VISITORS' WILLINGNESS TO PAY FOR AN ENTRANCE FEE: A CASE STUDY OF MARINE PARKS IN MALAYSIA

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ABSTRACT

Marine Parks are established to protect an area of the sea zoned as a sanctuary for the protection of its marine eco-systems, especially coral reefs and its associated fauna and flora, like sea grass beds, mangroves and the sea shores. In Malaysia, there are 6 marine parks to-date. Ironically, the establishment of marine parks also attracts more tourists to the areas. For example, the number of visitors to Payar Marine Park increased tremendously from 3,668 visitors in 1990 to 133,775 visitors in 2002. Environmentalists and scientists have voiced concern that too many tourists have adverse effects on the coral reefs.

This study estimates how much visitors are willing to pay for two separate issues; first, to reduce the damages due to crowding effect and second, to reduce the damages due to inland development, of three marine parks in Malaysia; Payar, Redang and Tioman Marine Park. The willingness-to-pay estimates were obtained from the respondents using the Contingent Valuation Method. A total of 650 questionnaires were distributed to the respondents. Then, half of the total respondents were asked to answer the crowding effect issue, and the other half was asked the inland development issue. For the crowding effect issue the respondents were presented with a hypothetical situation in which the park authority wanted to reduce the damage to the corals by limiting the number of visitors to half the number who came in 2000. The reduction in the total number of visitors is to be achieved by imposing an increased entrance fee. For the inland development issue, an increase in the entrance fee is intended for the authority to hire more people to monitor and enforce rules, to treat sewage and to implement coastal zone management and planning. Estimation was done using the double-bounded dichotomous choice method.

The willingness to pay (WTP) per person per visit to moderate the environmental impact of inland development is RM23.79, which is lower than the WTP to reduce crowding, RM31.59. In addition, when both data were combined to estimate the differences between the WTP of foreign and local visitors, we found that the WTP of foreign visitors was much higher than the WTP of locals at RM39.11 and RM19.52, respectively. Analyses using the Individual Travel Cost Method gave quite poor results since two thirds of the visitors were first-timers. Therefore, consumer surplus cannot be obtained due to the insignificant result of the respondent's total spending on the number of trips. However, using the Zonal Travel Cost Method (ZTCM), the average consumer surplus was found to be the same, RM1,000 for each park. The ZTCM was also used to calculate the elasticity of demand. The results for the three marine parks were found not to vary much, ranging between 1.07 and 1.36.

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DECLARATION

I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

Signature : _____

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LIST OF ABBREVIATIONS

CDF	cumulative distribution function
CE	choice experiment
CM	choice modeling
CS	consumer surplus
CV	contingent valuation
CVM	contingent valuation method
HPM	Hedonic Price Method
ITCM	individual travel cost method
IUCN	International Union for Conservation of Nature
ML	maximum likelihood
MOCAT	Ministry of Cultural and Tourism, Malaysia
MPA	marine protected area
NGO	Non-Government Organization
NOAA	National Oceanic Atmospheric Administration
NP	national park
PDF	probability density function
RP	revealed preference
RUM	random utility model
SP	stated preference
TCM	travel cost method
WCPA	World Commission on Protected Areas
WTA	willingness to accept
WTP	willingness to pay
WWFM	World Wide Fund for Nature Malaysia
ZTCM	zonal travel cost method

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Encouraged by the world's strong economy and events to celebrate the new millennium, tourism as a leisure activity has expanded worldwide. According to WTO's (World Tourism Organization) January 31, 2001 News Release, "world tourism grew by an estimated 7.4 per cent in 2000 – its highest growth rate in nearly a decade and almost double the increase of 1999" with almost 714 million arrivals and receipts of US$476 billion. Within the East Asia and Pacific region, ASEAN countries namely, Thailand, Malaysia, Cambodia and Vietnam had again became the world's favourite tourism destinations. In the period from January to August 2004, in South-East Asia, total arrivals increased by an extraordinary 45%. Arrivals rose 68% in Malaysia (+70% receipts), 44% in Cambodia and 48% in Singapore.

In 1999, Malaysia received 7.931 million tourists with receipts of RM13.45 million (MOCAT, 2000) and was ranked fourth after China, Hong Kong and Thailand in terms of arrivals in the Asia and the Pacific region. The favourable growth continued in 2000 and had positioned Malaysia in third rank within the East Asia and Pacific Region. In 2002, Malaysia was still at rank third (WTO, 2003).

Table 1.1: Top Ten Destinations within Asia and the Pacific

Top Destinations	Arrivals in 2002	% Change from 2001	Ranking in 1999
China	36,803,000	+ 11.0	1
Hong Kong	16,566,000	+ 20.7	2
Malaysia	13,292,000	+ 4.0	4
Thailand	10,873,000	+ 7.3	3
Singapore	6,996,000	+ 4.0	5
Macao	6,565,000	+ 12.4	-
Rep. Of Korea	5,347,000	+ 3.9	6
Japan	5,239,000	+ 9.8	8
Indonesia	5,033,000	- 2.3	-
Australia	4,841,000	-0.3	7

Source: WTO, 2003

Most developing countries look towards tourism as an agent of economic growth, based on the expected creation of economic benefits. In Malaysia, the tourism industry was the third largest industry generating foreign exchange in 1999. From 2000 up to the present, tourism was second largest after manufacturing. In addition, the share of tourism revenue in the services account of the balance of payments increased from 32.7 percent in 2000 to 43.0 percent in 2005. Being situated within the tropical region, Malaysia has many nature-based tourism attractions (for instance caves, waterfalls, hot springs, beaches, coral reefs, mountains, and birds and wildlife sanctuaries). At the same time, the government is also keenly promoting these nature-based attractions. To conserve these nature-based attractions, the government has established a network of protected areas for the conservation of biological diversity. Some of these national parks, wildlife reserves and sanctuaries, nature parks, bird sanctuaries and marine parks have been established since the 1930's. Peninsular Malaysia's largest national park, the Taman Negara in Pahang, covering 434,340 hectares was gazetted as early as 1939, and is essentially a virgin forest comprising various forest types according to altitudes and

soils. Hence, together with the protection of the permanent forest of 1.90 million hectares, the total area designated for the conservation of biological diversity in Peninsular Malaysia in 2002 stands at 2.45 million hectares or 41.1% of its total forested land (http://*www.mtc.com.my/publication/speech/sect4.htm*).

National parks were defined by International Union for Conservation of Nature (IUCN) in their tenth General Assembly (1969) as follow:

"National Park (NP) is a relatively large area:-

1. where one or several ecosystems are not materially altered by human exploitation and occupation, where plant and animal species, geomorphological sites and habitats are of special scientific, educative and recreative interests or which contains a natural landscape of great beauty;
2. where the highest competent authority of the country has taken steps to prevent or to eliminate as soon as possible exploitation or occupation in the whole area and to enforce effectively the respect of ecological, geomorphological or aesthetic features which have led to its establishment; and
3. where visitors are allowed to enter, under special conditions, for inspirational, educative, cultural and recreative purposes."

Therefore, national parks are established for the purpose of preservation, whilst allowing and even encouraging access for education, recreation and tourism purposes.

To date, Malaysia has 30 gazetted National Parks with 6 of them being marine parks. Only eight NPs are located in Peninsular Malaysia while 7 are in Sabah and 15 are in

Sarawak. Of the eight in Peninsular Malaysia, four are Marine Parks. A summary of the National Parks in Malaysia is in Appendix1.

The management of the parks is divided into four: the national parks in Peninsular Malaysia are managed by the Forestry Department of Malaysia, the marine parks are managed by the Fishery Department, all the parks in Sabah including their marine parks are managed by Sabah Parks, and parks in Sarawak are managed by Forest Department of Sarawak. Different management has resulted in a non-uniform management style in the parks.

At a general level, the important economic issues associated with the creation and management of both the land-based and marine reserves are identical. However, at a more specific level, analysts have suggested that marine reserves may differ from their land-based counterparts in ways that may be relevant to selecting and applying the most appropriate net benefit evaluation methodologies (Hoagland, 1995). The following are a number of reasons why marine reserves may differ from coastal or land-based reserves:

Human uses: A marine reserve does not normally provide habitat for humans (Doeleman, 1991).

Nature of uses: because marine reserves tend to be more remote than coastal or land-based reserves, patterns of visitation may differ. In particularly, costs of travel to the reserve may be relatively higher. Moreover, a significant portion of the benefits from

reserve designation may be derived from indirect uses or from bequest or vicarious non-uses.

Open access: both access to a reserve and the use of its resources are difficult to control, in particular because of problems in marking boundaries (Tisdell and Broadus, 1989). This characteristic implies that monitoring and enforcement costs may be significantly greater for marine reserves than for land-based reserves.

Resource fugitivity: management of fisheries and wildlife, especially containment, may be difficult (Tisdell and Broadus, 1989). Similarly, marine pollutant flows and effects are clearly different, and control or clean-up may be more difficult than on land.

Property or liability rights: the rights to use ocean resources or liabilities for damage to ocean resources may differ from those on land. International legal institutions may conflict with domestic management priorities.

1.2 MARINE PARKS

Marine Park is one of many different names given to marine areas that are, to some degree, protected by spatially explicit restrictions (McNeill, 1994). Marine protected areas (MPA), parks, reserves, harvest refugia, and sanctuaries (Allison et al., 1998) are some of the commonly used terms. The World Conservation Union provides the following definition of an MPA: “any area of intertidal or subtidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which

has been reserved by law or other effective means to protect part or all of the enclosed environment" (IUCN 1988). According to Fisheries Western Australia's Annual Report 1999 – 2000, Marine Park is a "state protected area with associated rules and restrictions to control activities such as fishing or boating". In Malaysia, a Marine Park is an area of the sea zoned as a sanctuary for the protection of its marine eco-systems especially coral reefs and their associated fauna and flora, sea grass beds, mangroves and the seashore.

In most marine park/reserves, use is regulated by government. Normally, the reserves protect the rare ecosystems or fisheries and wildlife habitats. Heavy industrial uses and other uses potentially destructive of wildlife or its habitats are usually restricted or prohibited within the confines of a marine reserve. Recreational uses, such as ecotourism and scuba diving, or certain kinds of recreational fishing may be promoted.

To appreciate the reasons why corals have to be protected, we have to understand about the life of corals, what makes it healthy and what makes it die and the benefits of corals to humans. Corals are comprised of colonies of tiny animals called polyps, which belong to the phylum Cnidaria. Each polyp resembles a small sea anemone and uses its stinging tentacles to paralyze and feed on plankton. Polyps secrete calcium carbonate, which forms the skeleton of coral and the framework of coral reefs.

Corals have a symbiotic relationship with microscopic algae called zooxanthellae that live inside each polyp. Zooxanthellae are photosynthetic, and produce foodstuffs which can be consumed by the polyps (Rowan and Powers, 1991). In return, the polyps

provide a secure environment for the zooxanthellae and nutrients such as nitrogen. Corals are not the only reef builders. Coralline algae cement various corals together with compounds of calcium, and other organisms such as tube worms and molluscs donate their hard skeletons (Cousteau 1985). Together these organisms construct many different types of reefs.

There are three basic types of reefs: fringing reefs, barrier reefs and atolls. Fringing reefs are coral reefs that grow in shallow waters and border the coast closely or are separated from it by a narrow stretch of water. Fringing reefs consist of several zones that are characterized by their depth, the structure of the reef, and its plant and animal communities. These regions include the reef crest (the part of the reef that the waves break over), the fore reef (the region of medium energy), and the spur and groove or buttress zone (the region of coral growth which includes rows of corals with sandy canyons or passages between each row). Most coral reefs found in Malaysia are of this first type.

Barrier reefs are reefs that are separated from land by a lagoon. These reefs grow parallel to the coast and are large and continuous. Barrier reefs also include regions of coral formation that include the zones found in fringing reefs along with patch reefs (small reefs), back reefs (the shoreward side of the reef), as well as bank reefs (reefs that occur on deep bottom irregularities). Coral reefs also include reef flats (the area of the reef not exposed), the reef crest, which runs parallel to the coast and is protected from the waves, and a coral terrace (a slope of sand with isolated coral peaks). These

features are followed by another coral terrace and a vertical drop into deeper waters. The most famous barrier reefs are the one found in Australia, the Great Barrier Reef.

The third type of coral reefs is atolls. Atolls are annular reefs that develop at or near the surface of the sea when islands that are surrounded by reefs subside. Atolls separate a central lagoon and are circular or sub-circular. There are two types of atolls: deep sea atolls that rise from deep sea and those found on the continental shelf.

Coral reefs have existed for approximately 450 million years and are one of the most diverse ecosystems in the world. These "rainforests of the oceans" are home to a wide variety of marine organisms. Coral reefs require tropical or sub-tropical temperatures, and are found between 30 degrees north and 30 degrees south of the equator. Coral reefs of the western Pacific are much more diverse than those of the Atlantic and Caribbean. There are up to 75% more genera and 85% more species of corals in Pacific waters (Wilkinson 1987). They occur in shallow, clear water where light is sufficient to support photosynthesis by the zooxanthellae.

There are several benefits of coral reefs to humans. First, as a source of food and livelihood for at least 100 million people worldwide (Lesser, 2004) from fisheries that are supported by coral reefs. Second, as a natural barrier that protects coastlines from tides, storms and hurricanes. Reefs dissipate the wave energy and decrease the destructive stress upon the coast (Sorokin, 1993). Third, as a source of alternative medicine (Quinn et al., 2002). Two examples are a potent pain-killing drug from the toxin of a reef-dwelling snail developed by scientists in California that is used for the

treatment of severe pain in the terminally ill who are resistant to morphine; and the usage of coral skeletons as bone substitutes in reconstruction bone surgery. Fourth, reefs are an important land builders in tropical areas, forming islands and altering continental shorelines (Goreau et al. 1979). Fifth, as a storehouse for biodiversity, and sixth as a recreatorial resource.

In recognition of the value of coral reefs, by 1989, approximately 60 countries have moved to establish official protection for nearly 300 coral reef areas (Wells, 1990) and the numbers have increased since (Hoagland et.al., 1995).

In the past 20 years, there have been large increases in visitation to marine protected areas in many parts of the world (Tilmant, 1987; Kelleher et al., 1995 in Inglis et.al., 1999). Marine protected areas or marine parks have emerged as an essential tool in ocean conservation, and the management of tourism and recreation activities within marine parks has become an important issue for the protection of marine and coastal resources. The reasons for this is two-fold: tourism has great potential as an activity that can have a minimal impact on the marine environment while generating income for the communities at its borders; and, as greater numbers of tourists seek more educational experiences in natural environments, marine parks provide invaluable settings for the dissemination of marine ecological information, creating groups of aware and concerned citizens to support ocean and coastal conservation (Murgatroyd, 1999).

1.2.1 Marine Parks in Malaysia

In Malaysia, even though parks and reserves were established as early as in 1925 (Jasmi, 1996), they were confined to mainland areas. It was only in 1983 that steps were taken to initiate conservation of the natural marine habitats in the form of marine parks and marine reserves (Ch'ng, 1990) surrounding selected offshore islands. The initial MPA establishment was made in 1983, where water areas of 8 km surrounding Pulau Redang, Terengganu was gazetted as a Fisheries Protected Area. In 1985, water areas of 3 km surrounding 21 islands in Terengganu (including Pulau Redang), Kedah, Pahang and Johor were also gazetted as Fisheries Protected Areas. These gazettements were made under the Fisheries Act of 1963.

The Fisheries Act of 1963 was later replaced by the Fisheries Act of 1985 with the objective, among others, to cater for the rapid expansion of the fishing industries and for the management, protection and conservation of marine habitats and other living marine resources such as corals, marine mammals and turtles. Under the Fisheries Act of 1985, a provision for the establishment of marine parks or marine reserves was made under Part IX – Marine Parks and Marine Reserve (Section 41 – 45).

The development of the MPA or marine parks in Malaysia is still in its "infancy stage" according to IUCN/WCPA categories. Coral rich areas as well as fisheries protected areas are only gazetted in 1994 as Marine Parks Malaysia. Under Section 41A - 41B of the Fisheries Act of 1985 (amended in 1993), a National Advisory Council for Marine Park and Marine Reserve was established. This Council is chaired by the Secretary

General of the Ministry of Agriculture and its members are representatives from various sectors such as environmental and business Non-Government Organization (NGOs), local universities, commercial firms, besides both Federal and State Government officers.

The functions of the Council are:

1. to determine the guidelines for the implementation at the national level with respect to protection, conservation, utilization, control, management and progress of the marine park and marine reserve areas;
2. to coordinate the development of any area of a marine park or marine reserve with the Federal Government and any corporate body; and
3. to give technical advice to the State Government with respect to any development project on any island which is situated in a marine park or marine reserve area.

The objectives of the Marine Parks Malaysia are:

1. To conserve and protect biological diversity of marine community and its habitats;
2. To upgrade and conserve the natural habitats of endangered species of aquatic life;
3. To establish specific management zones for the conservation of aquatic flora and fauna; and
4. To establish zones of recreational use consistent with the carrying capacity of the area. (Ramli et al., 2002).

Because of the peculiar situation in Malaysia, where land management is under the jurisdiction of the State Government, ensuring development on the islands does not

jeopardize the marine eco-system is an important issue. In order to ensure development projects on land are environment friendly, the Council has decided to advise each state which has marine parks to form its own committee to give advice to the State Government on matters which have impacts on the marine environment. In this way, it is hoped that development projects on islands would be properly planned and managed and would not harm the marine environment. The management of the marine parks in Peninsular Malaysia are as follows:

1. The Department of Fisheries Malaysia (a Federal agency) manages and administers all the Marine Parks Malaysia based on the broad policy guidelines set out by the Council.
2. The monitoring and enforcement work within the park area is done by the marine park rangers with the help of the Enforcement Unit of the Department of Fisheries. The park rangers, besides enforcing the laws, also do educational and awareness work, and other general maintenance and administrative tasks in the parks.
3. Research works in the parks are mostly done by the Research arm of the Department of Fisheries with the help of the park rangers. Scientists from local and foreign universities, as well as NGOs are also encouraged and allowed to carry out their research works in the parks.

A Marine Park Trust Fund has been established by the Government in 1987 with an initial grant of RM35,000,000 in order for the Department to start off the establishment and administration of the marine parks. Initially most of the fund was used to acquire assets like boats and vehicles and also to build infrastructure like the Marine Park Centres. However, since the mid 90's, monies from the Trust Fund have not been used

for such purposes but has been used mostly for the operation and maintenance of the parks (Department of Fisheries Malaysia, 2000). The regulations in the Trust Fund also allow the Department to collect donations from the public, as well as from any private companies. The Trust fund can also raise funds through economic activities like the selling of posters, T-shirts, books and others. Since the beginning of 1999 some of the marine parks have started collecting what is called a 'Conservation Charge' from visitors (Tourists) who take part in activities like snorkeling, scuba diving, etc. in the marine park waters. Although initially the Department faced some resistance from the private sector, especially the tour operators and chalet/hotel operators on this charge, the teething problems have now been solved and the Department is getting almost full cooperation from them now. Foreign tourists are often happy to pay once they understand what the fund is used for (Department of Fisheries Malaysia, 2000).

