UNIVERSITI PUTRA MALAYSIA

ECONOMIC VALUATION OF ECO-TOURISM RESOURCES IN PULAU PERHENTIAN MARINE PARK, MALAYSIA

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By

SHAMMI AKHTER

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

November 2014

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DEDICATION

THIS THESIS IS DEDICATED TO

MY LOVELY MOM HUSNA BANU

AND

MY BELOVED DAD MD. SHAHADAT HOSSAIN

WHO BELIEVED IN MY ABILITIES AND ALWAYS INSPIRED ME IN MAKING SOME OF MY GOALS COME TRUE

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

ECONOMIC VALUATION OF ECO-TOURISM RESOURCES IN PULAU PERHENTIAN MARINE PARK, MALAYSIA

By

SHAMMI AKHTER

November 2014

Chairperson: Professor Tai Shzee Yew, PhD
Faculty: Economics and Management

The Pulau Perhentian Marine Park (PPMP) is one of the most beautiful coral reefs islands in Malaysia. Therefore, tourism is developing rapidly at PPMP and contributes significantly to the economy. However, pollution and resource exploitation have been increased due to rapid tourism development. Though Marine Park is created to protect coral reefs and associated flora and fauna however, the rules are not applying strictly, resulting in resource damages. One of the main objectives is to assess the activities that caused damages to the environment and resources at PPMP and to suggest mitigating actions in order to prevent further deterioration. A damage schedule approach via the paired comparison method was used to assess the damaging activities at PPMP. A survey was conducted by a quota sample of 144 respondents consisting of both the resource dependent and the expert groups. This study also estimated the conservation value of marine environment and resources at PPMP using the contingent valuation method. Convenient samples of 250 tourists were interviewed to elicit their willing-to-pay (WTP) an increasing amount of entry fee for the conservation of the marine environment and resources in PPMP. This study used both the single and double-bounded contingent valuation methods to estimate the WTP. The results showed that improper sewage discharge by small resorts was the most damaging activities at PPMP, followed by direct disposal of sewage from village into sea (DS), and littering on the beach (LB) with a scale value of 65, 47.45 and 44.8, respectively. To mitigate the improper sewage discharge by the small resorts, all stakeholders suggested that imposing high damage payment, proper maintenance of septic tanks, and stopped all waste water channels passing straight to the sea would be the most effective steps. Direct disposal of sewage from village into the sea could be mitigated by introducing and practicing an environmental awareness programs to the villagers. Moreover, more regular collection of waste, installing composting systems for organic wastes could be able to mitigate this problem. Strict prohibition, improvement of information system, and more waste bins along the beaches could be effective steps to mitigate the problems of littering on the beach at PPMP. About 61.2% of the tourists were willing-to-pay an increased amount of entry fee to conserve marine environment and resources in PPMP. The median WTP per person per visit ranged from RM17.98 to RM21.72 that

could contribute to an aggregated benefit from 1.62 million to 1.96 million in 2011. In addition, the foreign visitor's median WTP per person per visit was much higher compared to locals, ranging between RM23.89 to RM27.86 and RM8.64 to RM13.40 respectively. Marine parks authority could apply different price system for both foreign and local tourists. This study would like to recommend RM23.18 for foreign tourists and RM8.64 for local tourists. Therefore, the above results of the study could be beneficial to the Marine Park authority in setting appropriate entrance fee at PPMP and taking adequate conservation activities to protect marine environment and resources to prevent them from deteriorating further.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

PENILAIAN EKONOMI ATAS SUMBER EKOTURISM DI TAMAN LAUT PULAU PERHENTIAN, MALAYSIA

Oleh

SHAMMI AKHTER

November 2014

Pengerusi: Profesor Tai Shzee Yew, PhD
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Taman Laut Pulau Perhentian (TLPP) merupakan salah satu pulau terumbu karang tercantik di Malaysia. Keadaan ini membolehkan, pelancongan berkembang dengan pesat di TLPP and menyumbang dengan signifikannya kepada ekonomi. Akan tetapi, pencemaran dan eksploitasi sumber telah turut meningkat disebabkan oleh kepesatan pembangunan sektor pelancongan. Walau pun taman laut diwujudkan bagi melindungi terumbu karang serta flora dan fauna, namun penguatkuasaan peraturan yang kurang berkesan telah menyebabkan kerosakan sumber alam dan seterusnya membawa kerugian sosial dan ekonomi kepada pihak-pihak berkepentingan. Salah satu daripada objektif kajian ini adalah untuk menilai aktiviti-aktiviti yang membawa kepada kerosakan dan kemerosotan alam sekitar dan sumber semulajadi di TLPP serta mencadangkan tindakan dan langkah pencegahan untuk mengelak bertambahnya kerosakkan dan kemerosotan di TLPP. Pendekatan menggunakan 'jadual kerosakan' (damage schedule approach) melalui kaedah 'perbandingan berpasangan' (paired comparison method) digunakan bagi mengukur dan menilai aktiviti-aktivi yang mendatangkan kerosakan di TLPP. Suatu survei telah dilaksanakan dengan menggunakan soalselidik berstruktur dan melibatkan persampelan kuota seramai 144 responden yang terdiri daripada dua kategori iaitu pengguna sumber alam dan kumpulan pakar. Kajian ini juga telah membuat anggaran tentang nilai pemuliharaan alam sekitar dan sumber marin di TLPP dengan menggunakan kaedah penilaian kontingen (contingent valuation method). Kaedah persampelan mudah (convenient sampling) telah digunakan dan 250 orang pelancong ditemubual bagi memperolehi maklumat berkaitan 'kesanggupan untuk membayar' (WTP) kenaikan bayaran masuk yang akan disalurkan kearah pemuliharaan alam sekitar dan sumber marin di TLPP. Kajian ini menggunakan kedua-dua format "single and double-bounded" yang terdapat dalam 'kaedah penilaian kontigensi' (CVM) untuk membuat anggaran tentang kesangupan membayar (WTP) dalam kalangan pelancong di TLPP. Hasil kajian mendapati bahawa pelepasan sisa kumbahan yang tidak terancang daripada resort-resort kecil telah dikenalpasti sebagai aktiviti yang paling menyumbang kepada kerosakan alam sekitar dan sumber marin di TLPP, diikuti dengan sistem saliran pelupusan sisa kumbahan secara terus daripada kampung ke laut (DS), serta pembuangan sampah di sekitar kawasan pantai

