that an ecosystem or resource exists to be enjoyed for personal fulfillment (Wilson & Carpenter, 1999). An individual may reveal existence value for the ecosystem without having visited the wilderness in the past or have future intentions to visit (Schuster, Cordell, & Phillips, 2005) (Figure 2.1).

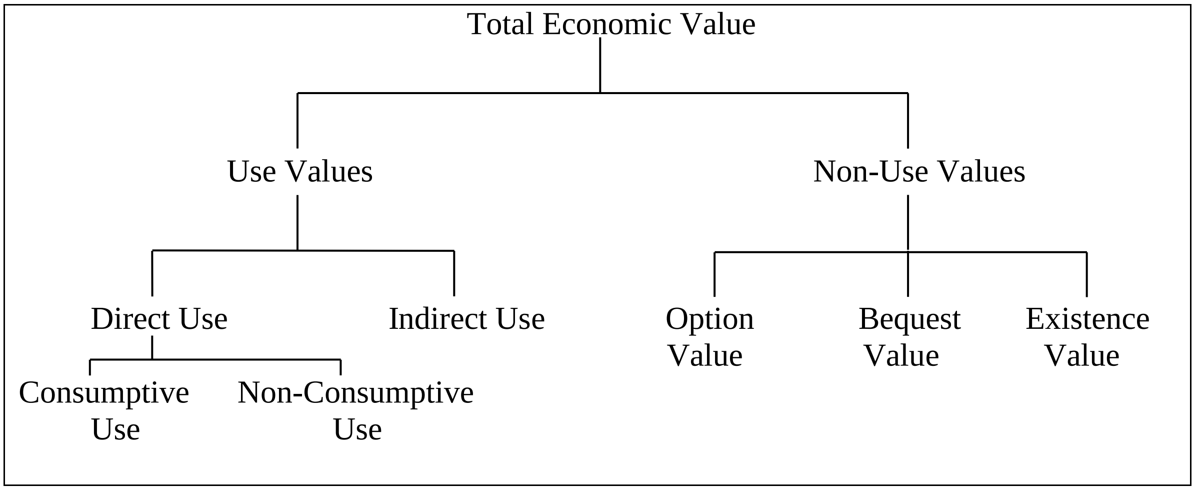

Figure 2.1 Types of economic evaluation of environmental resources (Goulder & Kennedy, 2009)

2.1.2 Classifying the Valuation Methods

The use of market pricing system to measure economic values of environmental resources (e.g., forests, parks, beaches) are not feasible as the market structures and property rights of these resources are not well defined. As such, these environmental resources are termed as non-market resources while non-market valuation techniques are often required to measure the value of such environmental resources. The two main non-market valuation methodologies to measure the value of non-market environmental resources are classified under the stated preference and revealed preference approaches (Thomas & Stratis, 2002) (Figure 2.2).

The stated preference technique is a direct approach which relies on respondents making choices for a range of hypothetical scenarios or data. In this case, respondents are required to select one alternative from among a range of hypothetical scenarios modelling tradeoffs between changes in attributes and compensation offered by respondents (Hicks, 2002; Mahasuweerachai, 2010). Such approaches include the Contingent Valuation Method (CVM), Choice Experiments, and Conjoint Analysis. In this case, use and non-use values of an environmental resource can be calculated.