In October 1994, water areas of two nautical miles surrounding 38 islands in Kedah, Terengganu, Pahang, Johor and the Federal Territory of Labuan were gazetted as Marine Parks Malaysia. In 1998, two more islands in Terengganu were added to the list. The islands that have been gazetted as Payar Marine Parks comprise four islands namely Payar (the largest), Kaca, Lembu and Segantang; Redang Marine Parks comprises of nine islands, Redang Island is the largest, Pinang is much smaller and there are seven islets; Kerengga Besar, Kerengga Kecil, Paku Besar, Paku Kecil, Ekor Tebu, Ling (also called Chipor) and Lima; Tioman Marine Parks comprises of nine islands i.e. Tioman, Labas, Sepoi, Gut, Tokong Bahara, Chebeh, Tulai, Sembilang and Seri Buat; Johor Marine Parks comprises of 8 islands, Rawa, Babi Besar, Babi Hujung, Babi Tengah, Tinggi, Sibu, Aur and Pemanggil; three more marine parks managed by

the Sabah Park, the authority under the Sabah Ministry of Tourism and Environmental Development are Tiga Park, Tunku Abdul Rahman Park and Turtle Islands Park. (Refer to Appendix 2 for the map of the marine parks). For the purpose of our study, only three marine parks are chosen. The parks are described in the section below.

1.2.1.1 Payar Marine Park

Payar was declared a marine park in 1985. It covers 2 nautical miles off four little islands - Payar (the largest), Kaca, Lembu and Segantang. These islands can be accessed from three major points - Kuah, on Langkawi Island, Kuala Kedah and Penang, which takes about 30 to 45 minutes by boat. None of the islands are inhabited, except by on-duty officers of the Fisheries Department on Payar Island. This is due to the fact that the islands are small and lack freshwater. It can be visited all year round but the best time is from February until November.

The four islands of the Payar Marine Park are surrounded by coral reefs and entice visitors to swim, snorkel and scuba dive. The calm and clear water enables the visitors to enjoy the marine life. The average 30 - 50 feet visibility is favourable and ensures satisfaction for diving activity at all times. Payar itself has four sandy beaches totalling about 200 meters in length. Their shallow water is protected from the rough seas and is suitable for swimming and snorkelling. For divers, the marine park offers a variety of diving conditions; one can dive on a flat terrain to the east of Payar or on a steep slope to the west and around Segantang. On the south western tip of Payar there is an area known as the "Coral Garden". It is covered with brightly, multi-coloured soft-corals and

is an inspirational sight. There are also artificial reefs that consist of 3 tyre reefs and a boat reef. Any of these areas will ensure divers of an unforgettable experience because they are filled with various species of fish. Based on World Wide Fund for Nature Malaysia's (WWFM) marine park study, 36 genera of hard corals, 92 other marine invertebrates and 45 genera of fish are available in this marine park. There are also two hiking trails built for the visitors to explore the Payar Island for its flora and fauna.

As shown in Table 1.2, the number of visitors showed a tremendous increase through the years. In 1990, only 3,668 visitors visited Payar; but in 2002, a total of 133,775 tourists visited the island, a more than 30-fold increase, with more than 50 % being foreign visitors. This is because most of visitors come from Langkawi Island, the import duty-free island that is visited by foreigners throughout the year. The tour operator in Langkawi Island has promoted Payar Marine Park at almost all entry points to Langkawi.

Table 1.2: Number of Visitors to Payar Marine Park Center, 1990 – 2002

Year	Local Visitors	Foreign Visitors	Total
1990	1,993	1,675	3,668
1991	3,361	2,250	5,611
1992	4,165	5,293	9,458
1993	5,620	7,418	13,038
1994	11,983	20,192	32,175
1995	23,484	46,935	70,419
1996	25,254	65,053	90.307
1997	23,174	67,993	91,167
1998	19,869	67,423	87,292
1999	16,557	66,689	83,246
2000	19,944	86,836	106,780
2001	38,027	87,458	125,485
2002	56,259	77,516	133,775

Source: Fisheries Department, Malaysia

1.2.1.2 Redang Marine Park

The Redang archipelago, gazetted in 1985, is Malaysia's oldest marine park and the most studied. It comprises nine islands, Redang Island is the largest, Pinang is much smaller and there are seven islets; Kerengga Besar, Kerengga Kecil, Paku Besar, Paku Kecil, Ekor Tebu, Ling (also called Chipor) and Lima. Redang Island has a land area of about 25 square kilometers and is located about 45 kilometers from Kuala Terengganu off the east coast of Peninsular Malaysia. The best time to visit is from March until October. Other times, the park is not visited due to the monsoon that makes the sea a bit rough.

Redang is the largest of all the islands in this Marine Park. This island is very suitable for snorkelers and swimmers because of its crystal clear water filled with marine life. The white sandy beaches are also perfect for relaxation, picnics and camping. There are many resorts with rooms and chalets for rental to the public, many of which are of international standards. There is also a fishing village with most of its houses on stilts.

Situated at the southern tip of Redang, is Pinang. The calm and clear water surrounding this island provides enjoyable and spectacular spots for swimming, snorkeling and diving. The fishes around this island are not afraid of human beings and can be hand-fed. The sea surrounding this island is very popular with snorkelers because of its abundance of fishes and corals. The natural beauty of Ekor Tebu, Lima and Lang Tengah offers unforgettable excitement and experience for snorkelers and divers. The waters off these islands are rich in various species of soft and hard corals and fishes.

Redang Marine Park can be accessed from Kuala Terengganu by boat. Kuala Terengganu is accessible by air and road from Kuala Lumpur. Visitors can also take a boat from the Marang Jetty in Marang, Terengganu. The journey takes about one hour from the Kuala Terengganu Harbour and about 30 minutes from the Marang Jetty.

Of all the 9 islands, only Redang Island is inhabited. The first settlement was in 1977, at the estuary of the Redang River, which flows out to Teluk Siang. The settlement, wooden houses on stilts, was opened to accommodate villagers who had to move from Pinang Island because the village was over-polluted. Some 200 families resided in the village. Without proper garbage collection and sewerage system, the islanders dumped rubbish and waste into the water, causing seaweeds to outgrow and overwhelm the coral "colonies". In 1989, the village had to move once again. This time, it was to a new inland settlement at Hulu Redang, which is some 2 km away from the estuary. The new area is, more or less, a permanent residential site for the villagers. To date, there are about 2200 residents living in Redang Island (according to the local authority of Redang). Most of them worked as fisherman once but since Redang become a marine park and tourism site, a lot of them have worked in tourism areas such as working as tour operators, opening up small businesses or working in hotels.

As shown in Table 1.3 above, there were not even 1,000 visitors in 1990, but this increased to 63,826 in 2002, an 80-fold increased, with 88 % of the visitors being locals. This is due to lack of promotion of Redang Marine Park to foreigners.

Table 1.3: Number of Visitors to Redang Marine Park Center, 1990 – 2002

Year	Local Visitors	Foreign Visitors	Total
1990	577	130	707
1991	3,938	787	4,725
1992	4,930	1,131	6,061
1993	6,413	1,235	7,648
1994	6,379	1,970	8,349
1995	18,690	4,035	22,725
1996	26,988	7,755	34,743
1997	30,258	5,940	36,198
1998	30,274	7,282	37,556
1999	39,449	7,559	47,008
2000	43,390	9,244	52,634
2001	65,539	8,041	73,580
2002	56,263	7,563	63,826

Source: Fisheries Department, Malaysia

1.2.1.3 Tioman Marine Park

The Tioman Marine Park which is situated in the South China Sea, off Pahang is about 32 nautical miles (56 km) northeast from Mersing, Johore and consists of 9 islands i.e. Tioman, Labas, Sepoi, Gut, Tokong Bahara, Chebeh, Tulai, Sembilang and Seri Buat. Tioman is the biggest island among all, being 39 km long and 12 km wide and the most developed of the volcanic islands (Sepoi and Labas are uninhibited). Mountainous and covered in dense forest, Pulau Tioman is a haven for birds, bats, lizards and mouse deer.

The underwater topography is a combination of patches of coral gardens and huge granite boulders, many over 15m high, on sand. Some are quite bare though many are completely covered in colourful soft tree corals and small sea fans. Bluespotty Lagoon Rays (Taeniura lymma) are found hiding under every crevice and are unusually tame here.

The multitude of beautiful angelfish includes the Blue-ring Angelfish (Pomacanthus annularis) and the larger Six-banded Angelfish (Pomacanthus sextriatus), both are quite common here but rare elsewhere in Malaysia.

The rocky outcrop of Labas Island features some of the best reefs in the area and is well known for its splendid multicoloured soft corals. For the experienced diver, the Tiger Rock which has a large submerged reef is an attractive site with strong sweeping currents which bottoms out at 30m between Labas Island and Sepoi Island. The Magicienne Rock which is another submerged reef is located north of Tioman Island and lies in 10m of water. It is rarely visited which makes it worthwhile to dive where giant manta rays have been sighted.

There are also artificial reefs which consist of a tyre reef, a boat reef and a concrete reef which can be very popular with divers. The concrete reef is made up of 720 cuboid units of concrete measuring 1.2 x 1.2 x 1.2m and is located at Telok Air Batang at a depth of 25m and is near to the Marine Park Centre.

Tioman can be accessed from several points. The nearest point of departure is from Mersing, Johor. Fast ferry services are available from Tanjung Gemok in Pahang; Mersing in Johor and Singapore. Regular flights from Kuala Lumpur, Kuantan and Singapore are also available.

Table 1.4: Number of Visitors to Tioman Marine Park Center, 1991 – 2002

Year	Local Visitors	Foreign Visitors	Total
1991	27,234	85,682	112,916
1992	35,345	106,313	141,658
1993	29,823	92,270	122,093
1994	33,705	104,084	137,789
1995	34,263	131,783	166,046
1996	48,264	124,586	172,850
1997	51,428	131,221	182,649
1998	85,037	115,173	200,210
1999	74,257	110,697	184,954
2000	72,383	128,144	200,527
2001	127,675	115,377	243,052
2002	119,094	94,078	213,172

Source: Fisheries Department, Malaysia

For Tioman, it has been known worldwide even before 1990 and as can be seen in Table 1.4 above, foreign visitors are more than the locals in 1991. Local visitor seems to increased throughout the year and in 2001 they exceeded foreign visitors.

1.3 DAMAGE TO CORAL REEFS FROM HUMAN ACTIVITY

From the above, it is obvious that coral reefs accrue benefits to human. Unfortunately, corals are very delicate species with complicated ecosystems. Coral reefs support complex food and energy webs that are inter-linked with nutrient inputs from outside sources (such as those brought by ocean currents and run-off from nearby rivers) and from the reef itself (where natural predation and die-off recirculate organic matters). These complex webs mean that any effect on one group of individuals will ultimately impact another, and single disturbances can have multiple effects on reef inhabitants. For example, the complete eradication of the giant Triton Charonia trinis through

overfishing usually results in outbreaks of Crown-of-Thorns starfish Acanthaster planci. This in turn leads to massive coral mortalities as the starfish reproduce and feed on the coral polyps. Habitats and food sources for reef fishes are then reduced leading to declines in the population of larger predatory fishes. Below are a review of human disturbances and their general effects on coral reefs (Nicolas J. Pilcher).

1. Collection of corals

   Corals have been mined for construction purposes in several countries including Sudan and Saudi Arabia (Nicholas J. Pilcher), broken into manageable sizes or crushed for the manufacture of cement and lime. Corals are also collected for use in the ornamental trade as curios, souvenirs, or as jewellery. The aquarium industry is also responsible for coral collection, either for direct sale as live colonies or through the process of fish collecting.

   The removal of coral colonies decreases the shelter and niche areas available to numerous other reef inhabitants. Juvenile stages of fishes that seek shelter among the branching species of corals, and worms and ascidians that take up residence on life-forms, are deprived of protection and refuges and may become prey to other reef organisms. Furthermore, the removal of entire colonies reduces the overall structural stability of the reef, and increases the rates of erosion from wave damage.

2. Destructive Fishing

   Destructive fishing, also known as fish bombing or dynamite fishing, has been reported from almost all countries in the Southeast Asia region (McAllister, 1988; Pet-Soede et al., 1999; Oakley et al., 1999) as well as in the Middle East (Riegl and

Luke, 1998). At present, this is done with the use of home-made explosives composed of fertilisers such as ammonium and potassium nitrate, kerosene (fuel oil) and fuse caps inserted into empty bottles (Woodman et al., 2003). Blast-fishers hunt for schooling reef fish, which aggregate in groups in the open or hide under large coral heads. The bombs are usually dropped into the centre of an area judged to have many fish and after the bomb has exploded the fishermen use dip nets to collect the stunned and dying fish (Pet-Soede et al., 1999). Fish blasting at high intensity is particularly destructive because it transforms a reef from a productive and solid structure to an area of mobile rubble instead of a reef crest and upper reef slope that takes years to recover (Woodman et al., 2003). The blasts change the three-dimensional structure of reefs, and the blasted areas no longer provide food or shelter to reef inhabitants. Further, once the reef structure has been weakened or destroyed by blast fishing, it is much more susceptible to wave action and the reef is unable to maintain its role in coastline protection (Pet-Soede et al., 1999). Larvae do not settle on rubble and thus replenishment and rehabilitation is minimal.

One of the most destructive fishing methods involves the use of cyanide. An aqueous solution of sodium cyanide or other chemical is squirted at fish to stun them, after which they are collected and sold to the live-fish trade. In the process of stunning the fish, the cyanide affects corals, small fish and invertebrates. A solution, which is narcotising to large fish, is often lethal to smaller ones (Kolm and Berglund, 2003). Cyanide has also been shown to limit coral growth, cause diseases, bleaching, and ultimately, in many coral species, leads to death.

3. Discharges of Pollution

Uncontrolled and unregulated discharge of industrial and domestic effluents can affect localised reef areas, rather than causing broad-scale reef mortality. Discharges may release chemicals that are debilitating, toxic, or lead to a change in the environmental conditions. The release of fluids high in organic matter or nutrients, such as sewage or abattoir refuse can lead to a phenomenon known as eutrophication (Walker and Ormond, 1982; McClanahan, 2002). Excessive quantities of algae may grow, stimulated by the high nutrient levels. When these die, the bacteria that cause decomposition can deplete the water of oxygen to such an extent that it becomes impossible for corals and other animals to survive. Raw sewage can also result in tumours on fish, and erosion of fins from the high concentrations of bacteria that develop.

Industrial effluents also impact coral reefs and their associated fauna and habitats. Discharge of heavy metals may give rise to elevated levels of lead, mercury or copper in bivalves and fish, or elevated levels of cadmium, vanadium and zinc in sediments. Larval stages of crustaceans and fish are particularly affected, and effluents often inhibit the growth of phytoplankton, resulting in a lack of zooplankton, a major food source for corals.

4. Solid Waste Dumping

Plastics, metal, wood, rubber, and glass can all be found littering coral reefs. These wastes are often non-biodegradable, or persist over long periods of time, causing damage which is primarily of a physical nature. Solid wastes damage coral colonies

at the time of dumping, and thereafter through movements with natural tidal and surge action.

5. Construction

Construction activities include coastal reclamation works, port development, dredging, and urban and industrial development. Commercial and residential property development in Jeddah have filled in reef lagoon areas out to the reef crest and bulldozed rocks over the reef crest for protection against erosion and wave action. 'Landfill' activities of this type generally result in increased levels of sedimentation as soil is nearly always dumped without the benefit of screens or silt barriers. Coral polyps, although able to withstand moderate sediment loading, cannot displace heavier loads and perish through suffocation (Sladek Nowlis, 2001; Nemeth and Nowlis, 2001).

The development of ports and marinas also involves dredging deep channels through reef areas for safe navigation and berthing, and damages reefs through the direct removal of coral colonies, sediment fallout, and disruption of the normal current patterns on which the reefs depend for nutrients.

6. Port Activities

Port activities can have adverse effects on nearby reefs through spills of bulk cargoes and petrochemicals. Fertilisers, phosphates, manganese and bauxite are often loaded and offloaded using massive mechanical grabs which spill a little of their contents on each haul. The input of these nutrients inhibits calcification and

increases sedimentation. Algal blooms also develop through input of nutrients (nitrogen and phosphorous compounds), limiting light penetration and depleting dissolved oxygen (Guzman and Holst, 1993; Negri et al., 2002).

7. Recreation

The recreation industry has caused small but significant localised damage to coral reefs (Garrabou et al., 1998) but the effect can be very severe where tourists especially those lacking of understanding about the delicacy of the corals can damage the corals. Large increases in tourism market have been accompanied by concerns about deterioration of marine parks caused by diving and snorkelling (Ward, 1990; Hawkins and Roberts, 1993; Davis et al., 1995; Inglis et al., 1999; Plathong et al., 2000; in Rouphael and Inglis, 2001). There are proofs of tourists stepping on the corals while snorkelling and divers accidentally bruise corals with their hands, body, equipment and fins while diving near the corals (Rouphael and Inglis, 2001).

8. Indirect Effects

Most anthropogenic effects and disturbances to coral reefs are easily identifiable. Blast debris and lost fishing nets can be seen. Pollutant levels and sediment loads can be measured. However, many other man-made or induced problems have indirect impacts on coral reefs that are both problematic to link directly to coral mortality and difficult to quantify. Agricultural practices and logging, for instance, contribute to coral reef degradation through the runoff of sediment, fertilisers and

pesticides. These result in the smothering of corals, limited larval settlement and localised nutrient enrichment.

Global warming, resulting from the greenhouse effect and the build-up of carbon dioxide in the atmosphere, might also kill corals. The extensive coral-bleaching event that took place in 1998, which was particularly severe in the Indian Ocean region, is accepted as having been the result of a rise in sea surface temperature. Bleaching of coral colonies occurs through the expulsion of zooxanthellae as coral polyps become stressed by adverse thermal gradients. If not matched by coral growth, this will mean that corals will be submerged deeper and will not receive the levels of sunlight required for photosynthesis by the zooxanthellae. Additionally, the ability of coral reefs to protect coastlines from erosion will be lost if the waves are able to wash over the newly submerged reefs.