(LB) dengan masing-masing menunjukkan nilai skala 65, 47.45, dan 44.8. Bagi mengurangkan pembuangan sisa kumbahan yang tidak teratur oleh resort kecil, langkah paling berkesan yang dicadangkan oleh semua pihak yang berkepentingan ialah mengenakan bayaran kerosakan yang tinggi, penyelenggaraan tangki septik yang teratur, dan menghentikan pembuangan air kumbahan (waste water) secara terus ke laut. Pembuangan sisa kumbahan secara langsung dari kampung ke laut boleh dikawal dengan menperkenalkan dan mengamalkan program kesedaran alam sekitar dalam kalangan penduduk kampong. Selain itu, pengumpulan dan pengangukutan sisa buangan yang lebih kerap, menggunakan sistem kompos bagi sisa organik dan pengawasan yang lebih kerap oleh pihak ranger taman laut juga dapat membantu mengurangkan permasalahan ini. Langkah-langkah selanjutnya seperti memperketatkan pengawasan aktiviti larangan, meningkatkan sistem penyampaian maklumat berkaitan aktiviti larangan di TLPP, dan menambahkan bilangan tong sampah di sepanjang pantai, mungkin akan berkesan bagi mengurangkan masalah sisa buangan di kawasan pantai TLPP. Dapatan kajian juga menunjukkan bahawa 61.2% daripada pelancong sanggup membayar kenaikan bayaran masuk bagi menampung pemuliharaan alam sekitar dan sumber marin di TLPP. Median bagi 'kesanggupan membayar' (WTP) setiap orang bagi satu lawatan adalah diantara RM17.98 hingga RM21.72 dan telah menyumbang kepada pendapatan tergabung sebanyak 1.62 juta hingga 1.96 juta pada tahun 2011. Di samping itu, median pelancong asing bagi 'kesanggupan membayar' (WTP) setiap orang bagi satu lawatan adalah lebih tinggi berbanding pelancong tempatan dengan kadar masing-masing diantara RM23.89 hingga RM27.86 dan RM8.64 hingga RM13.40. Dengan ini, pihak berkuasa taman laut boleh mengaplikasikan sistem harga yang berbeza bagi pelancong asing dan pelancong tempatan. Kajian ini ingin mencadangkan supaya bayaran yang dikenakan adalah RM23.18 untuk pelancong asing dan RM8.64 untuk pelancong tempatan. Namun, hasil kajian seperti di atas turut memberi manfaat kepada pihak taman laut untuk menetapkan kadar bayaran masuk yang berpatutan di TLPP dan menjalankan aktiviti pemuliharaan yang sepatutnya bagi tujuan melindungi alam sekitar dan sumber marin serta menghalang keadaan dari bertambah buruk.

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APPROVAL

I certify that a Thesis Examination Committee has met on 13th November 2014 to conduct the final examination of Shammi Akhter on her thesis entitled "*Economic Valuation of Eco-tourism Resources in Pulau Perhentian Marine Park, Malaysia*" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U. (A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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LIST OF ABBREVIATIONS

UNWTO	United Nations World Tourism Organization
NIA	Nutrient Indicator Algea
RRSEA	Reefs at Risk in Southeast Asia
MPAs	Marine Protected Areas
FPA	Fisheries Prohibited Area
IUCN	International Union for Conservation of Nature
WCPA	World Commission on Protected Areas
NRE	Ministry of Natural Resources and Environment
DMPM	Department of Marine Park Malaysia
LCC	Live Coral Cover
PPMP	Pulau Perhentian Marine Parks
WWF	Worldwide Fund for Nature
EV	Economic Valuation
WTP	Willing to Pay
TEV	Total Economic Value
UV	Use Values
DUV	Direct Use Values
IUV	Indirect Use Values
NUV	Non-use Values
OV	Option Value
BV	Bequest Value
EV	Existence Value
RP	Revealed Preference Approach
TCM	Travel Cost Method
ITCM	Individual Travel Cost Model
ZTCM	Zonal Travel Cost Model
CVM	Contingent Valuation Method
PM	Productivity Method
HPM	Hedonic Price Method
RC	Replacement Cost Approach
SP	Stated Preference Approach
CM	Choice Modeling
WTA	Willing to Accept
CS	Compensating Surplus
NOAA	National Oceanic and Atmospheric Administration
CR	Contingent Ranking
CE	Choice Experiment
DS	Damage Schedule
SBDC	Single-Bounded Dichotomous Choice
DBDC	Double-Bounded Dichotomous Choice
SEAFDEC	Southeast Asian Fisheries Deveopment Center

CHAPTER 1
INTRODUCTION

1.1 Background of the study

Malaysia is a large country with thirteen states, three federal territories and divided into Peninsular Malaysia and East Malaysia. Peninsular Malaysia is situated to the south of Thailand, north of Singapore and east of the Indonesian island of Sumatra. East Malaysia is located on the island of Borneo comprises Sabah and Sarawak and has borders with Brunei and Indonesia. The total land area of Malaysia is 329,847 km^2 with a population of 28,334,135 (Ugbede *et al*., 2013). Malaysia is located near the equator with in latitudes 1-7° north and longitudes l00-119° east. Malaysia has a warm and humid climate throughout the year with daily temperatures ranging from 21-32 ˚C (with the exception of mountain and hill areas). Its climate is very helpful for sustaining a vast and diverse range of ecosystems, habitats and species (Ministry of Natural Resources and Environment, 2009). There are about 15,000 flowering plants and 185,000 animals observed in Malaysia which comprise approximately 9% and 6% respectively of the world total. These biological resources make Malaysia one of the twelve most biologically diverse countries in the world (Yeo, 1998). In addition, Malaysia is endowed with many natural types of scenery including sandy beaches, beautiful islands, variety of flora and fauna, tropical forest, and magnificent mountains. Hence, Malaysia is one of the most popular countries in the world visited by tourists.