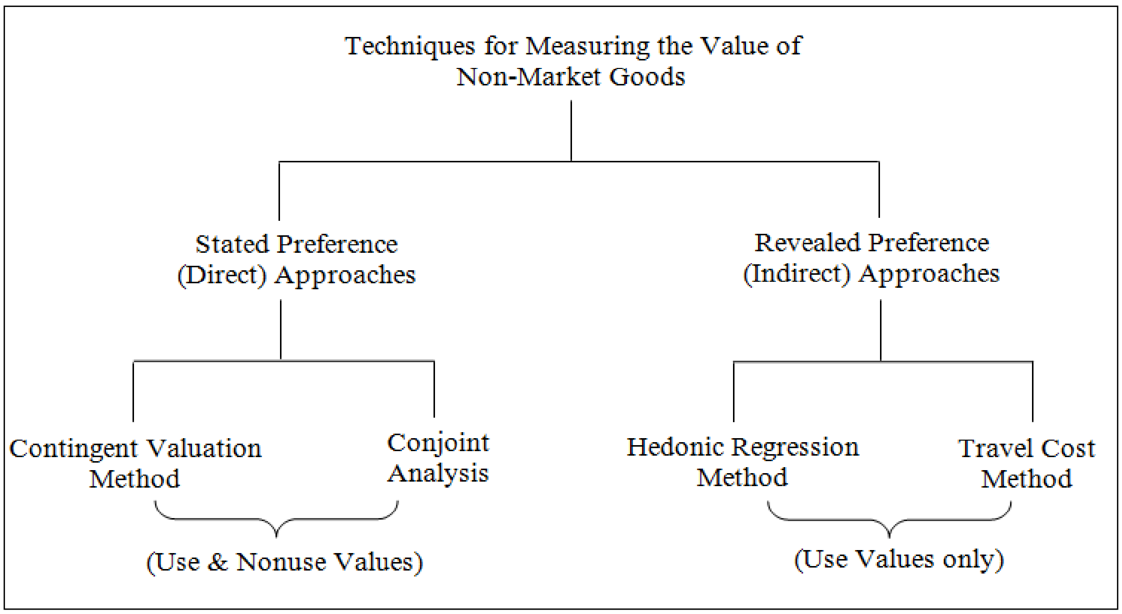

Figure 2.2 Techniques for measuring the value of non-market goods

Meanwhile, the revealed preference approach is an indirect approach relying on observations on actual behavioural data or choices made by individuals in valuing non-market goods (Hicks, 2002). Based on the concept of weak-complementarity (Maler, 1974), it is assumed that private goods (e.g., accommodation, transportation, recreational equipment) are consumed together with non-marketed environmental resources. In accordance to Willig's Theorem, these non-marketed resources are weak complements to its quality and are non-essential (Smith & Banzhaf, 2006). Specifically, the environmental goods are only valued whenever there is occurrence of consumption of complementary private goods. As such, the non-marketed commodities are considered as weak complements since the value of these environmental goods falls to zero if no consumption occurs within marketed commodities (Bockstael & McConnell, 2007; Palmquist, 2005). On this basis, only use values can be evaluated using such an approach.

The hedonic price method is a revealed preference method of estimating demand or value of a good or environmental amenity based on the contributory value of its attributes or characteristics. Briefly, the method assumes that the market price of a good (e.g., house) is determined by the implicit value of its characteristics, such as location, air quality, view, noise pollution, and proximity to public amenities. In this case, changes in any of these characteristics are inferred in the price of the property (Callan & Thomas, 2000).

Also included in the category of revealed preference based non-market valuation techniques is the travel cost model (TCM). Under TCM, consumers reveal the actual values on the consumption of the natural resources or the ecosystem based on individual's observed consumption behaviour (Atkinson & Mourato, 2008; Gustavson, Huber, & Ruitenbeek, 2000). In this case, the number of trips made by an individual to a recreational site and the incurred explicit and implicit travel cost are observed. Subsequently the recreation demand function is derived and the eventual consumer surplus (CS) or welfare analysis can be enumerated (Ozuna & Gomez, 1994; Phaneuf, Kling, & Herriges, 2000). Given that only values of actual visitors to the environmental resource is obtained, hence use values can be calculated using this revealed preference based approach.

2.2 Recreation Demand Function

2.2.1 Theoretical Framework

The basic economic framework suggests that the representative visitor preferences are represented by the utility function:

$$U = U(x, r, q) \tag{2.1}$$

where, U = utility level of a representative individual visiting a recreational site; x = quantities of market goods and services that are related to recreational outdoor activities (e.g., accommodation, transportation, relevant equipment); r = recreational activities produced by the non-market environmental goods (e.g., camping, cave excursions, hiking, trekking, wildlife spotting, boating, canoeing, water sport, rafting); q = quality characteristics of the ecosystem in the recreational site. According to McConnell and Strand (1981) and Mendes and Proenca (2005), the representative visitor's utility function is subject to budget and time constraints:

$$m = wT_w = P_X(X) + P_R(R) \tag{2.2}$$

where, m = available income of the visitor; w = market wage rate; T_w = time spent at work; P_X = price of quantities X; P_R = price (cost) corresponding to the quantities R; whereas time constraint is represented by:

$$T = T_w + T_r \quad (2.3)$$

where, T = total available time; T_r = time spent on recreational activities/leisure. As recreational utility is maximised subject to budget and time constraints, this yields a set of ordinary recreation demand function for the non-marketed recreational activities. Thus, the i^{th} recreationist's demand function is written as (with observation subscripts suppressed for brevity):

$$D = g(P_{X,} P_R, I, Q, DT, K) \quad (2.4)$$

where D = demand for recreation for the i^{th} individual; $P_{X,}$ = price paid for marketed commodities in order to enjoy the non-marketed goods (e.g., accommodation, transportation, etc); P_R = price for enjoying the environmental amenities (e.g., tour guiding services, entrance fees, boating, rafting, canoeing fees); I = recreationist's income level; Q = nature quality of the recreational site; DT = available recreational time (i.e., discretionary time); and, K = other socio-demographic characteristics.[7]