According to a report from WTO, more than a quarter of the world's reefs are at high risk, and just under a third of these habitats are at moderate risk, from human disturbance (Bryant et al., 1998). Of the four broad categories of potential threat to coral reefs evaluated (overexploitation of marine resources, coastal development, inland pollution and marine pollution), overexploitation of marine resources, including destructive fishing practices, and coastal development present the greatest threat. Globally, 36 percent of all reefs were classified as threatened by overexploitation, 30 percent by coastal development, 22 percent by inland pollution and erosion, and 12 percent by marine pollution. When these threats are combined, 58 percent of the world's reefs are at risk (defined as medium and high risk) (Bryant et al., 1998).

Most disturbing is the status of reefs in Southeast Asia -- a global hot spot of coral and fish diversity. As with tropical rainforests in this region, reef ecosystems are under tremendous threat. More than 80 percent of these ecosystems are potentially at risk (under medium and high potential threat) primarily from coastal development, overfishing, and destructive fishing practices (Bryant et al., 1998).

1.4 RESEARCH QUESTIONS

This study concentrates on two of the issues of coral destruction; the effects of inland development, and the effect of too many tourists. This study concentrates on these two issues because as mentioned above, most damage to corals are caused by uncontrolled inland development, and human activities. Even though Payar, Tioman and Redang had been gazetted as Marine Parks, areas that are protected under Part IX of the Fisheries Act are only the water areas of two nautical miles surrounding the islands. While the functions relating to the Marine Parks are exercised by the Fisheries Department constituted under the federal-level Ministry of Agriculture and Agro-based Industry, the land areas are under the jurisdiction of state governments. The state governments are free to approve logging activities or developmental projects on islands or coastal areas adjacent to existing marine parks.

Several examples amply illustrate these problems. As an example, in January 2002, the government of Malaysia has announced that Tioman Island which located in Pahang state is to be a duty free island with huge development projects to be built on the island; such as an airport, with a 2km-long runway and a terminal that will be built on

reclaimed land in Kampung Paya. These development projects conflict with the earlier objective of creating a marine park at Tioman Island. The second example is the controversy over the proposed yachting marina on Tioman Island in 2004 (Star (Malaysia), 2004). The marina project was championed by the Marine Department of the Ministry of Transport and the Pahang state government, even though it had been heavily criticized by the Ministry of Natural Resources and Environment for its potential harmful effects. Following public outcry nationwide, the project was put on hold while the Marine Department conducted further study on its feasibility. But in 2005, it has been reported that the project's EIA had been approved (Star (Malaysia), 2005).

The third example happened to Payar Island. In August 2002, the State Government of Kedah has approved a project of 15 luxurious day-use chalets to be built on the slope of the hill close to the shore without carrying any EIA report. The fourth example happened in Redang. In Redang, development is still in a slow pace but the progress of construction of chalets and hotels are extensive. An example is the development of a 212-room resort that started construction in end of 2002 reported a vast violation of DOE (Department of Environment) guidelines and regulations as reported in The Star, April 15, 2003. These examples show that there is no coordination among the government agencies to make sure that their roles and functions do not conflict.

Therefore, this study seeks to find out the opinion of visitors to these three marine parks regarding the development level of the parks and what they really wanted the parks to be. The authority should be made aware of the needs of visitors to marine parks. Do the

visitors want the islands to be developed with five star facilities, or do they want the parks to be left alone in its natural state? This is crucial if the Malaysian government still wants marine parks to be one of the tourist attractions in this country. They should be made aware that any damage done is irreversible and more thorough studies should be carefully done before any projects are approved.

The crowding issue is raised by our study due to the tremendous increase of visitors to these marine parks as shown in Table 1.5. The effect of too many people around the coral reefs can be very severe when tourists who lack understanding about the delicacy of the corals can damage the corals. Tourists may step on the corals while snorkelling and divers may accidentally bruise corals whilst diving.

Table 1.5: Number of Visitors to Payar, Redang and Tioman Marine Parks 1990 - 2002

Year	Payar	Redang	Tioman
1990	3,668	707	n.a
1991	5,611	4,725	112,916
1992	9,458	6,061	141,658
1993	13,038	7,648	122,093
1994	32,175	8,349	137,789
1995	70,419	22,725	166,046
1996	90,307	34,743	172,850
1997	91,167	36,198	182,649
1998	87,292	37,556	200,210
1999	83,246	47,008	184,954
2000	106,780	52,634	200,527
2001	125,485	73,580	243,052
2002	133,775	63,826	213,172

Source: Department of Fisheries Malaysia

Payar is over-visited if the number of visitors is compared to the size of the beach area. Li Ching Lim (1998), in her study on carrying capacity in Payar Marine Park found that

the majority of tourists interviewed said that it was crowded at the Marine Park, especially at the picnic area at the Marine Park Centre itself (64.47%) and 48.93% said it is crowded in the water area for snorkelling.

Divers can damage reefs in several ways. A study by Hawkins (1991) at three very popular Red Sea dive sites recorded several key attributes (numbers of hard coral species, colonies, broken coral, loose fragments of coral and abraded coral) at the three sites. They did the same for several non dived sites to be used for comparison, monitoring all sites for a year. The study found significant differences between the dived and non dived sites, the former containing more damaged coral, thus indicating that divers do cause damage to coral reef systems (Hawkins and Roberts, 1993). This damage can cause the corals to be unable to fight off disease and parasites (Richmond, 1993).

Hawkins and Roberts did a second study in 1993 that looked at the effects of coral flats trampling by divers and snorkel, comparing a trampled to an un-trampled area. The trampled areas were those where divers and snorkel walked out over the reef flats to reach deeper water. Hawkins discovered that while the divers damaged the flats uniformly, the snorkellers caused more uneven, very patchy damage by standing up on the coral. While doing so, the snorkellers would have trouble controlling their fins and caused coral damage in this way. The snorkeller damage was spread over the coral flats because of the snorkeling activities, while the divers followed a narrow path to deep water (Hawkins and Roberts, 1993).

Rouphael and Inglis (2001) also found that the increasing popularity of scuba diving has put more strain on coral reefs around the world. Divers frequently make contact with fragile corals, breaking them or damaging their fragile tissue surface, leaving them susceptible to bacterial attack and disease. Observations on damage to corals by underwater photographers and recreational divers (Rouphael and Inglis, 2001) found that:

- 15% of divers damaged or broke corals
- 95% of damage occurred by fin kicks
- Divers without cameras averaged 0.3 breaks per 10 minutes
- Divers with cameras averaged 1.6 breaks per 10 minutes

As our understanding of corals and coral reefs increases, it becomes apparent that the effects of the human population on these communities may be increasing as well. Fortunately, many of the human induced hazards to coral reefs can be remedied (Richmond, 1993). To reduce hazards caused by human activities, funding is needed. As known, funding from government is never adequate to meet al.l funding needs for providing recreation services on public land. A recreation access fee is one of the answers to this problem. Recreation access fees will not only help in providing funds, but can also be used to control the number of visitors because an uncontrolled scale and style of tourism development could destroy natural resources.

Despite knowing that human activities can cause danger to coral reefs, the Malaysian government policy does nothing to control these activities but increasing the tourist

influx to these parks instead. This can be seen in campaigns done by the Ministry of Tourism Malaysia to attract more tourists to Malaysia in the years 1990, 1993 and 2007. Even though in 1999 an entry fee has started to be charged to tourists, it is done in an effort to be self-sufficient, not to control the number of tourist influx. In addition, the charges are very minimal, with a fee of RM5.00 per visit for local and foreign adult tourists and RM2.50 per visit for children below 12 years old. Payar was the first to make the collection in January 1999, followed by Redang in March and Tioman in June the same year. The charge has produced an income to the Fisheries Department to be used in the management of the parks. Below are the collections from fees in three of the marine parks.

Table 1.6 Collections from Entrance Fee in Three Marine Parks 1999 – 2003

Year	Payar	Redang	Tioman*
1999	407,505.00	163,050.00	246,240.00
2000	543,175.50	147,787.00	432,724.50
2001	599,657.50	204.152.50	438,990.00
2002	638,225.00	154,808.00	353,459.50
2003	541,127.50^	176,031.00^	170,545.50#

Source : Marine Park Centre, Fisheries Department Malaysia
*an estimates
#until July 2003 only
^starting September, the children fee has been reduced to RM2.00

The charges are minimal and are standard for all visitors, foreign or local, unlike many developing countries, like Costa Rica, who charged differently for foreign and local visitors. From past studies, it is shown that foreign visitors gain more from nature-based

tourism and are also willing to pay more. Demand from foreign visitors may also be less price-elastic (Lindberg and Aylward, 1999). One of our aim in this study is to see whether in the case of Malaysia, foreign visitors are willing to pay more than the local visitors and if yes, then by how much.

This research therefore seeks to estimate the willingness-to-pay of the visitors to the marine parks in Malaysia. Specifically, the questions this research seeks to answer are:

1. Are current charges optimal? Or are visitors willing to pay more?
2. Will changes in prices (entrance fee) will affect the visitation rate and if so, by how much?
3. Is there any difference between foreign and local visitors in their WTP and to what extent?
4. Is there any difference between the WTP to reduce crowding and the WTP to reduce inland development, and by how much?
5. Which attributes exert more influence in the decision of making trips to marine parks?
6. Can the authority charge different charges for different parks or should they charge the same for all parks?
7. Do attributes such as over-crowding influence the entrance fee?
8. Can pricing reduce the over-crowding effect in the marine parks in Malaysia?

CHAPTER 2

REVEALED AND STATED PREFERENCE APPROACHES TO ENVIRONMENTAL VALUATION

2.1 BACKGROUND

Environmental debates have raged around the world since the early 1970's (Ward and Beal, 2000). One major issue in such debates has been the appropriate use of natural environments at all levels. The political process often suffers from the problem that little is done about an environmental issue until it becomes acute (Ward and Beal, 2000). Nevertheless, concern about environmental degradation has reached the world political stage e.g. the 1992 Rio Earth Summit; and the 1997 International Conference on Greenhouse Gas Emissions Trading, held in Kyoto, Japan.

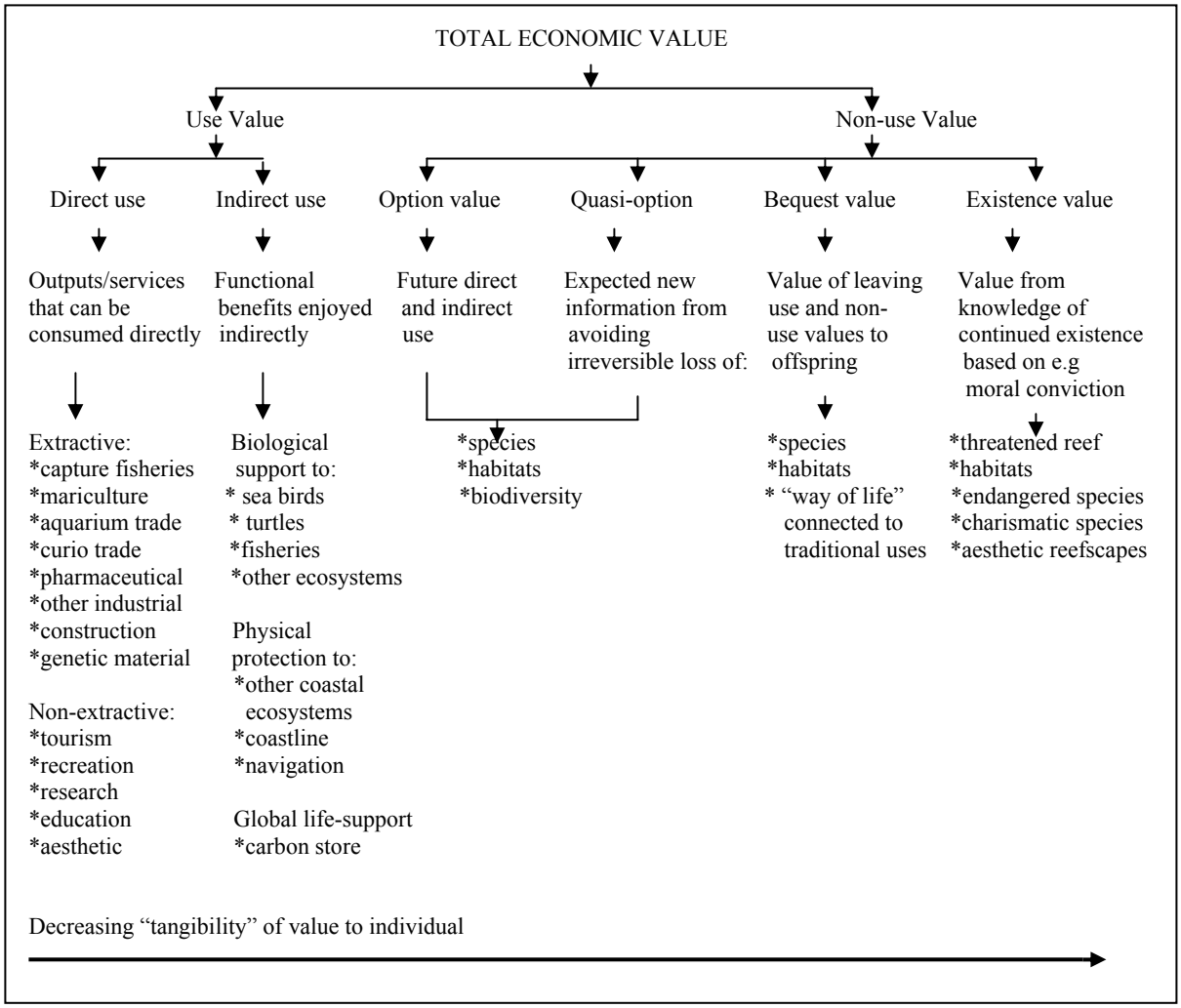
However, the fluctuating importance attached to the environment by governments also reflects the inherent problem facing the public sector, namely quantifying and comparing benefits arising from spending in a diversity of areas and thus maximising the welfare of society. Where a policy affects goods and services that are traded in normal markets, changes in prices and income can be linked to consumer behaviour. But in the absence of an observable market how can the benefits of health care, education or protection of the environment be compared?

A solution to this problem involves defining the benefits arising from differing sectors in terms of a single unit, money. In the context of recreation benefits arising from natural resources, this approach was first suggested in the 1940's (King, 1995). This development stems from a belief that unless the value of natural resources is expressed in monetary units, it will continue to be assigned a zero value, and will not therefore be incorporated into the decision making process. Money may not be ideal but, as it has been argued by Mitchell (1969) monetary valuation is a means of systemising and rationalising behaviour.

The valuation of Marine Protected Areas (MPA) using money values is important since establishing marine protected areas does not come without a price: marine parks require buildings, boats, administration, and field personnel; and protection has opportunity costs in terms of development benefits forgone. To convince the policy maker to establish marine parks, one has to show that the benefits outweigh the cost of protection.

Traditionally, the economic valuation of marine ecosystems has focused almost entirely on commercial fishing and tourism that can easily be measured in monetary terms. Although these sources of income still play an important role in economic valuation, it is now increasingly recognized that marine economic benefits extend far beyond these direct values. Looking at fisheries and tourism alone hugely underestimates the economic importance of marine ecosystems.

Figure 2.1: Economic Values Attributed to a Coral Reef Environment



Source: Barton, 1994 in Hoagland et al. (1995)

The benefits from MPA can be measured by the "total economic value" that comprises use and non-use values. Use values can in turn be broken down into direct use, indirect use and option values. Generally, values identified in Figure 2.1 as direct uses are those most likely to be observable in markets. However, not all direct uses are market-observable. For example, the benefits resulting from research uses are not always traded through markets. Further, some non-use values are incorporated into marketable commodities, such as aesthetic views from coastal properties. Indirect use values

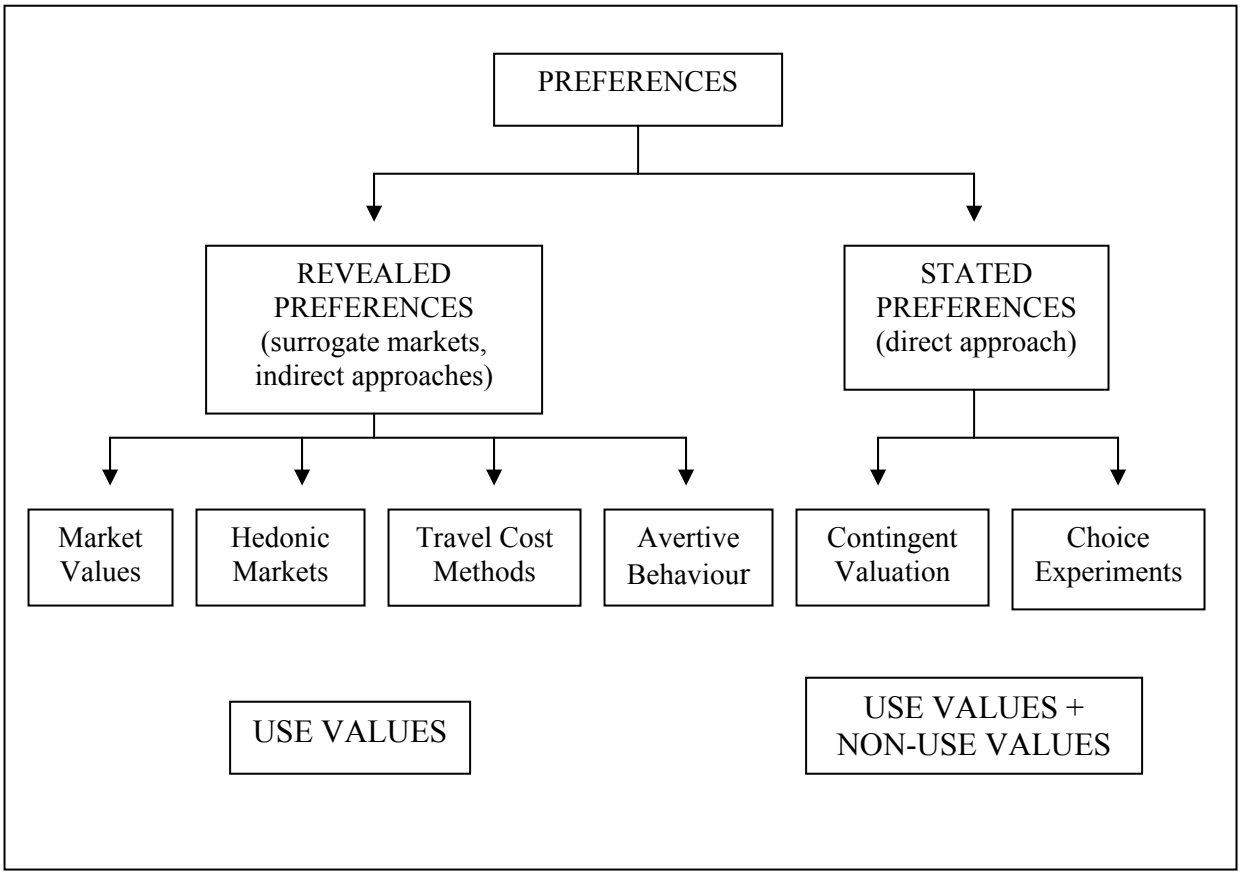
correspond closely to the ecologist's concept of 'ecological functions' (Georgiou et al., 1997). For example, MPA can be a biological support to fisheries, turtles, and sea birds.