Malaysia tourism industry is one of the world's most fast rising tourism industries in the world. It has been identified as the second largest foreign exchange earning sector and assisted to strengthen the economy (Hanafiah *et al*., 2010). Tourism contributes 11% of the Global Gross Domestic Product and is predicted to rise with an expected 1400 million international tourists throughout the world by 2020 (Christ *et al*., 2003). Tourism helps to promote countries infrastructural development, attracts foreign investment, creates employment opportunity, develops more domestic industries, and enable to exchange knowledge and technology.

United Nations World Tourism Organization (UNWTO) placed Malaysia in ninth position in terms of tourist arrivals (Ministry of tourism, 2010). International tourists had expanded remarkably over the past decades (Appendix A). The tourist arrivals had risen from 10.2 million to 23.6 million from 2000 to 2009 and tourists receipts had increased almost three times over the years. Tourism creates a significant work opportunities for millions of people directly and indirectly.

Malaysia has a large number of islands. These islands are one of the major attractions for tourists. The main attractions of these islands are natural resources includes coral reefs, fishes, mangroves, coastal vegetation, beautiful beaches with clear blue waters, and the peaceful environment of the islands. Malaysia's marine ecosystem is blessed with important marine resources. Malaysia's total sea area of 614,159 km^2 is almost twice its landmass. The size of Malaysia's Exclusive Economic Zone (area of the sea 200 nautical miles from shore), alone is 453,186 km^2 (Maritime Institute of

Malaysia). Malaysia has a total coastline of 4,675 km, comprising 2,068 km in Peninsular Malaysia and 2,607 km in East Malaysia. There are 877 islands within the political boundaries of Malaysia (Ministry of Natural Resources and Environment, 2009).

Marine recreational activities such as sight-seeing, diving and snorkeling contribute significantly to the economy. Conservation fee collected as entrance fee to Malaysia's Marine Parks was RM1 million in 2003. Moreover, marine park attracted 778,482 foreign and 820,116 local tourists revealed from the same report (Zakariah *et al*., 2008). The total number of visitors to the 4 marine parks has almost doubled from 423,229 in 2000 to 793,359 in 2013 (Appendix B) (Department of Marine Park Malaysia, 2014). This means revenue from tourism has increased and contributed to the Malaysian economy. Still, rapid tourism development may have created problems to the environment of marine parks. If the environment is not properly managed and maintained, depletion of natural resources, pollution and harmful physical impacts may occur that may impact negatively on the tourism industry. Some of the key issues related to marine parks degradation are discussed below.

Coastal Development

Rising population, growing industrial and tourism activities, and increasing demand for construction of new infrastructure facilities in coastal zones can cause problems for important marine resources in marine parks. One of the important resources in marine parks is coral reefs. Physical damage to the reef occurred as a result of direct pressure from construction (e.g. damage to substrate, sedimentation, dredging), land reclamation activities, and use of corals as a source of lime for cement production. Indirect pressure relates to the development in coastal areas and results in increasing sedimentation and nutrient runoffs. High levels of sedimentation generate problem for coral reefs photosynthesis and cause coral bleaching. Poor waste water treatment leads to high nutrient loads, resulting in algal blooms. These pressures can have significant negative impacts on coral reefs. Reef Check Malaysia, 2010 reported that average cover of nutrient indicator algea (NIA) in Peninsular Malaysia is relatively high compared to East Malaysia, at 7.2 and 3.8% respectively. The main reason for this problem is the higher density of resorts on the islands off the East coast where the tourism industry is more developed than in many parts of East Malaysia. The Reefs at Risk in Southeast Asia (RRSEA) project assessed that 23% of corals in Malaysia are damaged by coastal development activities (Zakariah *et al*., 2008).

Tourists' activities

The tourism industry has grown significantly over the past decade in Malaysia. The large numbers of tourist's arrival to marine parks will cause pressure to the marine resources. With increasing pressure from tourist arrivals, coral reefs are damaged, environment polluted from garbage and sewage. In addition, due to the development of tourism industries, recreational activities such as scuba diving and snorkeling have also gaining popularity. Snorkeling is the most preferred choices among visitors to Malaysia's marine parks. Snorkeling has an anthropogenic impact. Inexperienced snorkelers sometimes trample or stand on the reefs and threatening corals. In addition, corals are also damaged by new and careless divers.

Pollution

Various upland development activities such as logging, river modifications, road construction are the main causes of soil erosion. The sediments enter rivers that can carry them out to the sea. In addition to sediments, nutrients and fertilizers that are not absorbed by the soil also flow into the sea and pollute the marine environment. Effluent discharges from households are also polluting the marine environment. Sewage, oil, grease, and grey water are the most hazardous problems affecting the corals tremendously. A study conducted at Redang, Tioman and Sibu-Tinggi islands showed that the three islands are affected by these problems (Zakariah *et al.*, 2008). There are large numbers of hotels, resorts and chalets discharging untreated sewage directly into the ocean in marine parks in the east coast of Peninsular Malaysia (Reef Check Malaysia, 2010).

1.2 Marine Parks in Malaysia

In order to protect important marine resources from various damaging activities, the government of Malaysia has established several Marine Parks. In Malaysia, the Marine parks are also regarded as Marine Protected Areas (MPAs).