According to Wilman (1987), the representative visitor combines time and money to visit a recreational site and to stay on-site. The individual chooses a certain number of days to stay per visit or certain number of trips in a particular period by minimising total travel costs as well as on-site expenditures. Hence, the following equation (2.4), the recreation demand function can be further illustrated as:

$$NDS_i = f(P, I, Q, DT, K) \quad (2.5)$$

[7] It is hypothesised that the variable K denoting socio-demographic characteristics (e.g., age, gender, ethnicity, marital status, education level, occupation type) are proxies for taste and preference in the standard demand function.

where, NDS_i = number of days spent for the i^{th} visitor; P = price or recreational costs (including out-of-pocket costs and opportunity time costs); I = available income; Q_i = nature quality of the site; DT = discretionary time; and K = other socio-demographic characteristics. The recreation demand function can also be modelled as the number of trips in a particular period as well.

In modelling recreation demand, the demand for a representative individual is estimated. This is followed by calculation of the aggregate value measures from the sum of individual's recreational values (Freeman III, 2003). In such cases, information on visitors' individual explicit and implicit travel cost and other relevant explanatory variables are gathered to form the recreation demand function. Next, estimation of the WTP and marginal CS of the i^{th} visitor to a recreational site is computed based on the estimated demand function (Bell & Leeworthy, 1990; Font, 2000; Hof & King, 1992; Mendes & Proenca, 2005; 2011).

2.2.2 Statistical Recreation Demand Models

In estimating recreation demand models, it is common to encounter data with two types of features (Shaw, 1988; Yen & Adamowicz, 1993). First, the observed dependent variable is often categorised as *count data* given its non-negative integer values in terms of number of trips or number of days to a particular site during a certain time period. Second, the dependent variable may consist of a *truncated sample*, whereby information on non-users are unavailable. In such cases when the dependent variable is in non-negative integer values, the use of the ordinary-least-squares (OLS) regression analysis leads to inefficient parameter estimates (Maddala, 1983; Mendes & Proenca, 2005). Additionally, failure to account for the truncated nature of the dependent variable will lead to biased and inconsistent estimates in the parameters of the recreation demand models (Maddala, 1983; Yen and Adamowicz, 1993).

2.2.2.1 Count Data Modelling Using the Standard Poisson and Negative Binomial Models

To resolve the issue of inefficient parameter estimates arising from the presence of count data, alternative estimators such as the standard Poisson and negative binomial models have been proposed to determine changes in the number of trips/days spent due to changes in destination quality (Mahasuweerachai, 2010;Yen & Adamowicz, 1993).

In count data modelling, the standard count data estimator of a Poisson model is often used. Following closely the notations of Yen and Adamowicz (1993), the dependent variable Y_i is characterised by non-negative integer values of events occurring over a specified time interval. This results in the probability distribution function for Y_i:

$$P\left(Y_i = y_i\right) = \frac{\exp\left(-\lambda_i\right)\lambda_i^{y_i}}{y_i!} \qquad y_i = 0, 1, 2, \ldots, i = 1, 2, \ldots, n, \qquad (2.6)$$

where, y_i = realised value of the random variate Y_i; $\lambda_i = \exp(x_i\beta)$; x_i = vector of exogenous variables; β = vector of parameters. Given a sample of n independent observations, the log-likelihood of the standard Poisson model is written as:

$$\ln L = \sum_{i=1}^{n}\left[-\lambda_i + y_t x_i \beta - \ln(y_i!)\right]. \quad (2.7)$$

As highlighted by Yen and Adamowicz (1993), if the conditional mean and conditional variance for the Poisson distribution are equivalent to one another, [8] use of the standard Poisson model is acceptable. However, such a condition may not always hold given that information on number of trips/days often exhibits over-dispersion (Grogger & Carson, 1991), which is in fact a form of heteroscedasticity (Cameron & Trivedi, 1998). In this case, the data are over-dispersed when its variance is larger than the mean, thus resulting in the conditional variance being not equal to the conditional mean (Puig & Valero, 2006). The resulting effects of the presence of over-dispersion in the standard Poisson model is that the standard errors of parameter estimates will be biased downward and this may adversely affect interpretation of the resulting CS (Cameron & Trivedi, 1986; 1998; Mendes & Proenca, 2005).

To ameliorate the effects of over-dispersion in the data, the Poisson distribution is generalised by compounding both the Poisson and gamma distributions to result in the negative binomial distribution (Hausman, Hall, & Griliches, 1984; Yen & Adamowicz, 1993). In this case, the negative binomial probability distribution is used to correct for the over-dispersion count by allowing for the conditional variance to be different from

[8] That is, $E(y_i|x_i) = Var(y_i|x_i) = \lambda_i$.