Option value relates to the amount that individuals would be willing to pay to conserve an environmental asset for future use. That is, no use is made of it now but use may be made of it in the future. Option value is thus similar to an insurance premium to ensure the supply of something, the availability of which would otherwise be uncertain. A rather new thinking is to treat option value as use value under uncertainty (Ready, 1995). According to Ready regarding policy analysis, for example, in keeping a park open or close, an individual is faced with uncertain future preferences; that is, each individual "wants to visit the park", or "does not want to visit the park". There are two situation in this case, the ex ante and ex post situation. Ex ante refers to the situation where the state of the world is still unknown. Ex post refers to the situation after the state has been revealed. The policy decision must be made ex ante where we do not know which state will occur. Compensating surplus is an ex post welfare measure, in that it measures the amount of money that must be added or subtracted from an individual's income to leave that person as well off, according to their ex post utility function, as they would be under the baseline. Option price is an ex ante welfare measure, using the ex ante utility function to measure willingness to pay. Option value does not represent a separate category of benefits but it is simply the difference between an ex ante measure of benefits and the expected value of an ex post measure.

In theory, motivations for non-use value can be sub-divided into existence and bequest values. Existence value measures the WTP for the preservation of an environmental

asset that is not related either to current or optional use. Its intuitive basis is easy to understand because a great many people reveal their WTP for the existence of environmental assets through wildlife and other environmental charities, without taking part in the direct use of the wildlife through recreation. Bequest value measures an individual's WTP to ensure that an environmental resource is preserved for the benefit of his or her descendants.

Figure 2.2: Environmental Valuation Methods



Source: Garrod and Willis (1999)

Broadly, there are two ways of estimating the economic values attached to non-marketed goods and services (and bads). Methods are usually categorised into stated

and revealed preference approaches. The approaches and how they are related is illustrated in Figure 2.2. Stated preference approaches are based on constructed markets, i.e. by asking people what economic value they attach to those goods and services. In other words, the economic value is revealed through a hypothetical market based on questionnaires. The Contingent Valuation Method (CVM) has been widely used to estimate WTP and a more recent approach is the Choice Experiment approach. Examples of studies using choice experiment approach can be found in Hanley et al. (2002) for climbing in Scotland and Boxall and Macnab (2000) for wildlife preferences.

Revealed preference approaches are a possible alternative to CVM and Choice Experiments for modelling demand for environmental goods. There are a few techniques in this approach such as Travel Cost Method (TCM), Averting Behaviour Approach, and Hedonic Price Method (HPM). The HPM is based on consumer theory which postulates that every good provides a bundle of characteristics or attributes. Market goods can be regarded as intermediate inputs into the production of the more basic attributes that individuals really demand. The demand for goods, for example housing, can therefore be considered as a derived demand. A house, yield shelter, but through its location also yields access to different attributes such as different quantity and quality of public services (such as schools, shopping facilities, etc.) and different quantity and quality of environmental goods (such as open space, peace and quiet, sceneries, etc.). As the theory of demand predicts, the price of a house is determined by a number of factors: structural characteristics such as number of rooms, plot size, etc.; and the environmental characteristics of the area. Controlling for the non-environmental characteristics which affect the demand for housing permits the implicit price that

individuals are willing to pay to consume the environmental characteristics associated with the house to be estimated.

Averting Behaviour Approach assesses the value of non-marketed commodities such as cleaner air and water, through the amounts individuals are willing to pay for market goods and services to mitigate an environmental externality, or to prevent a utility loss from environmental degradation, or to change their behaviour to acquire greater environmental quality. For example, people may install air purifiers in their homes to improve air quality; or they might install double glazed doors and windows to prevent road traffic noise in their homes. Where such preventative and mitigatory expenditure is made by individuals or private conservation groups, then there may be a reasonable expectation that the benefits derived exceed that expenditure, or at least equal it at the margin.

The TCM is primarily employed to estimate the demand or marginal valuation curve for recreation sites. Entry to many recreation sites is either free or are charged a minimum fee. However, individuals need to purchase a private good, such as transportation service, to gain access to the recreation site. Using information such as the distance a respondent travels to sites, time consumed at the site, and the physical attributes of sites, a demand curve is derived. The demand curve establishes a relationship between the price of a good (or cost of visit) and the quantity of the good consumed or offered. Detailed discussions on the TCM are presented below.

2.2 TRAVEL COST METHOD (TCM)

TCM has been applied to estimate the demand and consumer surplus for wildlife and nature conservation at recreation sites. The demand for a park is estimated by determining the change in visits as the cost per visit is changed. Visits are recorded for each price of visiting. The total visits are plotted on a price-quantity space to derive a hypothetical demand curve for the park itself. The data set can be used to estimate a trip-generating equation such that visits to a recreational facility (e.g. a park) depend on, among other things, the costs of using the facility. These costs are the sum of the costs of getting to the recreation site and the costs of using it once there. The estimated marginal response rate of visits to such costs is then used, along with hypothetical increases in the direct cost of use, to simulate a demand curve for the recreational resource itself.

This approach was first suggested by Harold Hotelling in 1947 (Ward and Beal, 2000) in a release on the economics of recreation in US national parks by the National Park Service. The Service wanted to know how economic principles could be used to demonstrate economic values produced by national parks in the hope that parks could be shown to produce benefits exceeding costs to taxpayers.

Hotelling suggested measuring differential travel rates according to travel distances that visitors overcome to reach a park. Exploiting the empirical relationship between increased travel distances and the associated declining visitation rates should permit one to estimate a true demand relationship. If estimated empirically, this demand schedule

could be used to compute the total benefits produced to park visitors, which were equal to any entry fees they paid plus their remaining unpriced benefits, called consumer surplus (Hotelling, 1949).

Since then, the methodology was developed by others, including Clawson (1959); and Clawson and Knetsch (1966). TCM studies have consistently shown that as the price of access (cost of travel) increases, the visit rate to site falls (Garrod and Willis, 1999). The TCM is usually estimated as a trip generating function such as the following:

$$V = f(P,S)$$

Where V is the visit rate, P is the cost of travel to the site and S is a vector of travel costs to substitute sites.

There are two types of data used in the TCM. One, developed by Clawson (1959), is to estimate a travel-cost model based on data relating to the zones of origin of site visitors. The zonal travel-cost model (ZTCM) approach defines the trip generating function as:

$V_i = f\ (P_i, C_i, Y_i, R_i)$ where;

$C_i = g\ (D_i, T_i, A)$

where V_i = the number of visits from the *i*th origin; P_i = the population of the *i*th origin; C_i = the costs incurred in use from the *i*th origin; R_i = some index of alternative sites available to visitors from the *i*th origin; D_i = distance from the *i*th origin; Y_i = some index of income levels at the *i*th origin; T_i = travel time required to travel to the site from the *i*th origin; A = the admission charge or user fee.

Here, the WTP is proxied by the distance from the *i*th origin. That is, willingness to travel can be converted into WTP at some cost of travel per unit distance.

Clawson and Knetsch (1966) set the function as:

$$V_{hj}/N_h = f(P_{hj}, SOC_h, SUB_h)$$

where V_{hj}/N_h = the participation rate of zone *h* (visits per capita to the site *j*); P_{hj} = the cost of travel from zone *h* to site *j*; SOC_h = a vector of the socio-economic characteristics of zone *h*; SUB_h = a vector of substitute recreational site characteristics for individuals in zone *h*.

In the ZTCM, data are collected on site, recording the point of origin of visitors and the number of visits made to the site in a given period. The area surrounding the site is then divided into various zones of origin each of which has an associated average travel cost to the site.

The zonal methodology suffers from some weaknesses. One weakness is the omission of a travel time variable because it is often highly correlated with travel cost. Another weakness is the loss of information efficiency. This is due to the aggregation and averaging process necessary to estimate zonal values. The demographic characteristics of consumers like age, sex, family composition, income, education, and occupation are aggregated and averaged and can thus differ very little among zones (Ward and Beal, 2000). Another weakness is the weak link to demand theory, as the ZTCM is not based on individual behaviour.

Another method is the individual travel-cost method (ITCM) which can be estimated using the following function (Garrod and Willis, 1999):

$$V_{ij} = f(P_{ij}, T_{ij}, Q_j, S_j, Y_i)$$

Where V_{ij} = the number of visits made by individual *i* to site *j*; P_{ij} = the travel cost incurred by individual *i* when visiting site *j*; T_{ij} = the time cost incurred by individual *i* when visiting site *j*; Q = a vector of the (perceived) qualities of recreation site *j*; S_j = a vector of the characteristics of available substitute sites; Y_i = household income of individual *i*.

Another ITCM model used the numbers of days on site instead of number of visits to the site as a measure of annual trips. This is done, according to Dharmaratne and Brathwaite (1998) because there is sometimes no (or very little) variation in the number of trips across individuals, where most visitors visit only once. The same approach has been used by Kealy and Bishop (1986) to estimate the welfare anglers derive from recreational fishing in Lake Michigan; and Bell and Leeworthy (1986) to value Florida saltwater beaches for tourism.

From Dharmaratne and Brathwaite (1998), a visitor's decision of how much time (days) to spend on the island could be formally presented as a utility maximization problem.

$$\max U = U(D,X)$$

s.t. $Y = C_d D + P_x X,$

where D is the number of days and C_d is the cost per day. X is a composite good to identify all other goods, P_x is the normalized price of the composite good, and Y is disposable income.

The procedure undertaken within the ITCM requires researchers to undertake an on-site questionnaire survey of visitors aimed at eliciting estimates of household or individual visit frequencies over a given time period, plus information on the cost of travel to the site, recreational preferences, use of substitute sites, and socio-economic characteristics. These data are used to derive a demand curve from which consumer surplus may be estimated. Less frequently, household surveys may be undertaken to sample those who do not currently visit the site.

Consumer surplus of q visits may be estimated by integrating under the demand curve between zero and q. Once per person consumer surplus has been estimated it can be aggregated across all persons visiting the site.

The distinct advantage of the ITCM is that it takes more account of the inherent variation in the data, rather than relying on aggregate data as in the ZTCM. In theory, the use of individual data means that it is possible to look at the benefits generated by site visits to individuals undertaking specific types of recreational activity. For example, for a study of visits to Marine Park, it would be possible to estimate the consumer

surplus associated with households undertaking activities such as diving; snorkelling; or relaxing.

Walsh et al. (1992) (in Ward and Beal, 2000), have surveyed published and unpublished empirical studies in the US and found that 156 studies had been completed using the TCM during the period 1968 – 88. In their meta-analysis, one of the variables found to be significant at the 10 percent level or greater is whether individual or zonal data were employed (among other things such as site quality and substitute price). They found out that the use of individual data tended to increase the estimated value of consumer benefit in comparison with the use of zonal data.

Many alternative functional forms have been used in the literature for the trip generating function. Economic theory does not suggest any particular functional form for TCMs. The most common practice is to statistically test various functional forms such as:

Linear	$v = a + \beta P$
Log-linear	$\log v = a + \beta P$
Negative exponential	$v = a + \beta \log P$
Double log	$\log v = a + \beta \log P$
Hyperbolic (reciprocal)	$v = a + \beta\ 1/P$

To choose the most appropriate functional form of the TCM, a number of statistical criteria should be taken into consideration, such as R^2; the predicted total number of

visitors compared with the actual number; and the correlation between the distribution of predicted and actual visit rates across zones. Economic theory can also assist in the choice between models by comparing model results with those expected in theory, according to which variables are statistically significant in the model and their respective signs.

The assumptions underlying the functional forms also need to be considered. The linear functional form, for example, implies finite visits at zero cost but has a critical cost above which the model predicts that negative visits will be demanded. This may not always be detrimental in practice, but can cause certain problems in the statistical interpretation of the demand curve.

Logarithmic forms have the advantage that they may be more easily used to calculate demand elasticities. Less advantageously, the double-log functional form implies infinite visits per head at zero cost. The log linear, or semi-log dependent functional form, is widely used in TCM studies. It implies a finite number of visits at zero cost and never predicts negative visits even at very high costs. By contrast the negative exponential (or semi-log independent) functional form implies an infinite number of visits at zero cost, and like the linear form has a critical cost above which a negative number of visits are predicted.

A study by Bell and Leeworthy (1990) found that the simple linear form was the best fit model for their data:

$BDAYS$ = 4,9565 – 0.06073 POS + 0.0458 $TCPT$ + 0.000086 Y + 0.07534 $OTHD$ – 0.51506 AGE + 0.00712 $AGESQ$ + 2.085 $CROW$D – 0.45687 $PARK$

R^2_{adj} = 0.174; F = 22.65; N = 826,

Where $BDAYS$ = number of beach days consumed over the entire time period; POS = price or actual on-site cost per day; TCPT is the total travel cost per trip to the beach; $OTHD$ = days spent in other, non-beach-related recreational activities; $CROWD$ and $PARK$ = vectors of crowdedness for saltwater beaches and of adequacy of parking. The socioeconomic vector contains income Y and age AGE or age squared $AGESQ$.

Many more studies, for example Anex (1995) used a semi-log model following other literature such as Ziemer et al. (1980), Vaughan et al. (1982), Strong (1983) and Willis and Garrod (1991). The demand model has the form:

$$\text{Ln}(Q_{ij}/Pi) = \beta_0 + \beta_1 E_i + \beta_2 I_i + \beta_3 S_i + \beta_4 TC_{ij} + e_{ij}$$

Where Q_{ij} = number of trips from zone i to site j

P_i = number of households in zone i

E_i =educational attainment of population of zone i (i.e. percentage of population over 25 years having a B.Sc. or higher degree)

I_i = average household income of zone i

S_i = average roundtrip travel costs from zone I to substitute site

TC_{ij} = average roundtrip travel costs from zone I to site j

e_{ij} = error term

Alternatively, P_i may be included as a right-hand side variable. This model includes among the independent variables, the average travel cost to the nearest substitution site. This is due to findings by Smith et al. (1983) and Bockstael et al. (1991) which state that omitting substitute prices would make the welfare measure estimates biased since substitute prices are often correlated with own price and the demand function is defined as demand as a function of own price change, ceteris paribus.

Rather than using OLS, many authors have used count data models in travel cost analysis (Shrestha et al., 2002; Feather et al., 1995; Hausman et al., 1995, Hellerstein, 1991). The drawback of ordinary least squares is that it implies a continuous dependent variable. Furthermore, trips occur in nonnegative quantities and failure to control for this censoring will lead to biased estimation. Since trips are available only in integer quantities, therefore the usual demand models which correlate marginal quantity with marginal price, may not be the most applicable (Hellerstein, 1991), so count models such as the Poisson or Negative Binomial are used.

In count data models, the study implicitly estimates the "daily" probability of the recreator choosing to visit. Increasing the travel cost will reduce the probability of a visit on any given day. Following Small and Rosen (1981), integrating over these price changes yields a measure of the compensating variation. Extending these results to the repeated choice context yields a consumer surplus measure over an entire season (Hellerstein and Mendelsohn, 1993).

Given this background, we concentrate on estimating the expected value of trip demand. Furthermore, as a result of repeated discrete choice, the number of observed trips will follow a Poisson distribution. Formally, the expected value of demand is

$$E(Y) = f(P, Z; \beta)$$

Where

$E(Y)$ = the expected number of trips taken per season,

P, Z, = explanatory variables including travel cost to site (P) and demand shift variables (Z), such as income and travel costs to substitute sites, and

β = a vector of coefficients.

The Poisson probability distribution of demand is

(1) $\text{Prob}(Y = n; n = 0,1,2,\ldots) = \exp(-\lambda)\lambda n/n!$ with $\lambda = f(P, Z; \beta)$.

The Poisson is a single parameter distribution with expectation and variance both equal to λ (Mood, Graybill, and Boes, 1974). Although n is a non-negative integer, λ must be a strictly positive real number.

The Poisson model is solved by estimating β, say β^*, in $\lambda^* = \lambda(P, Z; \beta^*)$. The estimated value of λ, λ^*, is interpreted as the predicted expected value (and variance) of demand. The predicted expected value of consumer surplus, $E(CS)$, is then computed via the usual integration:

$$(2) \qquad E(CS) = \int_{Pobs}^{P\max} \lambda(P, Z; \beta^*) dP,$$

Where P_{obs} = observed price, and P_{max} = a choke price, possibly ∞.

A drawback to the Poisson model is the implied assumption that *E(Y)* and $\sigma^2(Y)$ are equal. Furthermore, Poisson "regressions" allow no random component in the λ estimator; the $\lambda = \lambda(P, Z; \beta^*)$ relationship does not contain an error component.

The Negative Binomial count model is often used to relax this unlikely condition of perfect knowledge of the estimator and to permit more flexible variance/mean relationships. Following Cameron and Trivedi (1998), the Negative Binomial is derived as a compound Poisson distribution, where λ is assumed to be distributed as a gamma random variable. Integrating over this distribution of λ yields the two parameter Negative Binomial. Formally,

Prob(y = n,n = 0,1,….)

$$\frac{\Gamma(n+v)}{\Gamma(n+1)\Gamma(v)}\left(\frac{v}{v+\mu}\right)^{v}\left(\frac{\mu}{v+\mu}\right)^{n},$$

with

$E(Y) = \mu$ and $\sigma^2(Y) = \mu + \frac{\mu^2}{v}$

The variance to mean ratio of the Negative Binomial is a decreasing function of v. As *v* approaches infinity, the Negative Binomial collapses to the Poisson; hence the Poisson is nested within the Negative Binomial.

Poisson and Negative Binomial have several useful empirical properties:

a) The sum of W independent Poisson variates is also Poisson distributed, with parameter $\lambda_w = \sum_i^w \lambda_i$. Thus, the distribution of visits from the aggregate of W individuals is prob(Y = n) = $(e^{-\lambda_w})(\lambda_w)^n / n!$. This adding-up property facilities utilize the use of aggregate data, given the knowledge of population size.

b) If a constant term is included in the function describing λ, the sum (over all observations) of observed demand will equal the sum of predicted demand.

c) Zero values are admissible. These properties also hold for the Negative Binomial, with λ replaced by μ.

To ensure that λ (or μ in the Negative Binomial) is strictly positive, it is postulated that

(3) $\lambda(P, Z; \beta) = \exp(\beta_0 = \beta_p + \beta_z Z)$

These count data models are estimated via maximum likelihood (ML) techniques (Judge et al., 1988).