A marine park is a protected area of the sea where water is protected from two nautical miles from the shore due to the protection of its marine eco-systems. In the early 1980s, marine fisheries had experienced a significant decline. In order to enhance fisheries resources, coral reef areas where various commercial fish species live, breed, feed, and grow, need to be protected (Department of Marine Park Malaysia, 2010). The Malaysian government has declared the first MPA in Pulau Redang of Peninsular Malaysia under the Fisheries (Prohibited) Areas Regulations 1983. This regulation established a Fisheries Prohibited Area (FPA) in the 8km of maritime waters surrounding Pulau Redang. In 1985, Fisheries Protected Areas gazetted with 22 islands of Terengganu, Kedah, Pahang and Johor including water areas of 3 km under the Fisheries Act of 1963. The Fisheries Act of 1985 is initiated instead of the Fisheries Act of 1963 and declared another three islands Pulau Talang-Talang Besar, Pulau Talang-Talang Kecil and Pulau Satang Besar of Sarawak as FPA. The National Advisory Council for Marine Parks and Marine Reserves was established under the Ministry of Agriculture in 1987 (Department of Marine Park Malaysia, 2010). In 1989, Marine Parks Malaysia Order 1989 was established and gazetted Pulau Payar, Pulau Segantang, Pulau Lembu and Pulau Kaca as Marine Parks under the first Marine Park Centre Pulau Payar. This order was, however, replaced by the introduction of the new Marine Parks Malaysia Order 1994. The development of Marine Parks in accordance with the International Union for Conservation of Nature (IUCN) and World Commission on Protected Areas (WCPA) categories occurred in 1994 under the Fisheries Act of 1985 (Department of Fisheries, 1996). Finally, in 1994, 38 islands in the state of Kedah, Terengganu, Pahang, Johor and Federal Territory of Labuan were declared and gazetted as Marine Parks Malaysia under the Fisheries Act, 1985, reduced the coverage of the marine park areas to 2 nautical miles from the shore to all marine parks except one nautical mile for Pulau Kapas. Two more islands Pulau Nyireh and Pulau Tenggol were gazetted as Marine Parks of the Terengganu Marine Park Island Centres under the establishment of Marine Parks Malaysia Order 1994 (Amendment 1998). These developments resulted in a total of 40 marine park islands in Malaysia. The Marine

Park Section was shifted from Fisheries Department to a new management under the Ministry of Natural Resources and Environment (NRE) in 2004 and subsequently upgraded as Department of Marine Park Malaysia (DMPM) in 2007 (Department of Marine Park Malaysia, 2010). In February 2008, the two islands of Pulau Yu Besar, and Pulau Yu Kecil were gazetted as Marine Parks making the total of 42 Marine Park Islands in Malaysia (Ministry of Natural Resources and Environment, 2009). These 42 islands are grouped into five centres, located off the coast off Kedah, Terengganu, Pahang, Johor and Labuan (Yacob *et al*., 2008). Table 1.1 shows the list of islands that are grouped into five Marine Park centres.

Sabah and Sarawak with autonomous power in managing their natural resources, have established their own MPAs and State agencies for MPA management. The Sabah Parks established under the National Parks Ordinance 1962 is responsible for the Sabah State Parks, including Marine Parks. There are presently three land national parks and six marine national parks in Sabah. The six marine national Parks are Tunku Abdul Rahman Marine Park, PulauTiga, Turtle Islands, Tun Sakaran Marine Park, pulau Sipadan and Tun Mustapha Marine Park (Herman, 2006). Tuanku Abdul Rahman Park gazetted in 1974, Pulau Tiga Park in 1978, the Turtle Islands Park in 1997, Tun Sakaran Marine Park in 2004 and Pulau Sipadan which is under the authority of National Security Council is proposed as an MPA under the management of the Sabah Parks. In 2003, the Sabah State Cabinet endorsed the establishment of the Tun Mustapha Marine Park (Zakariah *et al.*, 2008).

Several State agencies, namely the National Parks and Wildlife Office of the Sarawak Forestry Department, Sarawak Museum, and the Department of Fisheries manage marine ecosystems and their associated fauna and flora in Sarawak. Pulau Talang-Talang Besar, Pulau Talang-Talang Kechil, and Pulau Satang are turtle nesting beaches in Sarawak. Coral reefs are also protected in these islands (Zakariah, *et al.*, 2008).

1.2.1 Objectives of Marine Parks in Malaysia

The main objectives of marine parks are as follows:

1. To conserve and protect the marine ecosystem, especially coral reef areas
2. To sustain the exploitation of coastal fisheries resources
3. To protect and manage marine parks for research, education and recreation purposes

Destructive activities to the coral reefs and the marine ecosystems are prohibited under the Fisheries Act 1985. These prohibited activities include fishing, collecting of corals, shells and other marine living organisms, mining sand, littering, polluting, and direct anchoring of boats to the reefs.

1.2.2 Benefits of Marine Parks

Marine parks provide significant benefits to different stakeholder groups. Fishers around the vicinity of marine parks benefit through sustainably fisheries resources. Marine Park also Provide special protection to aquatic fauna and flora, conserve and maintain the natural breeding grounds and habitat of aquatic life (Kaur and Barison,