Another way of modeling recreational demand with revealed preferences is through a random utility model (RUM), which focuses attention on the choice among substitute sites for any given recreational trip. The RUM is particularly suitable when substitution among sites differentiated by quality accurately represents the problem. The RUM has mostly been used to value changes in site characteristics, such as fish catch rate per unit

of effort (Ward and Beal, 2000). Variability in site characteristics is essential to explain how visitors allocate their trips.

The RUM is set up to predict the probability of choosing a given site among many possible choices. It predicts a probability between zero and one for all sites in the system. Whichever site produces the highest probability of a trip larger than zero is presumed to be the one selected. The functional form of the demand model generated by the basic RUM model is the Multinomial Logit, which is typically estimated with maximum likelihood methods.

For example, Font (2000) used a Multinomial Logit model which allows for multiple sites. The utility that tourist *i* have during period *t* if he chooses to visit area *j* is:

$$\upsilon_{jti} = \alpha_j + z'_{ji}\beta + w'_i\gamma_j + \varepsilon_{jti} \quad \text{or} \quad \upsilon_{jti} = V_{jti} + \varepsilon_{jti}$$

The probabilities are defined under the basic assumption that on a particular choice occasion *t* tourist *i* will visit area *j* only if the utility of the *j*-option is larger than others.

In practice υ_{jti} is not observable, but we can observe a dummy variable y_{jti}, resulting from a binomial process defined as

$$y_{jti} = \begin{cases} 1 & \text{if } \upsilon_{jti} = \text{Max}(\upsilon_{1ti},\upsilon_{2ti},\ldots.\upsilon_{jti}) \\ 0 & \text{in other cases.} \end{cases}$$

Therefore we can write the probability that area *j* will be chosen as

$$P(y_{jti}=1)=P(\upsilon_{jti}>\upsilon_{kti},\forall k\neq j)=\frac{e^{V_{jti}}}{\sum_{j=1}^{J}e^{V_{jti}}}$$

If the tourist is faced with up to T_i repetitions of the choice, then the likelihood function is

$$L=\prod_{i=1}^{N}\left[\frac{T_i!}{\prod_{j=1}^{J}y_{ji}!}\right]\prod_{j=1}^{J}\pi_j^{\,y_{ji}}$$

A drawback with the RUM approach is that the total number of trips per recreation season is assumed fixed.

2.2.1 Issues in the Travel Cost Method

Issues debated in the TCM include how to calculate the value visitors put on the site in a study if visitors made multi-trips; the inclusion of travel time and what type of cost to be included; and the effect of substitute sites. We will discuss such issues in the next section.

2.2.1.1 Type of Costs to be Included

A variety of costs that are included in the model can be found. In most TCM studies (individual or zonal) pecuniary travel costs are equated with transportation costs, and

have been assumed to be a linear function of distance and a cost per mile constant (Caulkins et al., 1986; Smith, 1988; Creel and Loomis, 1990; Bergstrom and Cordell, 1991; Hellerstein, 1991; McConnell, 1992). Anex (1995) valued full car running costs (cost of fuel plus standing charges such as insurance, depreciation, and service) were taken to be three times the cost of gasoline, resulting in a cost of $0.13 per mile driven. Site entrance fees are often considered the other main component (Fletcher et al., 1990). There is also no general agreement among the above studies on the appropriate cost per mile, although a general principle is that the marginal cost of visits is the correct focus.

Studies that used reported out-of-pocket costs also have not shown consensus on which expenditures to include. Ward and Loomis (1986) noted that it is not obvious which costs to include, and suggested that a key determinant of whether or not to include certain expenses depends on how well those expenses serve as entry fee proxies. In Kealy and Bishop (1986), they chosed to include travel costs, as well as spending for fishing tackle, equipment and boat rentals, trip-related food and lodging. Larson (1993) used a cost per mile to approximate travel expenditures, and also included all food and lodging expenses made while travelling.

The total cost of spending D number of days could be given as (Kealy and Bishop, 1986):

$$D\left(\frac{TC}{D_a}\right)+P_n\left(1-\frac{1}{D_a}\right)+P_v,$$

where TC = the cost of a return ticket, D_a = the average number of days per trip, P_n = the lodging cost per night, and P_v = the variable cost per day. For international tourism, D = D_a, that is, the total number of days on the island is equal to the average number of days per trip, as only one trip is taken to the destination in a year. Subjected to this condition, total cost can be simplified to $TC + P_n(D - 1) + P_vD$. The travel cost demand function derived from the above utility maximization problem can be specified as (in the linear inverse estimation form):

$$C_d = \beta_0 + \beta_1 DAYS + \beta_2 Y + \beta_3 TC + \sum_i \beta_t X_i + u ,$$

where

$C_d \left(= P_n + P_v\right)^1$;

DAYS (= D) = the number of days on the island;

Y = the household income ($/year);

X_i = the preference and behavioral variables in the model; $\beta_0, \beta_1, \beta_2, \beta_3 and \beta_4$ are parameters to be estimated; and

u = the random error $\sim \left(0, \sigma^2\right)$.

In the above model, the cost of return airfare is not a part of the marginal cost as the airfare becomes a sunk cost once the visitor is on the island. However, airfare may be correlated with cost per day, and its exclusion would create a bias in the estimated coefficients. Therefore, it is included as an explanatory variable in our model.

2.2.1.2 Multi-Purpose Trips

The TCM assumes separability in the specification of the model. For non-priced recreation, this requires that the recreational good consumed does not depend on the quality of any other recreational good also consumed. Typically the demand equation for recreation goods does not include the demand for market goods, though there may be a subset of goods which are connected to recreation, e.g. outdoor clothing, guide books, recreational equipment, the purchase of which may predisposed individuals to visit a particular site.

The utility function underlying the TCM must also be separable with respect to different recreational activities. Recreation demand equations typically estimate demand for one activity without reference to other recreation activities, primarily because of data limitations. Results will be biased if the utility function is not separable in this manner.

Separability of alternative recreation activities is linked to issues of joint production and cost. Time and travel cost is a classic example in the TCM literature. But there is also the problem of expenditure on meals and accommodation as part of the recreational experience. Only the net proportion of expenditure incurred as a consequence of the trip should be included. However, utility might be generated as a result of staying at a more comfortable hotel. In such cases, trips and accommodation need to be considered as separate goods. Failure to do so would result in an upward bias in the cost of the trip. Alternatively, if enjoying refreshments is not separate from the enjoyment of a more

comfortable hotel, then it should be included in the demand system, but this complicates the TCM model considerably.

2.2.1.3 Time and Travel Cost

The cost or price of access to an open-access, non-priced, recreational good appears intuitively to be simple to assess and in some cases the exercise can be performed in a remarkably straightforward manner. However, whilst the vast majority of visitors to remote sites and areas arrive by car, others walk or arrive by bicycle, train or bus. All of these categories have different transport costs, though conventionally such costs are estimated based on round trip mileage and a constant vehicle speed. Within the group arriving by car, transport costs can vary enormously depending on the make and size of the car, and also, for the individual, its ownership. These days a substantial proportion of vehicles are company or leased cars and these will incur different marginal costs.

Consumer-surplus estimates vary depending on whether the cost of access is assumed to reflect petrol costs only or whether the full running cost, including depreciation, maintenance, insurance and other factors, are included. In a study of a number of UK Forestry Commision sites, consumer surplus derived from a demand curve based on the full cost of travel was three to four times than those derived from assuming that cost of travel was of petrol cost only (Willis and Garrod, 1991). Hanley and Common (1987) also estimated consumer surplus for forest recreation based on both petrol costs and full running costs and found that the latter yielded estimates more than twice the size of the former.

More problematic than costs is the whole question of the value of time, a subject which has engendered considerable debate in the labour economics literature. The value of leisure time in a TCM has been considered as the following:

1. Zero value and therefore not included (e.g. Mugatana and Navrud, 1994), although this is contrary to economic theory;
2. The opportunity costs of work, and therefore leisure time is valued at the marginal wage rate;
3. Some proportion of the wage rate based on an individual's willingness to pay to save time in a non-working situation, typically his journey to work (e.g. Willis and Garrod, 1991).

Cesario (1976) first suggested that travel time be valued at one-quarter to one-half of the wage rate. Anex (1995) followed the work by Smith et al. (1983), Bokstael et al. (1987) and Larson (1993), who valued the travel time as full average zonal wage rate in 1993. Thirty-three percent of the wage rate has probably been the most often chosen fraction (for instance, Hellerstein and Mendelsohn, 1993; Englin and Cameron, 1996; Bin et al., 2005; Hagerty and Moeltner, 2005). Parson et al. (2003) observed that the recreation demand literature has more or less accepted 25% as the lower bound and the full wage as the upper bound.

Feather and Shaw (1999) proposed a method of determining the opportunity cost of leisure time. They argued that using wage rate as a proxy for the opportunity cost of time presents problems when individuals are not employed and have no observable

wage. They used hedonic model to predict wages. This provides time cost estimates for both employed and unemployed individuals.

More recently, Hynes et al. (2004) showed how a potential wage rate can be estimated from a secondary data source to use in the measurement of the opportunity cost of travel time. They evaluated the effect of different treatments of the cost of time on the welfare impacts of a number of different management scenarios. One of their findings is that including the opportunity cost of time added a 72% to the travel cost specification that excluded the opportunity cost of time altogether and resulted in an estimate 30% lower than the travel cost specification based on a "simplistic" opportunity cost of leisure time derived by dividing each respondent's gross earnings by 2000. However, Amoako-Tuffour and Martinez-Espineira (2008) in their study in estimating the value of travel time to recreational sites found that the most commonly used fractions in the literature would overestimate the opportunity cost of time and therefore overestimate the consumer surplus derived by the average visitors from access to the park.

There are also studies that exclude the cost of time altogether such as Whitten and Bennet (2002), Prayaga, Rolfe and Sinden (2006), and Fleming and Cook (2008). This method is consistent with the findings of Beal (1995), who, in a study seeking to elicit the opportunity cost of travel time for visitors to Girrawen and Carnarvon Gorge National Parks in Australia, concludes that it would be inappropriate to include time costs in travel cost valuations.

However, there are also other approaches such as in Fix and Loomis (1998) that include travel time as its own variable. This totally eliminates the concern of what values (as a percentage of the respondent's wage) to use as the opportunity cost of time. The theoretical framework for including travel time as its own variable is detailed in Cesario and Knestch (1970) and Brown and Nawas (1973). Our study also uses this same approach. We believe this is the most appropriate approach as expressed by McKean et al. (2003):

> "The consensus is that the opportunity cost component of travel cost has been its weakest part, both empirically and theoretically."

2.2.1.4 The Effect of Substitutes

Even though demand theory postulates that the demand for a good is related to the prices and qualities of substitutes as well as its own price and other factors, the problem of near-perfect collinearity between these prices (Ribaudo and Epp, 1984 in Ward and Beal, 2000) can force researchers to omit the variable. Other studies like Caulkins, Bishop and Caulkins et al. (1985) and Rosenthal (1987) found that omission of substitute prices cause bias in the estimated consumer surplus.

To counter this problem, Freeman (1993) suggested researchers ask visitors which other single site is visited most frequently and include only that site's price as the relevant substitute price. This approach however, will face difficulty if too many sites are named.

One other alternative is to construct hypothetical sites that constitute substitutes for the site to be valued. Random Utility Models (RUMs) or discrete choice models focus on the choice of a site recreation among a set of sites which are considered to be substitutes. RUM analysis is suitable for use when the demand choice rests on the quality of substitutes sites (Ward and Beal, 2000). RUMs are probabilistic in nature, and revolve around the allocation of a fixed quantity of trips across substitute sites, as site quality change. There is one problem in site-choice RUM because total trips to all sites in the choice set are fixed by assumption. Two ways have been developed to encounter this problem. The first is to use a repeated RUM model, where both the number of trips and trip destination are modelled simultaneously (for example, see Morey et. al., 1993). A second alternative is to combine RUM and count data models, and estimate the system simultaneously. This model has been applied by Hausmann et al. (1995). Count data models focus on predicting participation (trips) at sites, and on consumers' surplus per trip. In other words, RUMs answer the question of "where to go" and count data models answer the question of "how often to go" (Feather et al., 1995). This approach however, requires the researcher to study many sites.

2.3 CONTINGENT VALUATION METHOD (CVM)

The term "contingent valuation" is derived from the nature of the method: responses are sought from individuals as to their actions contingent on the occurrence of a particular hypothetical situation. For example, individuals might be asked their maximum willingness-to-pay (WTP) to enter a national park contingent upon a charge being introduced or a park being created. Alternatively, they may be asked to state the

minimum amount of compensation required to maintain their original utility level, if the park was closed to the public.

CVM is a tool that can also estimate non-use values, since there is, by definition, no related market good for the mere existence, as distinct from use, of the park. Thus, for example, contingent valuation is required to value the non-use values of public goods such as wilderness and landscape preservation; biodiversity; the value of preserving historical artefacts, monuments, and the character of old towns and villages.

CVMs have a long history with the earliest use on the 1960s (see Davis (1963); for an application to deer hunting in Maine in Boyle and Bergstorm, 1999). Since then, the debate on the validity and reliability of CVM estimates has evolved rigorously. This evolution changed dramatically with the Exxon Valdez oil spill in 1989. CVM was no longer viewed as just an intellectual curiosity of practitioners or a tool of government economists, but also CVM was used as a tool to support legal defence in the natural resources damage litigation ensuing from the Exxon Valdez oil spill.

2.3.1 Property Rights

Underlying the use of CVM is the question of property rights. If the individual does not own the right to a good, then the relevant measure of utility of the good to the individual is the maximum he or she would be willing to pay (WTP) to acquire it. Conversely, if the individual owns the good, then the minimum the individual would be willing to

accept (WTA) as compensation for its loss, is the relevant utility measure, since this is the amount that would restore the individual to his utility level before being deprived of the good.

WTP and WTA should be similar in magnitude for most goods which are close substitutes and for which the income effect is small (Garrod and Willis, 1999). However, several experiments have revealed that WTP is typically 2 to 5 times the magnitude of WTA values for the same good (Table 2.1).

Table 2.1: Disparities between WTP and WTA

Study		WTA/WTP ratio
Hammack and Brown (1974)		4.2
Banford et al. (1977)	(i)	2.8
	(ii)	4.2
Bishop and Heberlein (1979)		4.8
Brookshire et al. (1980)	(i)	1.6
	(ii)	2.6
	(iii)	6.5
Shaw and Willis (1982)		2.9
Coursey et al. (1983)	(i)	3.8
	(ii)	1.6
Knetsch and Sinden (1984)		4.0
Adamowicz et al. (1993)	(i) video	1.95
	(ii) hockey ticket	1.70

Source: Garrod and Willis (1999)

There are a number of reasons that may explain this divergence. First, the theory may be correct, so that the observed difference is a function of the inadequate empirical procedures used to elicit WTP and WTA, such as questionnaire design, interviewing technique, etc.

Second, the WTA measure might be faulty. Respondents may reject the property right implied by the WTA questions; that they have to sell their 'right' to some environmental attribute.

Third, respondents might behave strategically. Consumers may act rationally in formulating their WTP bids, conscious of their income and budget constraints; and preferences for other goods. However, a CV framework might not give respondents enough motivational incentives to give truthful answers, especially about the minimum they would be willing to accept as compensation for their loss to restore them to their original utility level. Respondents have a greater incentive to act strategically in demanding compensation for the loss of a good.

Fourth, the observed difference between real WTA and WTP might be explained by psychological factors. This theory has been put forward by Kahneman and Tversky (1979) in the context of loss aversion and by Thaler (1980) as an "endowment effect". This means that when a good becomes part of your endowment, the value you place on it increases. Thus WTA will be larger than WTP. Kahneman et al. (1990) ran experimental markets that divide random divisions of groups of individuals in half, with half receiving some good that has value; they then allow trading to take place. Equivalence of WTA and WTP should imply that approximately half of the goods were improperly allocated and should be traded. In fact, far less than half are traded, suggesting WTA > WTP. An experiment by Kolstad and Guzman (1999) that include information by allowing agents to repeat their bid supported the outcome by Kahneman et al. (1990). They conclude that the divergence between WTA and WTP naturally

emerges and further, that the divergence increases when the cost of information acquisition is greater.

Fifth, the difference between of WTP and WTA also depends on a substitution effect. Hanemann (1991) proved that substitution effects could exert a far greater leverage on the relationship between WTP and WTA than the income effects. He gives the example of Yosemite National Park: where the willingness to pay to move Yosemite into one's consumption bundle may be far less than the willingness to accept compensation for removing it. Therefore, the divergences between the two may be not because of some failure in the survey methodology but of a general perception on the part of the individuals surveyed that the private-market goods available in their choice set are, collectively, a rather imperfect substitute for the public good in consideration.

There are also the issue about the inconsistency between real and hypothetical WTP and WTA. As listed by List and Shogren (2002), lots of studies have been undertaken on comparisons between real and hypothetical WTP but few on WTA. Among the list, studies using the dichotomous choice type of elicitation and done field experiment are by Bishop and Heberlain (1979), Dickie et al. (1987), Seip and Strand (1990), Navrud (1992), Foster et al. (1996), and Brown et al. (2003). Results vary between studies but most of field experiments yield a higher calibration factor than laboratory experiments, for example Brown et al. (2003) yield 6.5 compared to Kealy et al. (1990) that yield between 1.0 to 2.0. However, after controlling for person-specific effects, they conclude that hypothetical and real statements are equivalent at the margin.

2.3.2 Stages in Practical Application

As suggested by Bateman and Turner (1995), the practical application of CVM can be split into six distinct stages. We outline and discuss each stage below:

Stage 1: Preparation

The first step is to devise a hypothetical market for the environmental in question. For example, a study by Quah and Chong (1999) set a scenario as follows:

> "Suppose the government wants to make the East Coast Park smaller in size so that more houses can be built. In exchange, the government will develop a park exactly similar to the East Coast Park but located in an urban, built-up area."

The second step is to define the payment vehicle. There are many different payment vehicles through which the WTP bids can be collected: income tax, value added or sales taxes, trust fund payments, entry charges, property taxes, and changes in utility bills. However, different types of payment vehicle have different types of obstacle. Some payment vehicles may encourage free riding and some payment vehicles might cause a lot of protests. For example, a survey of local residents on the WTP additional local water or sewerage charges to fund improved water quality might result in protests against the payment if the principle beneficiaries of the improved water quality are tourists in the area who do not share any of the costs. But if instead, we surveyed

tourists, they may reveal large WTP values for an increase in local tax which they do not have to pay. In the latter case a hotel room tax might be a more appropriate payment vehicle.

The third step is to define the elicitation method. Here, individuals are asked to state their maximum WTP for the environmental good (either to increase the quantity of the good, or to prevent a decrease in the quantity of the good); or their minimum WTA compensation for the environmental good (either to forgo an increase in the quantity of the good, or to accept less of the good). The principle elicitation methods are:

1. An open-ended question in which no value is specified and individuals are asked a simple question on their maximum WTP for the good, for example

   > "Suppose the National Park authority charged a fee to enter this recreation site. What is the most you would be willing to pay to use it per person per day?"

   Where the respondents have the experience of purchasing similar goods (e.g. access to other private recreation sites), then open-ended questions offer a relatively easy method to elicit bids. However, where the respondents have no prior experience of purchasing environmental goods, they may experience considerable difficulty with this format. For this reason the National Oceanic and Atmospheric Administration (NOAA) report by Arrow et al. (1993) advocated that open-ended formats should

not be used to elicit non-use values for environmental goods: those very situations for which there is no market in the good or similar good.

2. A close-ended question in which a range of values are specified and the respondent chooses one of the values, for example:

   "Suppose the National Park authority charged a fee to enter this recreation site. What is the most you would be willing to pay to use it per person per day? (please circle one value)"

   1 2 3 4 5 6 7 8 9 10

   Such a format anchors the respondent's answer to the range of values presented, although they can be offered another category in which they specify the value. This type of format might be applicable to non-priced open access recreational areas, where values in the range presented have already been determined for other comparable sites.

3. A dichotomous choice or referendum type question in which a single payment amount is presented to the respondent who either agrees or disagrees with the amount, for example

"Suppose the National Park authority charged a fee of $5 per person per day to enter this recreation site. Would you be willing to pay this fee?

YES/NO"

The payment amount varies across the sample questionnaire survey across a pre-determined range. This is the elicitation method which is advocated by the NOAA. But the price range must be determined, which is normally done by doing a pilot test. This method is also rather inefficient in a sampling sense where it needs a larger number of observations.

4. An iterative bidding format or multiple-bounded dichotomous choice questions. The iterative bidding approach begins as a dichotomous choice question. Depending upon the response, the respondent is then asked if she would be willing to pay a higher or lower amount than the first.

Stage 2: Survey

WTP or WTA bids are obtained through a questionnaire survey. CV questionnaires typically obtain three sets of information from the respondents:

1. attitudes to environmental goods in general and preferences for the particular good under investigation vis-à-vis others; awareness of substitute goods; use of the good

perhaps in relation to uses of other goods; and any perceived non-use benefits of the good;

2. WTP and/or WTA bids for the good using one or more of the elicitation methods, with questions to respondents exploring their reasons for their bids, which can be used to eliminate illegitimate responses; and questions to gauge the respondents' ambivalence; and

3. socio-economic information on the respondent and his or her household. This data is gathered to assess: (i) whether the sample is representative of the general population, and representative of visitors if profiles of visitors are available; (ii) the theoretical validity of the WTA or WTP bids, using a regression model relating bids to price, quantity demanded, income, preferences, and other variables which theory suggests should explain the inverse demand curve.

The survey can be administered in a number of ways; the most popular include face-to-face interviews; self-filled questionnaires; telephone interviews; and mail shots.

Stage 3: Calculation

From a given survey, the mean WTP or WTA amounts can be derived by averaging the observed bid responses. However, a CV survey permits many different statistical values to be calculated: means; medians; modes; trimmed estimators; modified estimators

(with biased and ineligible responses omitted); standard deviations and other measures of dispersion. At large, mean WTP values, or trimmed or modified estimators based on mean WTP values, are commonplace. However, median bids are increasingly popular because they are unaffected by large bids in the upper tail of the distribution. In practice, whether to use the mean or median bid value only arises when the distribution is skewed, so that the median and mean are typically different. In the case of the WTP responses in a CVM survey, a common problem is one of right-skewness, with a large number of people being willing to pay small amounts of money and a few of them are willing to pay a very large amount of money. In this matter, the median is invariably much smaller than the mean. Hanemann (1984) stated in his paper, "a purely statistical argument can be made in favour of C*" where C* is the median of the distribution". Hanemann shows that the mean is very sensitive to slight changes in the shape of the distribution resulting from different estimation methods or outliers in the data, while the median is relatively robust.

Harrison and Kristrom (1996) explicitly look into the issue of whether to use the mean or the median of the sample for 2 different cases: a) the Exxon-Valdez oil spill and b) mining activity in the Kakadu Conservation Zone of Australia. They favour the median value. This is because, "(i) since …. the mean can not be reliably estimated and the median can be reliably estimated" (p.101), and (ii) the median is a "…. lower bound for the damage estimate" (p.11) in the Exxon-Valdez case. Their calculations of the mean show that the mean is primarily determined by the shape of the right tail of the distribution, rather than by the actual data. Hence the mean is likely to be higher than the one with the median. Another point in favour of the median is that it provides a

more conservative measure of aggregate damages since it gives a lower value. This is one argument used when it involves a real monetary compensation as in the Exxon-Valdez case.

The conclusion that the median should be preferred to the mean is also reached by Leon (1996). He was in favour of using the median because a) it tends to be more robust to the influence of extreme observations; and b) it is consistent with the referendum approach to policy decision, i.e. with a majority rule social welfare criterion.

The issue of outliers can be a problem. One or two outliers can increase the average WTP dramatically, and can provide an over estimation of the worth of a public good. Some zero WTP responses may also be erroneous values. Trimmed estimators can be employed if outliers exist. The problem with trimmed estimators is the determination of the observations that are 'erronous', and hence those which should be excluded from the calculation. A common practice is to trim the top and bottom 5% or 10% of the distribution of WTP observation.

Other modified estimators are mean WTP values with biased and illegitimate responses removed. Biased and illegitimate responses are identified by a series of questions designed to find out why respondents gave that particular WTP response. Modification are also done with protest responses (where respondents that are not willing to pay any amount even though they value the good) are omitted from the sample.

Stage 4: Estimation

A bid curve can be estimated to investigate the determinants of WTP bids. For a continuous question format (open-ended type question), standard OLS estimation techniques can be applied:

$$WTP_i = f(Y, V, S) + e$$

Where y = income, V = visits, and S = substitutes. There is no theoretical correct form of this function. But if a log-log function is used, it will provide the Hicksian compensated demand curve for the good, and permits the average Hicksian consumer surplus per visitor to be estimated, as the area under the demand curve for the average visitor who is assumed to make the mean number of visits in a given time period.

Besides traditional open ended question, a close ended question like a bidding format can also be used. In the bidding process, the respondent is asked a series of dichotomous choice questions until some point estimate of WTP is reached. The dichotomous choice question was pioneered by Bishop and Heberlain (1979), where a single dichotomous choice question is asked, and the dollar amount is treated as a threshold. If the good is valued more highly than the threshold dollar amount, the person answers "yes", otherwise "no". As concluded by the NOAA panel report,

> "….asking respondents to give a dollar valuation in response to an open ended question presents them with an extremely difficult task. At the same time, CV proponents also recognize that presenting respondents a set of dollar amounts

> from which they are to choose is likely to create anchoring and other forms of bias. Thus, we recommend as the most desirable form of CVM elicitation the use of a dichotomous question that asks respondents to vote for or against a particular level of taxation, as occurs with most real referenda" (Arrow et al., 1993).

To obtain Hicksian compensating and equivalent welfare measures from discrete response data, a Logit or Probit model is typically estimated (Hanemann, 1984).

A double-bounded CVM approach was first proposed by Hanemann (1985) and first implemented by Carson, Hanemann and Mitchell (1986). In double-bounded CVM, the respondents are engaged in two rounds of bidding: participants respond to a first dollar amount and then face a second question involving another dollar amount, higher or lower depending on the response to the first question. Hanemann et al. (1991) have proved that the double-bounded dichotomous choice model is asymptotically more efficient than the single-bounded model. Therefore the confidence intervals are tighter in double-bounded compared to the single-bounded model.

Stage 5: Aggregation and/or Disaggregation

Mean WTP or WTA estimates from the sample survey must be aggregated across the total population to derive a total value figure. Sometimes the population figure is quite difficult to determine and can produce an inaccurate estimate. It is more problematic in the case of estimation for non-use values.

CVM also offers the possibility of disaggregating the bids into use, option and existence values. Mitchell and Carson (1989) give four techniques to achieve this:

1. Asking each respondent to bid separate amounts for each part of the benefit being valued. Although this technique is simple it risks grossly overestimating the WTP and there is the potential for receiving invalid or meaningless answers because of the fallacy of motivational precision and part-whole bias.

2. Asking the respondent to bid in the normal way, followed by asking them to split the WTP amount he/she stated into values for one or more benefit components. This has the advantage of obtaining a valid WTP before attempting to split it and helps respondents grasp the idea that component values are a subset of the overall value.

3. Confronting the respondent with two or more scenarios or, ideally presenting different scenarios to separate sub-samples. The scenarios differ only in respect to the specific benefit measure under investigation and the difference between the total WTP for each scenario yields an estimate of the WTP for that measure. The advantages are that it is relatively simple to administer, that it may be easier for respondents to conceptualise than other forms of question, and that the fallacy of motivational precision is circumvented because it only asks respondents for their total WTP for a given scenario. Since there is only a single package of environmental goods on offer, there is also the opportunity of avoiding part-whole

bias. The disadvantage is that where the same individual responds to the different scenarios there may be contamination across the scenarios.

4. Through asking respondents if they use the site, individuals can be divided into user and non-users. No extra questions are asked, but the WTP given by the non-users is an expression of option value and existence value. The advantage of this technique is that it circumvents the fallacy of motivational precision.

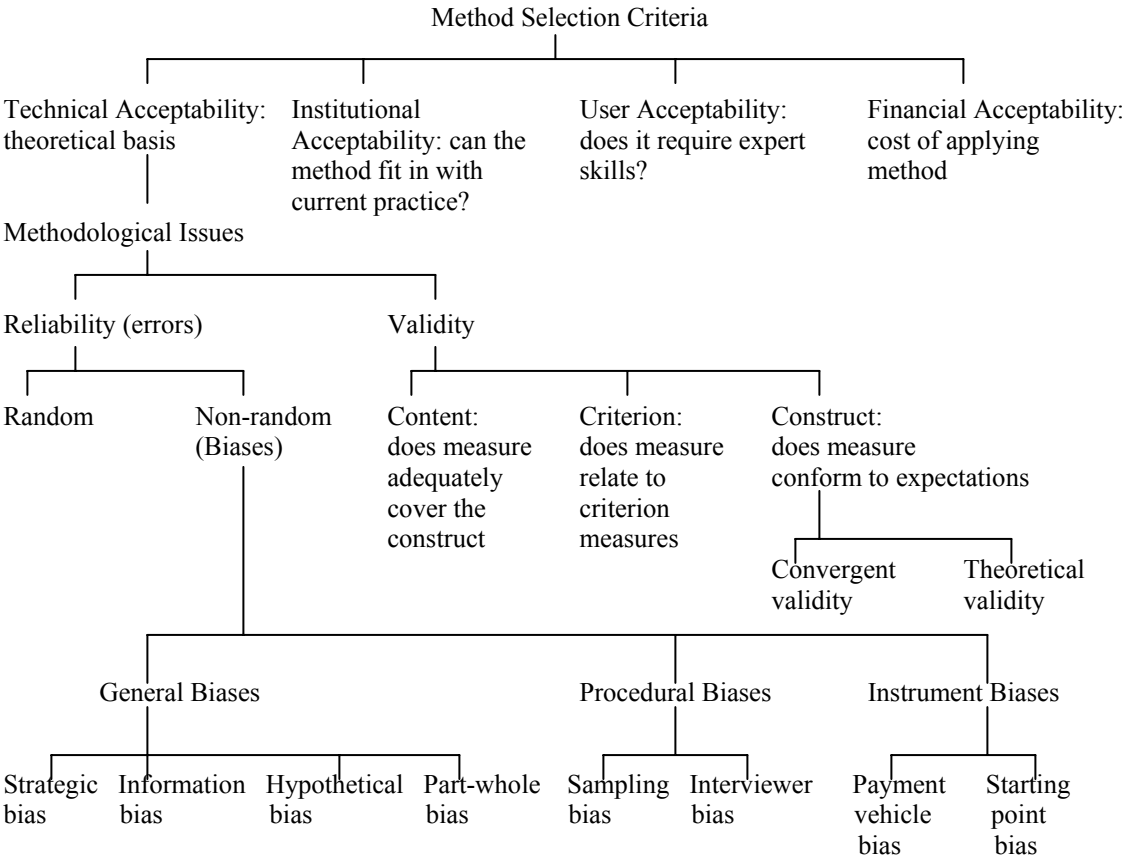
Stage 6: Appraisal

To test for the validity of the CVM, the technical acceptability of the evaluation estimates produced by the CVM needs to be taken into consideration. In practice, technical acceptability is only one of the criteria upon which both CVM and all other evaluation methods are likely to be judged. Figure 2.2 illustrates four facets of method acceptability: technical (whether the evaluation estimates are valid and reliable); institutional (whether decision makers can incorporate the method into their framework of analysis); users (whether analysts sufficiently comprehend the technique so as to put it into practice); and financial (whether the cost of application is reasonable) (Bateman and Turner, 1995). However, this study will only concentrate on the technical acceptability.

2.3.3 Validity Test

The validity of a measure is the degree to which it measures the theoretical construct under investigation. In the CVM context this is the maximum amount of money the respondents would actually pay for the public good in question. The validity of CVM estimates has been judged in a number of ways following the taxonomy suggested by Mitchell and Carson (1989) in terms of content validity, criterion validity, and construct validity (also shown in Figure 2.3).

Figure 2.3 Method Selection Criteria



Source: Bateman and Turner, 1995

Content validity involves the issue of whether the measure adequately covers the constructs' domain. It can be assessed by a subjective judgement based on the examination of the instrument (in the case of CV, the wording of the question) by a panel of authorities, to find out if it actually asks the right questions in an appropriate manner. Thus, the questions more likely to be asked in the circulation of a draft survey questionnaire are (Mitchell and Carson, 1989):

> "Is the description of the good and the payment vehicle meaningful to the respondents?", or
>
> "Are the property rights and the market of the good defined in such a way that it is clear that the scenario is acceptable and the WTP format is plausible?", or
>
> "Does the scenario appear to force reluctant respondents to come up with WTP amounts, or is it favourable to specific policy issues or groups of interests?"

Another issue is that of criterion validity. Criterion validity is concerned with whether the measure constructed by the researcher is related to other measures that may themselves be regarded as criteria. Suitable criteria are not always available to validate measures, as in the case with measures concerning public goods. However, several important studies have managed to create markets in order to compare the resulting prices with values obtained for the same good.

Two types of markets can be compared with the hypothetical markets that CVM uses. The first comparison is with simulated markets. These can be created only for quasi-private goods from which people can be excluded. In such hypothetical-simulated

market experiments, the amounts respondents pay are appropriate criteria for the validity of the parallel hypothetical market (Mitchell and Carson, 1989).

One more issue is that of construct validity. Construct validity involves the degree to which the particular measure in question relates to other measures as predicted by theory. One form of construct validity, convergent validity, asks whether the CVM measure and other measures of value (for example travel-cost or hedonic price) are consistent with theoretical expectations.

The other form of construct validity, theoretical validity, ask whether the measure is related to measures of other construct in a manner predicted by theory. It is most commonly evaluated by regressing some form of the WTP amount on a group of independent variables believed to be theoretical determinants of people's willingness to pay for the good in question. The outcome of interest is not the R^2 but the size and the sign of the estimated coefficients which are then examined against economic theory. Another way to test theoretical relationships is to compare mean WTP values of different conditions with that predicted by theory.

2.3.4 Biases in Contingent Valuation Method

CVM may be subject to a number of biases. The biases are discussed in the sections below.

2.3.4.1 Strategic Bias

There are two elements of strategic behaviour resulting from the valuation of public goods or of goods with certain characteristics of common property rights. Firstly, respondents may feel that by understating their WTP they may obtain access or use of the good at reduced cost to themselves. This is a well-known free-rider problem. This can be overcome by stressing the fact that the scenario is hypothetical. However, this introduces the second element, where respondents may overstate their true WTP if they believe that by doing it they will gain greater benefits in terms of policy outcomes and project implementation.

Strategic bias is extremely difficult to detect and to test for in CVM surveys; however laboratory experiments suggest that strategic bias may not as strong as generally imagined (Smith (1980) as cited in Garrod and Willis, 1999). A study in developing country (Singapore) by Quah and Khye (1999) also find that their tests on strategic bias are not significant. Garrod and Willis (1999) also suggest practical steps within the CVM process to minimise strategic bias. These are outlined below:

1. Removing outliers (either individual observations, or by trimming the top and bottom 5% or 10% of all observations to produce a trimmed estimate). However, there is no theoretical justification for removing any observations in this way, unless a bid is subject to bias, and this is generally unknown.

2. Inserting questions in the CVM questionnaire, after the WTP or the WTA responses, to ascertain why respondents gave that bid. Responses to the questions are then used to judge whether respondents' bids are legitimate or illegitimate.

3. Stressing in the questionnaire that respondents should answer honestly (to prevent free-riding state that if bids are insufficient the environmental good will not be provided); and that payment by others is guaranteed (to prevent strategic overbidding to ensure that the good is provided).

4. Making the environmental change dependent upon the bid to prevent respondents anticipating that the change will be automatically forthcoming irrespective of their bid.

5. Concealing the bids of others. This is the usual practice in CVM surveys because they are administered to individuals or households. However, focus group responses are open to strategic manipulation.

6. Adopting a referendum format (single or double bounded), rather than an open-ended WTP format. Respondents can only answer 'yes' or 'no' to the bid offered instead of choosing a high or low bid for strategic or free-riding motives. Burton et al. (2003) did some laboratory experiments to test theoretical explanations by Carson, Groves, and Machina in their Plenary address to the European Association of Resource and Environmental Economists, Oslo, Norway (CGM). Burton et al. (2003) tested two out of four theoretical explanations given by CGM, the Weighted

Average hypothesis, and Uncertain Cost hypothesis. CGM explained the existence of biases in terms of inconsistency in the mean and median estimates using the single bounded and the double bounded referendum format questions. They also explained why the expected frequency of Yes-Yes and No-No responses are higher than expected. The Weighted Average hypothesis assumes that respondents respond to the second cost amount by assuming that the true cost is in the middle of the costs suggested by the questionnaire. This hypothesis predicts that there will be more Yes-Yes and No-No responses in the double-bounded referendum format questions. In the Uncertain Cost hypothesis, respondents are assumed to respond to the uncertainty created by the second valuation question by treating the second question independently from the first, but treating the new cost as an uncertain value with a mean equal to the second stated cost amount and that the respondents are risk averse. This hypothesis predicts that there will be more No answer to the second question than if cost were known with certainty where the distribution of the stated willingness to pay will be skewed to the left. Burton et al. (2003) found strong evidence to reject the hypothesis that the vote distributions in the Baseline and Weighted Average treatments are the same (Baseline is where the respondents are assumed to treat the second cost as certain). They also found that there is weak evidence to reject the hypothesis that the vote distributions in the Baseline and the Uncertain Cost treatments are the same. Econometric methods can be applied explicitly for the case of presence of cost averaging by incorporating it into the estimation procedure.