Table 1.1 Lists of Marine Parks and Marine Park Centres in Malaysia

No	Marine Park Islands	Marine Park Centre	State	Area (km^2)	Year Operational
1	Pulau Payar	Pulau Payar Marine Park	Kedah	188.13	1989
2	Pulau Kaca				
3	Pulau Lembu				
4	Pulau Segantang				
5	Pulau Perhentian Kecil	Pulau Redang Marine Park	Terengganu	568.69	1990
6	PulauPerhentian Besar				
7	Pulau Susu Dara				
8	Pulau Lang Tengah				
9	Pulau Redang				
10	Pulau Lima				
11	Pulau Ekor Tebu				
12	Pulau Pinang				
13	Pulau Yu Kecil				
14	Pulau Yu Besar				
15	Pulau Kapas				
16	Pulau Tenggol				
17	Pulau Nyireh				
18	Pulau Chebeh	Pulau Tioman Marine Park	Pahang	676.61	1994
19	Pulau Seri Buat				
20	PulauSembilang				
21	Pulau Tioman				
22	Pulau Tulai				
23	Pulau Labas				
24	Pulau Tokong Bara				
25	Pulau Gut				
26	PulauSepoi				
27	Pulau Goal	Mersing Marine Park	Johor	765.65	1993
28	Pulau Harimau				
29	Pulau Mensirip				
30	Pulau Hujung				
31	Pulau Tengah				
32	Pulau Besar				
33	Pulau Rawa				
34	Pulau Tinggi				
35	Pulau Mentinggi				
36	Pulau Sibu				
37	Pulau Sibu Hujung				
38	Pulau Aur				
39	Pulau Pemanggil				
40	Pulau Kuraman	Labuan Marine Park	W.P Labuan	158.15	1996
41	Pulau Rusukan Besar				
42	Pulau Rusukan Kecil				
Grand Total		**42 Marine Parks**			

Source: (Department of Marine Park Malaysia, 2014)

2008). Natural regeneration is possible where decline has arisen. Scientists and researchers have the opportunities to conduct research on biodiversity resources. In addition, marine resources, especially coral reefs, fish, mangroves, coastal vegetation, beautiful beaches and clear blue waters, are the main attractions for tourists and are supporting the tourism industries through income generation.

Employment opportunities are also being created for different stakeholder groups. Due to the establishment of MPAs, the economic dependency for local communities had changed from fisheries to tourism industries.

1.2.3 Resources condition of Marine Parks

In order to maintain sustainable tourism development, it is very essential to see the present condition of the resources in the marine parks. Tourism development is more prevalent in Peninsular Malaysia than East Malaysia. Therefore, the resources condition in different marine parks in Peninsular Malaysia will be discussed here.

Coral reefs are one of the main attractions in marine parks areas. Coral reefs are called the rainforests of the sea, which maintain the most diverse forms of life on earth (Moberg and Folke, 1999). Coral reefs are colonies of tiny living animals, sufficient sunlight and clean water is essential for its survival (Gleason, 1998). Coral reefs are important by providing food and other resources (fish, mariculture, jewellery, aquarium items etc.), construction materials (sand and rocks), pharmaceuticals, other industrial chemicals, tourism and recreation (snorkeling and diving), biological support to other ecosystems, protect coast from erosion etc.

However, such an important resource is threatened from both natural and human activities in marine parks areas in Peninsular Malaysia. According to Coral Reef Health Criteria developed by Chou *et al*., (1994) the general condition of Malaysia's coral reefs is categorized as "fair", based on the average Live Coral Cover (LCC) (hard coral + soft coral) of 44.31% as shown in Tables 1.2 and 1.3.

Table 1.2 Average Percentage of Substrate Type Cover recorded within 20 m in Malaysia in different Islands in 2010

Substrate Type	Percentage
Hard Coral	38.56
Soft Coral	5.75
Recently Killed Coral	3.30
Nutrient Indicator Algae	4.35
Sponge	1.83
Rock	21.25
Rubble	13.60

Source: (Reef Check Malaysia, 2010)

Table 1.3 Coral Reef Health Criteria

% of live coral cover	Rating
00-25	Poor
26-50	Fair
51-75	Good
76-100	Excellent

Source: (Chou *et al*., 1994)

The reef check Malaysia survey results from four islands in east coast in peninsular Malaysia showed that Tioman has the highest LCC (Table 1.4). This represents the "good" condition under the coral reef heath criteria. Coral reefs of Kapas, Aur and Pulau Perhentian Marine Parks (PPMP) are in "fair" condition comprising 49.2%, 38.1%, and 35.9% of LCC respectively (Reef check Malaysia, 2010).

From Table 1.4, it is observed that the coral reefs of PPMP are in an unhealthy state due to the presence of significantly higher NIA (18.28%) compared to other islands. NIA in PPMP have been increasing over three years from 6.6%, 10.7% and 18.3% in 2008, 2009 and 2010, respectively (Reef check Malaysia, 2010). One of the main reasons of this kind of problem is pollution due to rapid tourism development.

NIA poses damage to coral reef health because of increasing influx of nutrients into the water, can lead to a proliferation of algea to a level that is above the ability of herbivorous organism to keep it check. As a result algea smothering and killing corals, making competition for space and sunlight and also reduce the suitable surface for new coral recruitment. Furthermore, the live coral cover (hard + soft) is also low (35.94%), and recently killed coral is high (2.97%) in PPMP compared to other islands indicating the degradation of coral reef in the island.

Table 1.4 Percentage of Substrate Type Cover Recorded within 20 m at Each Island Peninsular Malaysia, 2010

Substrate Type	Aur Island	Kapas Island	PPMP	Tioman Island
Hard Coral	33.91	46.88	35.78	60.47
Soft Coral	4.22	2.34	0.16	0.55
Recently Killed Coral	1.25	1.41	2.97	2.89
Nutrient Indicator Algae	6.25	1.88	18.28	4.69
Sponge	1.09	1.41	0.94	1.56
Rock	16.41	36.56	32.66	14.69
Rubble	24.69	3.75	6.25	6.64

Source: (Reef check Malaysia, 2010)

Another important resource in marine parks areas is fish. Most marine parks are suffering from low abundance of fish species which indicate overfishing especially before the islands were gazetted as Marine Parks. Low abundance of fish for food trade such as groupers and parrotfish are observed in most of the marine parks (Reef check Malaysia, 2010). The number of prized fish like Barramundi cod, Sweetlips and Humphead wrasse were also very low according to the report. The number of fish species in different marine parks is shown in Table 1.5.

The number of fish species is also found low (Table 1.5) in Perhentian island comparing with other islands. Similarly, other kinds of invertebrates were low in the marine parks. Triton shell, pencil urchin and lobster were totally absent although

edible sea cucumbers and giant clams are in good condition in Aur, Kepas, Tioman and Perhentian islands. Diadema urchins were to be found very high in Tioman and Perhentian Islands which is an indicator of nutrient pollution (Reef check Malaysia, 2010).