2.3.4.2 Information Effects (Bias)

It is clear that values individuals attach to goods, depends on the information available to them. Since in the CVM the WTP is contingent on the information of the hypothetical situation of the survey, the dependency on the information provided by the researcher is often referred to as information bias. But according to Hirshleifer and Riley (1992), an individual's valuation is correct given the information available, it is not appropriate to call it a "bias" but only an effect (Munro and Hanley, 1999). Even though it is not a true "bias", it creates its own difficulties for CVM.

Studies that address this issue have found mixed results. In studies where there is strong use value for the good in question, information had no significant impact in 2 out of 3 experiments involving users (Munro and Hanley, 1999). Studies that investigated existence value or combination of existence and use values show clear evidence of significant changes in mean WTP (for example, Samples et al., 1986; Whitehead and Blomquist, 1991). As expected, positive information on substitutes lowers the WTP, while positive information on complements raised the WTP.

2.3.4.3 Part-whole Bias

This bias, which is also referred to as scope effects exists when respondents cannot distinguish differences in the quantity or scale of a good: for example valuing part of a park versus the whole park.

Among the general strategies to minimize part-whole bias are the inclusion of a description of the larger entity in the scenario, with a warning not to confuse the larger entity with the amenity changes being valued; and making the description of the good more salient by the use of such descriptive devices as maps (see Bateman and Langford, 1997; Moran, 1994; and Kosz, 1996).

Hadker et al. (1997) in their study on the WTP for Borivli National Park (BNP) stressed the importance of part-whole bias where respondents were instructed that:

> "1. The issues discussed here are only a few among many other environmental problems Bombay faces. 2. BNP is only one among India's great forest treasures. 3. Income is limited and has important alternative uses. 4. Focus must be solely on the BNP, not on other environmental issues, or other national parks around the country. India may be facing other environmental problems that you may be concerned about. However, this interview is about BNP only. 5. There are other alternative recreational spots apart from BNP."

When this bias is taken into account by setting the value scale of BNP to zero to reflect those that did not attribute value to any of BNP's assets, the stated WTP reduces.

Bateman, Willis and Garrod (1994) also test for part-whole bias by introducing mental accounts into CVM surveys by asking initial exploratory questions about the respondents' total yearly budget for all environmental issues, including those donations and subscriptions that he or she might already have made. They found no serious part-whole bias in their study. Instead, they found similarities in the relationship of mean

WTP to overall country-side budget for the Norfolk Broads sample and for visitors to the Yorkshire Dales (16% and 19% respectively).

2.3.4.4 Interviewer Bias

This bias has a potential to exist if telephone or in-person interviews are used. The bias would be present to the extent that respondents shape their answers in a way that they think will either please the interviewer or will increase their status in the interviewer's eyes.

To reduce this bias, the respondents can be randomly assigned to the interviewers and each interviewer conducts a reasonably large number of interviews. A study by Smith et al. (1983) that controlled for different respondent characteristics in their Monongahela water quality study found no evidence for interviewer bias. However, it is possible that this issue could remain significant.

2.3.4.5 Payment Vehicle Bias

The choice of the payment or bid vehicle can also affect the WTP results. The vehicles most often used in CVM studies, such as utility bills, entrance fees, taxes, and higher prices, are likely to be familiar to most respondents. What is novel, however, is the way these vehicles are used in CVM studies. For example, respondents ordinarily think of

their electric utility payments as a way to purchase electricity, rather than a way of buying increased air visibility.

The payment vehicle should be neutral with respect to the good unless the researcher intends to value a policy which is linked to a particular payment vehicle. In situations where the respondents do not understand the scenario in the way intended by the researcher, a trade-off between plausibility and understandability may be necessary to avoid misspecification. For example, despite its high level of familiarity and obvious connection with the good, the use of an entrance fee as a vehicle to value some aspects of a recreational site may be a poor choice because of the likelihood that it will encourage respondents to restrict their WTP amounts to the range associated with a "fair" or customary entrance fee. Similarly, if property taxes are used as a payment vehicle the researcher should be aware that negative feelings about such taxes may strongly influence the WTP amounts; it is the policy, rather than the public good independent of the payment mechanism, which is valued.

2.3.4.6 Starting Point Bias

Starting point bias arises in the iterative bidding game when the initial bid influences respondent final bids. In theory, the starting bid is merely a tool for initiating the bidding process and should not affect respondent final bids. The starting point bias might arise when the item being valued is poorly defined or not distinctly perceived by the respondent (Randal and Brookshire (1978) in Boyle et al. (1985)). Brookshire et al. (1981) in Boyle et al. (1985) also suggest two other possible causes of this problem.

First, if the starting bid is significantly different from the respondent's actual WTP, the respondent may become bored with the bidding and truncate the process before his or her actual WTP is revealed. Secondly, the initial bid may suggest an appropriate range of final bids to the respondent. Herriges and Shogren (1996) analysed a starting point bias in a double-bounded dichotomous choice model and found mixed results. They stressed that an anchoring[1] effect which is not found to be a significant problem for local respondent, significantly biases both the estimated recreationist's WTP and the estimate of the dispersion of WTP among recreationists.

Besides the anchoring effect, another starting point bias is the "yea-saying bias". The yea-saying bias is defined as "the tendency of respondents to agree with the questions regardless of the content" (Blamey et al., 1999). Kahneman and Knestch (1992) find that the CVM response reflects an individual's WTP for the moral satisfaction of contributing to public goods, not just the economic value of these goods. The yea-saying bias may also be due to social pressures faced by respondents during the survey. People are usually sensitive to public opinion in their community. If the public opinion of a community places a high priority on the public spirit that induces good citizens to contribute their share of responsibility to the provision of public goods, then a respondent in the community may have a higher propensity to say "yes" to CVM questions that ask the respondent how much he is willing to pay for the provision of public goods. Both the anchoring and yea-saying bias will lead to an overestimation of the real WTP.

[1] According to Mitchell and Carson (1989),"Confronted with a dollar figure in a situation where he is uncertain about an amenity's value, a respondent may regard the proposed amount as conveying an approximate value of the amenity's true value and anchor his WTP amount on the proposed amount".

Some of the literature has argued that the double-bounded dichotomous choice format may also face starting point bias problems. This issue is first raised by Herriges and Shogren (1996) who develop a basic model of anchoring effects in the double-bounded dichotomous choice model. One of these is that respondents' estimated point valuations of the resource at the moment of the first question often differ from their estimated valuations when the second question is asked. In practice, a number of negative responses to the second question are often higher than would be expected from the distribution of values based on responses to the first question alone (Hanemann et al., 1991). A higher than expected frequency of yes-yes and no-no responses has also been observed (Cameron and Quiggin, 1994). These so-called "problems" arise because of the assumption that responses to the first referendum question are a truthful reflection of subjects' underlying WTP. Findings of an empirical study by Herriges and Shogren (1996) show mixed results where the anchoring was not found to be a significant problem for local residents, but it did significantly bias both the estimated recreationists' WTP and the estimate of the dispersion of WTP among recreationists.

Other methods that have becoming increasingly popular among environmental economists are choice modelling and combining the revealed and stated preference methods. Below we present brief explanations of both methods.

2.4 CHOICE MODELLING

The latest approach to environmental valuation is choice modelling (CM) or also known as conjoint analysis. The conceptual microeconomic framework for CM lies in Lancaster's (1966) 'characteristics theory of value' which assumes that consumers' utilities for goods can be decomposed into utilities for composing characteristics. CM also uses survey techniques (as CVM), with the only difference between CM and CVM, that in CM, goods are described in terms of their attributes and the levels that these take whereas in CVM, goods are described in terms of the 'with' and 'without' situation. In CM, respondents are presented with various alternative descriptions of a good, differentiated by their attributes and levels, and are asked to rank the various alternatives, to rate them, or to choose their most preferred option. By including price/cost as one of the attributes of the good, willingness to pay can be indirectly recovered from people's rankings, ratings or choices. As in the CVM, CM can also elicit all forms of value including non-use values.

There are four main variants in CM approach (Hanley et. al., 2001): choice experiments, contingent ranking, contingent rating and paired comparisons. In a choice experiment (CE) respondents are presented with a series of alternatives, differing in terms of attributes and levels, before being asked to choose their most preferred option. A baseline alternative, corresponding to the status quo or 'do nothing' situation, is usually included in each choice set. This is because one of the options must always be in the respondent's currently feasible choice set in order to be able to interpret the results in standard welfare economic terms. The choice experiment approach was

initially developed by Louviere and Hensher, and Louviere and Woodworth in the early 1980's (Hanley et al., 2001).

In a contingent ranking experiment respondents are required to rank a set of alternative options, characterised by a number of attributes, which are offered at different levels across options. As with CE, a status quo option is normally included in the choice set to ensure welfare consistent results. Contingent ranking can be seen as a series of choices in which respondents face a sequential choice process, whereby they first identify their most preferred choice, then, after the removal of that option from the choice set, identify their most preferred choice from the remaining set and so on. Ranking data provides more statistical information than choice experiments, which leads to tighter confidence intervals around the parameter estimates.

In a contingent rating exercise respondents are presented with a number of scenarios and are asked to rate them individually on a semantic or numeric scale. This approach does not involve a direct comparison of alternative choices and consequently there is no formal theoretical link between the expressed ratings and economic choices. In practice this method has not been very popular amongst environmental economists because it requires strong assumptions in order to transform ratings into utilities. These assumptions relate either to the cardinality of rating scales or to the implicit assumption of comparability of ratings across individuals: both are inconsistent with consumer theory. Hence, contingent rating exercises do not produce welfare consistent value estimates.

In a paired comparison exercise respondents are asked to choose their preferred alternative out of a set of two choices and to indicate the strength of their preference in a numeric or semantic scale. This format is also known as graded or rated pairs. The graded pairs approach is an attempt to obtain more information than simply identifying the most preferred alternative and, as such, combines elements of choice experiments (choosing the most preferred alternative) and rating exercises (rating the strength of preference). If the ratings are re-interpreted as providing an indication about choices only, then this approach collapses into a choice experiment.

2.5 COMBINING REVEALED AND STATED PREFERENCE TECHNIQUES

There has been increasing interest in combining revealed preference (RP) and stated preference (SP) data in valuation of demand for environmental quality. The advantages of combining these two data sets include an increase in the amount of information available; the possibility of modelling goods with attribute levels outside the range of current levels; and reduction in the collinearity offered by the SP statistical designs (Adamowicz et al., 1997).

There are two main approaches of combining SP and RP data. The approaches are Random Utility Models combining SP and RP data, and the Contingent Behaviour Approach relating to either price or environmental quality changes. Adamowicz et al. (1997) used RP and SP data based on recreational choices, where choice alternatives are described in terms of site attributes. This pooled Random Utility Method (RUM) approach is probably most suitable when the analyst wishes to focus on the value of

different attributes of recreational goods; and where changes in environmental quality produce site substitution effects across a group of sites (eg a group of fishing rivers when water quality alters).

Contingent Behaviour models are somewhat different. The word “contingent” implies that what is being measured is intended behaviour in some contingent market, rather than actual behaviour. Observations from contingent behaviour can be combined with observations of actual behaviour from the same individuals, using either pooled or panel data models. In Englin and Cameron (1996), four price-quantity estimates were made for each respondent, one real and three hypothetical. They conclude that the RP data gave lower estimates per angler than the hypothetical data; and that combining the real and hypothetical data improved the precision of the model estimates. The main feature of the Englin and Cameron paper is that the contingent behaviour relates to changes in trip frequency as prices changes. A natural extension is then to look at contingent behaviour when environmental quality changes. Such an approach was followed by Hanley et al. (2003), who look at the benefits of improved water quality standards on Scottish beaches. A more recent study, Kragt et al. (2006) also uses contingent behaviour approach to estimate the effect of quality of Great Barrier Reefs to the demand for recreational trips.

2.6 CONCLUSIONS

There are two types of valuation that can be used in valuing non-market goods such as environmental goods. These are the revealed preference approach and the stated

preference approach. For the revealed preference approach there are several methods, namely Hedonic Price Method, Averting Behaviour Method, and Travel Cost Method. From all these methods, the TCM is the most appropriate method to be adopted in this study since it is a method that uses the cost of travelling to a non-priced recreation site as a means of inferring the recreational benefits which that site provides.

There are two types of the TCM normally used in past studies; Individual Travel Cost Method, and Zonal Travel Cost Method. Both methods have their strength and their weaknesses. For instance, the ZTCM is best suited to estimating consumer surplus for recreation at sites where visitor origins are relatively evenly distributed (Garrod and Willis, 1999). Problems arise when visitor origins distributed asymmetrically or where there are a few important points of origin to a single site. Another issue with the ZTCM raised by some authors is about the zonal definition. For example, Smith and Kopp (1980) demonstrated that the assumptions underlying the definition of zones can seriously impact on the resulting estimates of consumer surplus. Another limitation of the ZTCM is that it assumes that the estimated demand is generated by a "representative consumer" whose behaviour reflects the average behaviour in the population of a zone.

Another method is the ITCM that has an advantage over the ZTCM in that it takes more account of the inherent variation in the data, rather than relying on zonal aggregate data. The procedure undertaken in the ITCM requires researchers to undertake an on-site questionnaire survey of visitors aimed at eliciting the estimates of household or individual visit frequencies over a given time period, plus information on the cost of travel to the site, recreational preferences, use of substitute sites, and socio-economic

characteristics. With the information, we can derive a demand curve from which consumer surplus may be estimated. Even though the ITCM is generally more flexible and applicable at a wider range of sites than the ZTCM, the former requires more information about individual visitors and it relies on surveys to elicit visitor characteristics, preferences and behaviour.

When both methods were carried out using the same data sets, considerable differences have been observed in estimated consumer surplus such as found by Willis and Garrod (1991), and Hanley (1989). Taking all the above into consideration, this study used both methods to elicit consumer surplus and at the same time to investigate whether we will agree with the abovementioned author or not.

Revealed preference, or behaviour in the market place, cannot value all environmental goods. As an example, by using TCM, one can estimate the value of a national park by assessing the demand for a related market good, which is by calculating how much people are prepared to spend on travel to gain access to that particular park. However, one cannot estimate non-use values, since there is, by definition, no related market good for the mere existence, as distinct from use, of the park by using TCM. Thus, stated preference approaches is the most appropriate approach to use to value public goods such as wilderness and landscape preservation; or the value of preserving historical artefacts, monuments, or the character of old towns. This is because in stated preference approach, respondents are directly asked of the WTP they put on a good in a study through a survey question.

In the stated preference approach, currently there are two most prominent methods namely the Contingent Valuation Method and the Choice Experiment or Choice Modelling. One advantage that CM has over CVM is the ability to separately identify the value of individual attributes of a good or programme. However, the CM questionnaire needs respondents to answer complex choices or rankings between bundles with many attributes and levels.

So, for stated preference approach, we decided to use a single-bounded (or referendum) and a double-bounded CVM. This is because this format has become the pre-eminent approach to contingent valuation throughout the world since mid-1990s (Garrod and Willis, 1999). The CVM studies can actually be conducted using several elicitation formats. Until the mid-1980s, the elicitation formats are based on open-ended questions and iterative bidding games (with or without the use of payment cards). Problems associated with these techniques led a number of researchers to investigate alternative elicitation formats that did not require respondents to construct their maximum WTP for a particular environmental good but instead asked them to choose between discrete alternatives relating to the specification of that good and its cost. The discrete choice question format, often known as referendum CVM becomes the most popular format of WTP elicitation after the recommendation made by the US Department of Commerce's National Oceanic and Atmospheric Administration's (NOAA) Blue-Ribbon Panel (Arrow et al. (1993). This format only requires respondents to answer "yes" or "no" to a given amount. It is like a market situation, where for each good the price is given, and consumers choose whether to accept it or not. The advantage of this type of question format is that respondents are said to have no incentive to behave strategically (Arrow

et al., 1993). Thus, when a respondent is asked whether they are willing to pay some amount of money for a specific environmental improvement, and they said "yes", it imply that their "true" WTP for that improvement is at least that amount of money.

Even though the referendum CVM is widely used not just for research purposes but also for policy decision making, it is still associated with some weaknesses. In order to improve the statistical efficiency of the referendum CVM, some researchers have proposed that a further round of bids follow the first round, with the level of the second bid dependent upon the response to the first. Thus, an affirmative response to the first bid amount would lead to the respondent being asked about a higher amount, while a rejection of the first bid would lead to the second bid amount being lower. The double-bounded model is asymptotically more efficient than the single-bounded model, as proved by Hanemann et al. (1991).

The assumption underlying the resulting analysis is that identical value distributions are elicited by both the initial and the follow-up questions (Cameron and Quiggin, 1994). However, there are several studies which found that they yield WTP estimates that are substantially different from the estimates implied by the first responses alone such as Hanemann et al. (1991), McFadden and Leonard (1995), and Herriges and Shogren (1996). Herriges and Shogren investigate the existence of an anchoring effect caused by the first bid, and conclude that it affects, at least in part, the estimates. Some other researchers investigate a "yea-saying" effect. For example, Whittington et al. (1992) found that giving respondents time to think had a clear influence on their answers,

producing consistently lower estimates. There is concrete possibility that some respondents tend to say “yes” if an answer is needed on the spot.

Calia and Strazerra (2000) used a Monte Carlo analysis in search of the bias and efficiency of a single-bounded versus a double-bounded model. They confirmed that the double-bounded CVM is more statistically efficient compared to the single-bounded model. It produces more precise point estimates of parameters and central tendency measures of the WTP, as well as narrower confidence intervals around the mean or median WTP. On the contrary, no clear-cut results are obtained for the point estimates given by the two models, even for a small sample size, so they conclude that neither estimator can be said to be less biased than the other.

CHAPTER 3

PAST STUDIES USING THE TRAVEL COST METHOD AND CONTINGENT VALUATION METHOD IN DEVELOPING COUNTRIES

3.1 INTRODUCTION

In the developed world, policy makers have accepted the importance of taking into consideration economic valuation when making decisions. It is widely accepted that environmental goods can be measured using several methods. Among the most used are the travel cost method and the contingent valuation method.

In the developing countries, the valuation of environmental goods is still relatively uncommon. Even researches published in journals are very infrequent. Nevertheless, published papers have shown that people in the developing countries also place values on environmental goods. In addition, the papers have shown that the valuation methods used in the developed countries can also be applied to the developing countries.