Table 1.5 The Number of Fish Species in Marine Parks

Marine Park Island	Fish Species
Pulau Redang	149
Pulau Perhentian	127
Pulau Tioman	233
Pulau Tinggi	219

Source: (Kaur and Barison, 2008)

Therefore, it is found that the resources condition of different marine parks is not satisfactory. The Perhentian Island is affected the most due to rapid tourism development. The main reason for these kinds of problems is pollution. There are large numbers of resorts and rapid coastal development is mainly responsible for this coastal pollution which indicates inefficient management system in marine parks.

1.2.4 Management of the Marine Parks

The marine parks of Malaysia is governed by three levels, namely federal, state and local governments (Zahari, 1991). Federal government is responsible to formulate policies to govern national development. State government decides the proper programmes and policies for their local governments. In Marine Parks, State government has control over land matters to develop and decide on land use of the islands. Local Authority - such as the District and Land Office implements many of the decisions of the State government and administer amenities of island and in principal manage physical development activities. Marine parks are administered by Department of Marine Parks Malaysia, under the Ministry of Natural Resources and Environment which have the legal rights to protect and conserve marine ecosystem (Islam et al., 2011). However, Department of Marine Parks Malaysia has limited power to control on marine resources which restricted an area only two nautical miles of the sea surrounding the islands. All estuarine and marine resources are under the control of Federal government jurisdiction, while the lands of the islands are under the control of state government (EPU, 2003). Therefore, coordination between federal and state government is necessary for the sustainable resources management. However, lack of coordination between Federal and State government is one of the main constraint for the sustainable management practices of marine resources in marine parks Malaysia (Gopinath and Puvanesuri, 2006).

A National Advisory Council for Marine Park and Marine Reserve was established under section 41A-41B of the Fisheries Act 1985 (amended in 1993) in 1987. Secretary General of the Ministry of Agriculture is the chairman of the council. The other members of this council are selected from various sectors such as the senior officers from Federal and State Government, environmental and business

organizations, NGOs, and universities teachers (Hiew, 2000). The functions of the Council are:

1. Establish the rules and regulations to control, utilize, protect, conserve, manage, and progress of marine parks at the national level.
2. Make coordination among the various corporate organizations with the Federal Government to develop the marine park or marine reserve areas.
3. Provide support to the State Government with regard to the development of marine park or marine reserve areas.

As shown in Table 1.2 five Marine Park Centres were established which act as a focal point for the administration and management of the Marine Park. Furthermore, these centres also serve as a base for enforcement of rules and regulations in the park areas. Various forms of printed materials such as posters, charts, slides, videos and others are made available for all visitors which provide valuable information to the visitors on the Marine Park and its fauna and flora. The centres are also used as focal points for marine environmental education, not only for students but also for the general public.

A sub-centre at Pulau Tinggi in Johor was established in 1999 and another at Pulau Perhentian in Terengganu in 2003 (Department of Marine Park Malaysia, 2010). These sub-centres also act as the main points for the administration and management of the marine parks nearby. There is a plan to build more sub-centres in order to provide better administration and management of the marine parks during the period of the 8th Malaysia Plan (2001-2005). The management of the marine parks in Peninsular Malaysia takes the following forms (Ahmad, 2009).

1. All the Marine Parks Malaysia administers under the department of Fisheries Malaysia (Federal agency) based on the board policy guidelines which are established by the council.
2. The marine park rangers monitor and enforce laws and regulation within the park with the assistance of the enforcement unit of the Department of Fisheries. The park rangers also arrange educational, awareness work, maintenance and administrative tasks in the parks.
3. The research works in the parks carry out the research arm under the Department of Fisheries with the help of marine park rangers. Moreover, local and foreign scientists from different universities and non-government organizations are encouraged and permitted to conduct their research works in the parks.

The government had introduced a Marine Park Trust Fund with a grant of RM35 million in 1987. That fund was distributed to purchase boats, different kind of vehicles, developing infrastructural facilities and building Marine Park Centres. After that, the fund was used mainly for the operation and maintenance activities from the mid 90's (Department of Fisheries Malaysia, 2000). The trust fund also raised fund

through the donation from general public, private companies and from different economic activities like selling posters, books, T-shirt and so on.

A "Conservation Fee" is implemented under the current management. This conservation fee is collected from visitors as an entry fee system initiated since 1999. An identical conservation fee is levied in all marine parks in Malaysia. The fund is used to assist in the maintenance and protection of Marine Parks (Yeo, 2002). The conservation fee for an adult visitor is RM5 (US$1.32) whereas students, retirees and children are charged RM 2.50. This price is uniform for both local and foreign tourists.

Enforcement activities within the Marine Parks can still be amended. The main reason for various problems that exist in marine parks is ineffective management system. The qualification of staffs and the numbers should be increased to conduct perfect enforcement activities in the marine parks. Lack of funds to meet high management costs is another problem in most of the marine park areas. Therefore, additional fund is needed to success various development activities of Marine Parks in Malaysia according to World Wide Fund for Nature, 2009 (WWF, Malaysia).

1.2.5 Policy, Acts, and Legal Aspects of Marine Parks Malaysia

There are different types of policies, acts, and legal aspects related to the establishment of Marine parks are important for sustainable resource management in Malaysia. All acts are related to the enforcement in marine and terrestrial protected areas are discussed below:

Fisheries Act 1985

This act is responsible for the conservation, management, and development of marine and estuarine resources. Marine Parks and marine reserve are under the part of IX which regulates different eco-tourism activities such as snorkeling, scuba-diving, underwater photography. Marine Parks Malaysia Order 1994 established under this act, which has the authority to the waters off the 42 Islands named as Marine Parks. However, the management of these areas is under the control of Department of Fisheries (Yacob *et al.,* 2008).

Protection of Wildlife Act 1972 (amended 1976 and 1988)

This act is stated that Wildlife Reserves and Wildlife Sanctuaries are under the authority of the state government. The Federal Depertment of Wildlife and National Parks are empowered the management of both types of reserves. In this act, people who have the written permission from the authority can visit the reserves (Yacob *et al.,* 2008).

National Forestry Act 1984 (Peninsular Malaysia)

Under this act, the lagal basis for the concept of a national Permanent Forest Estate (PFE) is set out which has formed many Forest Reserve controlled by the state. PFE

is classified into 11 functional categories stated in section 10 of this act. Three of these are related with ecotourism namely Forest sanctuary for wildlife, Amenity Forest, and Education Forest. However, another (Virgin Jungle Reserved Forest) is important for conservation of biological diversity (Yacob *et al.,* 2008).

National Land Code 1965 (Peninsular Malaysia)

This code is related with land use and land tenure important for land use and ownership. State government empowered to use the land for any purpose whereas the code provides no provision for management or enforcement (Yacob *et al.,* 2008) .

Local Government Act 1976

Under this act, local authorities empower to establish and manage public places including marine parks. This act is responsible for the creation of small protected areas of natural habitat (Yacob *et al.,* 2008).

1.3 Study site: Pulau Perhentian Marine Park (PPMP)

PPMP is selected as the study site because of its present resource condition and tourism importance. The Pollution from rapid tourism development is high in PPMP which deteriorating the important resources day-by-day. Therefore, this island is selected in this research so that can be able to bring improve condition by providing important information to the policy makers.

1.3.1 Location

The PPMP is one of the most beautiful islands in Malaysia. It is situated in the South China Sea, approximately 10 nautical miles off the coast of the state of Terengganu. Figure 1.1 shows the map of the study site. The Malay name Perhentian means "stopping point" referring to their longstanding role as a waypoint for traders between Bangkok and Malaysia. There are 11 islands that constitute the Perhentian with the largest being Pulau Besar (approximately 867 ha) and Pulau Kecil (approximately 524 ha). Other important islands are Pulau Rawa, Pulau Serenggeh, Pulau Susu Dara Besar and Pulau Susu Dara Kecil. The islands' only small fishing village is 'kampung pasir huntu' being located in Pulau Perhentian Kecil. This village is home to over 1500 people. The physical infrastructure of the village consists of three jetties, a primary school, a health clinic, a police station, a post office and several shops and a small market. Electricity is supplied by a generator installed in 1994 and piped water is provided by a water treatment plant in the village (Islam *et al*., 2013).

Figure 1.1 Perhentian Islands Marine Park Malaysia
Source: (Islam *et al*., 2013)

1.3.2 Climate

The PPMP have a tropical climate with normally calmer conditions from March until October. The annual north east monsoon season creates high winds and heavy rainfall from November to February.

1.3.3 Resources of the Island

PPMP comprises a globally important area of marine species biodiversity. The islands are one of the most renowned and beautiful islands in Malaysia. There are plenty of palm trees, crystal-clear water, blue oceans, sea-turtles, jellyfish, small sharks, reef-fishes, soft powdery sands, and fringing coral reefs found in the islands. A study by Coral Cay Conservation in 2000 around the adjacent Marine Park Islands along this eastern coastline recorded 221 hard coral species (Harborne *et al*., 2000). The number of fish species was recorded 127 (Kaur and Barison, 2008). The reefs around the Perhentian Islands may support up to 80% of the biodiversity. In comparison with the reef systems of the other Marine Park Islands on the east coast of Peninsular Malaysia, the coral reefs around the Perhentian Islands are recognized to contain high biodiversity. Moreover, the islands are also significant as the home to the Green and Hawksbill turtle nesting population where about 300 nesting per year were observed. Turtle nesting are observed on six sandy beach areas of these islands. This indicates that the PPMP are important for biodiversity resources for the surrounding areas and for Malaysia (Harding *et al*., 2003).

1.3.4 Tourism in PPMP

The uniqueness of the spectacular natural view and coral reef ecosystems are the prime attraction for recreation and natural based tourism in PPMP. The beautiful natural view of PPMP makes it a destination for tourists. Palm-fringed white coral sand beaches and turquoise blue sea are the main attractions for tourists. Tourism started in the islands in 1960s. Prior to early 1980s, the main economic activities on

the islands were fishing and small scale agriculture including the cultivation of coconut, rubber, clove and fruit trees. At present tourism is the major economic activity in PPMP. The most popular tourist's areas are Teluk Pauh, Pasir Jong, Teluk Keke and Teluk dalam in Pulau Perhentian Besar and Kampung Pasir Panjang, Teluk Kerma, and a few other areas in Pulau Perhentian Kecil. The most popular tourist's activities in PPMP are scuba-diving, snorkeling and swimming. Some of the popular dive sites in these islands are Tokong Laut, Terumbu Tiga, and Sugar Wreck. Popular snorkeling spots in Pulau Perhentian Besar include Teluk Pauh, Shark Point and Tanjung Basi. These are surrounded by all kinds of coral and home to numerous species of reef fish and other marine life. Besides diving and snorkeling, other activities include fishing, jungle trekking, swimming, banana boat ride, camping, canoeing and other excited water sports. PPMP receives up to 90,150 tourists annually. The number of tourists almost doubled from 2004 to 2011 (Table 1.6)

Table 1.6 Total Numbers of Tourists in PPMP from 2004 to 2011

Year	Total no of visitors
2004	51150
2005	47527
2006	59172
2007	58546
2008	75262
2009	89968
2010	93541
2011	90150

Source: (Islam *et al*., 2013)

There are a large number of chalets being built in PPMP compared to other islands in Terengganu due to rapid tourism development (Table 1.7). From Table 1.7 found that PPMP occupies 43 chalets. This rapid resort development shows the importance of tourism in this island. On the other hand, these chalets create pollution and cause environmental problems to PPMP.

Table 1.7 Number of Chalets in Selected Areas in Terengganu

Name of Islands	Number of Chalet	Number of Dive Shop
Pulau Susu Dara	-	-
Pulau Lang Tengah	2	2
Pulau Perhentian	43	19
Pulau Redang	13	7
Pulau Lima	-	-
Pulau Ekor Tebu	-	-
Pulau Pinang	-	-
Pulau Yu Besar	-	-
Pulau Yu Kecil	-	-
Pulau Kapas	2	1
Pulau Nyireh	-	-
Pulau Gemia	-	-
Pulau Tenggol	3	2

Source: (Department of Marine Park, 2010)

1.4 Problem Statement of the Research

Tourism in PPMP contributes significantly to the economy. However, rapid expansion of tourism in PPMP has witnessed pollution of the environment, over-exploitation and damages to the resources by various activities. Tourism related activities pose the biggest threat to the coral reefs and environment of PPMP (Tamblyn *et al*., 2005). The existence of a large number of small resorts as shown in Table 1.8 on both Pulau Perhentian Besar and Pulau Perhentian Kecil are the main problems (Reef check Malaysia, 2010). The islands are small and can support a certain amount of development and infrastructure.

The sewage system of most resorts is small and is not properly maintained, thus is unable to handle the amount of waste produced. Excessive demands on water and problems of waste disposal are too evident. Due to lack of proper sewage system, nutrients influx into the adjacent sea water occurred and causes the increase in NIA and algae bloom. Moreover, PPMP is a designated marine park and there fishing, collecting coral and littering are strictly prohibited. In practice however, litter is one of the major problems in the islands. Local communities on the islands also contributed to the environmental problems through sewage disposal and littering. Furthermore, snorkeling and diving activities by hundreds of tourists occur breakage of coral due to tourists standing on the reefs and their careless activities.

Coral growth is very slow and they only grow about 1 to 25 cm/year. If these issues are not addressed carefully may bring loss in the future by deteriorating corals. Then Perhentian will fail to attract tourists due to poor quality of coral reefs and environment. If coral damage, it has an impact in the economy by losing revenue from tourists, reef related fish will be decrease, and overall bring damage to the environment. This loss is not only the loss of present but future also. These damages will cause social and economic losses to different stakeholder groups. Therefore, the various damaging activities need to be assessed and this constitutes the main focus of this research in order to prevent the resources and the environment in PPMP to deteriorate further. This research aims to address these issues.

To derive long-term economic and environmental benefit of PPMP, economically sustainable ways need to be find out. Therefore, conservation of the marine resources are necessary. Conservation of environmental goods and services requires costs and may produce losses through improper use. The Worldwide Fund for Nature, 2009 (WWF, Malaysia) states that majority of the Marine Parks in Malaysia have insufficient conservation fund. The temporary and unstable nature of conservation funding demands that alternative ways to meet the funding requirements be explored.

The entry fee currently imposed on tourists to PPMP is minimal and uniform for all groups. In many countries in the world, different charges are levied on foreign and local tourists. Various studies have shown that foreign tourists are willing to pay more than locals for conserving the corals and the environment (Nam and Son, 2001; Seenprachawong, 2001; Ayob *et al*., 2002; Asafu-Adjaye and Tapsuwan, 2008; Yacob *et al*., 2009; Ahmad, 2009). Therefore, this study attempts to seek the answer

to the question of whether visitors are willing to pay more than the current fee levied in order to protect the coral resources and the environment in PPMP. Furthermore, this study also attempts to investigate whether it is possible to implement discriminate pricing for the local and foreign visitors.

Economic valuation (EV) can help policy makers in making more rational decisions. EV of the PPMP aids policy-makers to acquire holistic knowledge about the islands that will assist proper allocation of resources among competing uses. In order to implement effective social and economic policies and well organized institutional arrangements that retards excessive deterioration and reduction of resources in the marine parks, it is essential to determine the activities value and to incorporate these into decision making process. In addition, EV will make a link between environmental protection and sustainable economic development. Without environmental protection economic development cannot be sustained in the long run.

1.5 Objectives of the Research

The general objective of this study is to estimate economic valuation of eco-tourism resources in the Pulau Perhentian Marine Parks.

The specific objectives are

1. To assess the damages to the environment due to rapid tourism development in PPMP
2. To determine the mitigation actions to the respective damaging activities of PPMP
3. To examine tourists perception on different resources and facilities of PPMP
4. To estimate the conservation value of PPMP

1.6 Research Questions

Following the above objectives, this study attempts to answer the research questions which are stated below:

1. What are the damaging activities in PPMP due to rapid tourism development?
2. What are the mitigation actions to the respective damaging activities in PPMP?
3. What are the tourist's perception on different resource attributes and facilities of PPMP?
4. Are tourists willing to pay more than the current entrance fee?
5. Are foreign tourists willing to pay (WTP) more than local tourists?
6. What is the annual eco-tourism resources value in PPMP?

1.7 Significance of the Study

Malaysian marine ecosystem mainly marine parks have received little attention in terms of valuation studies. There are few studies valuing the recreational and conservational benefits of marine park areas (Yeo, 1998; Ayob *et al*., 2002; Radam and Mansor, 2005; Yacob *et al*., 2009; Ahmad, 2009). More studies still have essential in this area. Therefore, valuation studies would explore new areas in PPMP.

This study will provide important information to the policy maker for taking necessary actions to the island.

Another contribution from the study will be in addition to derive WTP the damages due to unsustainable tourism will also be investigated. The research findings may also be able to provide important guidelines to the different stakeholder groups for sustainable tourism development in the study areas. This will help different stakeholder groups to take their activities carefully and in a sustainable manner. In addition, this study will also be advantageous for researchers, environmental consultants.

Most importantly, true value of environmental resources make the government to allocate adequate resource use and conservation polices and also assist the government to encourage resource users to behave responsibly through education and raising awareness.

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