According to the World Bank in their Environment Assessment Sourcebook Update (1999), even though the developing countries have budget constraints, the government should spend some funds on environmentally-oriented economic analysis. The World Bank had listed some suggestions of "best practice" for integrating natural resource and environmental issues into economic analyses of projects and policies. The methods and approaches that are applicable to the developing countries are categorized into three: market-based methods, methods based on surrogate market values, and methods based

on potential expenditures or willingness-to-pay. Examples of market-based methods are the change-in-productivity approach and the loss-of-earnings approach. Methods based on the surrogate market values include the property value approach, the wage differential approach, and the travel cost approach. Approaches under the methods based on potential expenditures or willingness-to-pay are the replacement cost approach, shadow projects approach, and the contingent valuation method. This means that the World Bank strongly encourages developing countries to start to internalize environmental costs and benefits measured in money terms and integrate these values in economic appraisal of government's projects and policies.

3.2 PAST STUDIES

To see how far developing countries had applied the approaches on valuation of environmental goods, this chapter is going to present past studies that applied the CVM and the TCM especially in Malaysia and the South-east Asia and in the developing countries in general. Studies that are reported here are studies using various valuation methods done on Malaysia and some other South-East Asia countries. Since many studies done on Malaysia are hardly published, what is reported here are only the accessible papers. Table 3.1 is the summary of studies carried out on Malaysia and selected South-east Asian countries.

Table 3.1: Valuations of Environmental Goods in Malaysia and South-east Asia

Ecosystem and Original Study	Approach Used	Valuation Results
Conservation of outdoor recreational places at the Damai district, Kuching, Sarawak, Malaysia (Radam et al., 2000)	Contingent Valuation Method (CVM): Dichotomous Choice Approach	Mean WTP RM11.90(using Logit model) and RM15.11 (using Probit model) entrance fee from survey on 160 domestic visitors.
Outdoor recreational resources in Manukan Island, Sabah, Malaysia (Radam and Abu Mansor, 2000)	CVM: Dichotomous Choice Approach	Mean WTP RM5.02 (using Logit model) of entrance fee. Consumers' surplus can be computed by multiplying WTP by the number of visitors to the island where the number of visitors increased from 12,355 in 1988 to 91,379 in 1995 and decreased to 65,602 in 1998 (due to regional economic crisis and haze disaster).
Valuing Environmental Goods Using Contingent Valuation Method: Case Study Pulau Payar (Ayob et al., 2002)	CVM: Dichotomous Choice Approach	Mean WTP (using Logit model) of RM12.00 for local visitors and RM26.00 for foreign visitors. Non-use value for local visitors to Langkawi is estimated as high as RM13.00.
Entrance Fee System for Recreational Forest in Selangor, Malaysia (Othman and Asmuni, 2003)	Contingent Ranking	Consumer surplus of $3.84 for Forest Research Institute Malaysia; $4.68 for Kanching Recreational Forest and $3.48 for Kuala Selangor Nature Park.
Outdoor recreational resources of Sungai Congkak Forest Reserve, Selangor Malaysia (Nik Mustapha, 1994)	ZTCM	Consumer surplus per trip of RM5.80 with total annual net economic benefit of RM27,772.
Fireflies recreational experience at Kuala Selangor mangroves, Malaysia (Othman, 1998)	ITCM, CVM: Dichotomous Choice Approach	Net benefit RM225/trip/recreationist or RM2.2 million annually.
Beach recreation at Port Dickson, Malaysia (Nik Mustapha, 1995)	CVM: Dichotomous Choice Model	Mean WTP ranged from RM63.83 to RM620.58 (using Logit model) and RM71.74 to RM597.48 (using Probit model) for a mean income of RM404.56 to

		RM3,933.30.
Recreation of urban-based park, Tasik Perdana, Kuala Lumpur, Malaysia (Nik Mustapha, 1995)	CVM: Dichotomous Choice Model	Mean WTP ranged from RM84 to RM106 per person.
Recreation value of Taman Negara, Malaysia (Mohd. Salleh and Othman, 2000)	ZTCM and CVM: Dichotomous Choice Approach	Consumer surplus (from ZTCM) was estimated about RM120/trip or annual total net economic benefits of RM2.6 million (based on total domestic visitors in 1995). Mean WTP (from CVM) is RM235.06 (using Logit model) and RM280.86 (using Probit model).
Recreational benefits of Phi Phi Islands, Thailand (Seenprachawong, 2001)	ITCM, CVM: Dichotomous Choice Model	Total benefits of USD1.75 million per year for domestic visitors and $203.66 million per year for international visitors (based on the number of visitors in 1998) using ITCM. Mean WTP per visit of USD7.17 for domestic visitors and $7.15 for international visitors from a sample of 400 domestic and 128 international visitors.
Tourism Palawan Coral Reef, Philippines (Hodgson and Dixon, 1988)	Productivity Change	Present value gross revenue USD6,280 with logging vs USD13,334 with logging ban; based on mean hotel capacity, occupancy and daily rates; and an assumed 10% annual decline in tourism revenue due to the degradation of seawater quality from sedimentation.
Tourism Valuation, Indonesian Coral Reefs (Cesar, 1996)	Productivity Change	Net Present Value of tourism loss/km^2 of reef USD3,000 - USD436,000 (from poisoned fish); USD3,000 - USD482,000 (blast fishing or coral mining); USD192,000 (sedimentation); based on assumptions regarding the rate of reef degradation associated with each practice.
Economic Valuation of Mangroves of Surat Thani, Thailand (Sathirathai,1998)	Production function	Economic value of mangrove estimated to be in the range of USD13.05 to USD658.55 per person. That estimates includes direct use value by local communities and indirect use value in terms of off-shore fishery linkages and the value in terms of coastline protection.
Analysis of the Recreational Value of the Coral-surrounded Hon Mun Islands in	ITCM, ZTCM and CVM (single-	Annual recreational value of USD17.9 million using ZTCM and about USD8.7 million using ITCM.

Vietnam (Pham Khanh Nam and Tran Vo Hung Son, 2001)	bounded)	
Economic Valuation of Coastal Ecosystems in Phang Nga Bay, Thailand (Seenprachawong, 2002)	Choice Experiments	Annual value of a 35% to 65% increase in environmental quality to be USD144.6 million. Suggested entrance fee of 40 Baht ($1.00) for Thais and 400 Baht ($10.00) for foreigners. Also suggested room tax of 40 Baht per bed-night.
Entrance Fee System for National Parks in Thailand (Isangkura, 1998)	Contingent Ranking	Suggested entrance fee for Doi Inthanon National Park increased from 5 Baht ($0.12) to 40 Baht ($1.00); 20 Baht for Mae Sa Waterfall; and remain no fee for Doi Suthep.
Pricing a scenic view at East Coast Park, Singapore (Quah and Tan, 1999)	CVM: open-ended question	Aggregate WTP to preserve the scenic view was estimated to be S$146 million and the aggregate WTA for a loss in the scenic views stood at S$451 million.
A Contingent Valuation Study of Scuba Diving Benefits: Case Study in Mu Ko Similan Marine National Park, Thailand (Asafu-Adjaye, J. & Tapsuwan, S., 2008)	CVM: Dichotomous Choice Model, Single and Double Bounded Model	Average WTP using single-bounded model is USD62.64 while that for the double-bounded model is about half at USD27.07. Single-bounded model shows overseas divers are willing to pay more (USD64.18) compared to Thai divers (USD44.02) whereas for double-bounded model, there are no significant difference between the two groups. The researcher propose the authority to charge USD27.55 compared to current scuba diving fee level USD4.80 per day.

Note: 1. Studies by Hodgson and Dixon (1988) and Cesar (1996) are described in Cartier and Ruitenbeek, 1999

2. Studies by Nik Mustapha 1994, 1995 and Othman 1998 are described in Mohd. Salleh and Othman (2000)

From the above studies on Malaysia, two studies have been undertaken on marine parks - Manukan Island (Tunku Abdul Rahman Marine Park) by Radam (2000) and Payar Marine Park by Ayob et al. (2002). To date, none of these studies have been published.

Ayob et al. (2002) estimated the value of preserving the natural beauty of Pulau Payar, one of the marine parks in our study, using the CVM single-bounded dichotomous choice model for both users and non-users respondents. Using a Logit model, this study

estimated a use-value of WTP of RM12.00 and RM26.00 for local visitors and foreign visitors respectively; which are higher than the RM5.00 imposed by the authority at present. Non-user value was estimated at RM13.00 for all respondents. Non-user value is calculated from surveys to respondents that do not visit Payar Marine Park at the time the survey was conducted. They showed that the significant variables when regressed with the probability of saying yes to the amount shown to respondents are card value, income, age, gender and year of schooling. This means that the probability of the respondent saying yes to the amount shown on the bid card depends on various demographic factors of the respondents.

Radam and Abu Mansor (2000) used the CVM to assess the net economic values of recreational resources in Manukan Island, located in Tunku Abdul Rahman Marine Park, Sabah, Malaysia. They raised the same issues as our paper, which are first, to impose entrance fees to capture the benefits from ecotourism, and using that money to maintain and enforce environmental regulations. Secondly, to reduce visitation in areas that suffer from overuse and accompanying ecological damage. This paper used a single bounded referendum format question for the WTP, and the models are estimated using the Logit and Probit techniques. Both the Logit and Probit model gave them about the same mean WTP of RM5.00 which is more than the current rate of RM 1.00 to RM2.00.

A study that uses both the CVM and TCM is Mohd. Salleh and Othman (2000) who assess the recreational benefits of Taman Negara, the biggest national park in West Malaysia. For the TCM, this paper adopts only the zonal TCM, and a simple regression yields the highest R^2 and the estimated value per visitor per annum of about RM120.

For the CVM, this study used a single-bounded dichotomous choice model. They estimated welfare using both the Logit and Probit model that yielded an amount between RM235 to RM280, which are higher than the estimates obtained using the TCM.

Another study, carried out in a neighbouring country, Thailand, is Seenprachawong (2001). From the TCM, Seenprachawong estimated the annual consumer surplus to improve coral reef quality at Phi Phi Island per person for domestic visitors equal to USD183.82 and USD2,010 for international visitors. While using the CVM, he obtained the mean maximum WTP per visit of USD7.17 for domestic visitors and USD7.15 for international visitors. Both the CVM and TCM were used in Seenprachawong's study but his study used simple ITCM while our study uses both ITCM and ZTCM. Seenprachawong also raised methodological issues on the CVM where he suggested a double-bounded dichotomous approach since the approach gave more information than the single bounded approach. Our study adopts the double-bounded dichotomous approach.

A study by Pham Khanh Nam and Tran Vo Hung Son (2001) is very similar to our study where they used both the ITCM and the ZTCM, and also the CVM. The only difference is that our study uses the double-bounded dichotomous choice while they used the single-bounded referendum method for the CVM. Their study was to estimate the recreational value of the coral-surrounded Hon Mun Islands in Vietnam. This was due to the plan of expanding a port located six km from the area. The ZTCM estimated the annual recreational value at approximately USD17.9 million while the result from

the ITCM is about USD8.7 million. A 20% loss of the recreational value that is expected to ensue from the proposed port expansion is still larger than the expanded port's projected annual revenue of USD3.1 million. Both the ITCM and the ZTCM are estimated using OLS regression with a semi-log model. In the ITCM, with semi-log model, travel costs, income and age are found to be significant with the expected signs. In the ZTCM, visitation rate was only regressed with costs for attempts at regressing the visitation rate with cost, income and substitute price resulted in a multicollinearity problem. For the CVM, they used a Tobit model that estimated WTP for locals to be VND 17,956 and VND 26,786 for foreign visitors.

Both the CVM and TCM (zonal) were also applied by Yaping (1998) in valuing the improvement of water quality for recreation in East Lake, Wuhan, China. One interesting finding by Yaping relates to the calculation of costs; first, cost of time, and second, what to be included as costs. He used two levels of value of time; full and one-third the hourly wage. The differential change of wage rate is found to not have much impact on travel cost due to the relatively low hourly wage rate, so he focuses only the use of full wage rate. Even so, he found that the variable of cost of time is insignificant. Since most people in China rarely owned private cars, the modes of transport for short distance travel are bicycles, buses, taxies, and business or government vehicles. For long distance travel, Yaping used local statistics on passenger turnover to derive the proportion of travels by air, train, river, and coach, and weighted averages were calculated for travel cost and time for each zone and he also included cost of lodging as part of travelling costs. Under the existing water quality level, it is found that the annual total consumer surplus amounts to RMB Y141.62 million; and an additional RMB

Y15.01 million would be gained if the water quality level increased from existing to boatable/fishable. If the water quality is further improved to swimmable and drinkable, the total consumer surplus would increase to RMB Y180.11 and RMB Y209.98 million, respectively. The annual total WTP as measured by the CVM for the recreational area is RMB Y12.11, RMB Y21.41, and RMB Y32.41 if the water becomes clean enough for boating, swimming, and drinking, respectively. A comparison between the TCM and the CVM results indicated that the CV values are higher than those from the TCM. In terms of annual value, CV estimate is 71.62% higher than TC measurement when the water quality is improved from existing to boatable level. However, the CV figures do not seem to be much higher than those of consumer surplus at drinking quality level, being only 0.86% higher. The difference, according to Yaping might be due to the non-use values of the lake for recreation.

Radam, Said, Abu Mansor and Merican (2000) used CVM to determine visitors' satisfaction through their WTP for the conservation of Damai Resort district. This is due to an increase in competition of land uses due to development programmes at Damai beaches and its other natural wilderness within the coastline of Santubong in Sarawak. The development has significantly disrupted wildlife and ecosystems, and contaminated the beaches, to the extent of limiting the income of the surrounding local communities dependent on the natural resources. Thus the ability to conserve this area is of significant importance in balancing the ecosystem over and above maintaining future heritage for its citizens. This study used a dichotomous choice approach with self-administered questionnaires. Regression using the Logit and Probit model yielded mean WTP of RM15.11 with the Logit model and RM11.71 with the Probit model.

Othman (2000) used an open-ended CV questions with face-to-face interviews to assess the conservation values, especially the total non-use or passive values, of the Matang Mangroves Forest located in Perak, Malaysia. Matang Mangroves Forest has been gazetted as a protected forest since pre-independence days. The forest consists of two forest types – production forest and "environmental" forest. The production forest comprises 80 % of the total forest area. Sustainable logging has been an ongoing activity in the production forest area. The timber is used mainly for the production of charcoal. The environmental forest constitutes some 20% of the forest. This forest is mainly for environmental protection and conservation functions. No amount of logging is permitted in this forest area. The hypothetical situation raised in this paper is that if the management of Matang Forest might increase the production forest area to allow for increased collection of royalties and premium from timber and charcoal production. An increase of 3% in the production forest area may decrease both the environmental forest area by 14% and the number of migratory bird species by 3% while increasing the number of jobs by 5%. Reduction in the environmental forest area can however be avoided if every household in Perak contributes annually to the Matang Mangroves Trust Fund.

The mean and median of WTP are found to be RM17.00 and RM10.00 per year respectively. The study also found that after running an appropriate regression, the WTP was strongly influenced by income and relevant attitudinal variables such as environmental awareness, and have the expected signs. The coefficient for age was found to be insignificant. The coefficient for the Malay dummy was surprisingly

negative and significant. This means that the Malays are less likely to agree to pay for the conservation of the Matang Mangroves forest. Othman concluded that this might be because of the income for the Malays is substantially lower relative to their non-Malay counterparts. A profile check shows that the average monthly income for the Malays is RM991 while the non-Malays is at a higher figure, RM2,383.

Quah (1999) estimated the total economic value of a major park in Singapore, the East Coast Park. He estimated both the WTP and the WTA from a contingent valuation open-ended questionnaire. He found that the WTP and the WTA bid curves are influenced by different variables. For example, the interactive effect of monthly income and the highest educational level attained is significant at the 5% level when used in the WTA bid curve but is insignificant (at the 5% level) when included in the WTP bid curve. Also, the income variable is significant at the 10% level in the WTP bid curve but is insignificant in the WTA bid curve. According to Quah, this result is consistent with theory that the WTP bids are constrained by income, while the WTA bids are not. Quah estimated the WTP to preserve the scenic views of the East Coast Park to be S$146 million and the WTA to be S$451 million. The WTA estimate is three times larger than the WTP estimate, which echoes results found in other studies.

Among the "first-generation" attempts at the valuation of recreational facilities in developing countries is a study by Durojaiye and Ipki (1988). They studied three urban recreation centres in Nigeria – Agodi Gardens and the University of Ibadab Zoological Garden (U.I. Zoo), both located in Ibadan; and Luna Amusement Park, Lagos. Ibadan and Lagos are important cities in Nigeria. Ibadan is the hub of commercial activities in

the Western Nigeria, and Lagos is the federal capital. Both cities have inadequate recreational facilities. This paper used a TCM as outlined by Clawson and Knestch (1966). Data was gathered between June and October 1983 as households left the park. The study estimated four forms of equation: linear, quadratic, exponential, and log-linear equation, presenting the results of the quadratic form only as it gave the most conservative, that is minimum, value estimates. Thus, values are "at least as high as" that provided by this functional form. This study made an attempt to include travel time and when included, the coefficients of average expenditure per trip for all centers except Agodi Gardens are smaller.

The study found that the demand for recreational use of the three centers is price inelastic. The total consumer benefits for Agodi Gardens is N57,297 and the consumer surplus per visitor is N1.57 and N1.36 for adults and children respectively. The nondiscriminating monopolist value estimated for the center in 1982 was N13,248. This is the maximum amount that could have been collected as entry fees if fees of N2.40 per adult and N1.20 per child were charged. With these entry fees, however, only 3,113 adults and 4,814 children, or 20 % of the actual number of adults and children that visited the center that year, would have visited the center. The U.I. Zoo generated total consumer benefits of N479,906 and consumer surplus per visitor of N2.18 and N1.49 for adults and children, respectively. The Luna Amusement Park generated total consumer benefits of N1,146,643 and consumer surplus per visitor of N9.69 and N2.56 for adults and children, respectively.

A study that focuses on the elasticity of demand with respect to the entrance fee to national parks is Chase et al. (1998). They studied the three most visited national parks in Costa Rica; Volcan Paos, Volcan Irazu and Manuel Antonio. The first two are active volcanos and the latter is a beach park. This study used a contingent behaviour model using a stated preference approach and direct estimation of visitation demand changes in response to entrance fees. They surveyed foreign tourists that were randomly picked at all three parks in study. They managed to get 311 usable questionnaires. In their questionnaire, the respondents were asked to fill columns about the "actual" fee paid and how many trips would they visit with the actual fee and an "hypothetical" fee and how many trips would they visit with that hypothetical fee (higher than the actual or current fee). The respondents were required to give "number of days they would visit" for all three parks regardless of where they were surveyed. The nature of the feedback they got from the questionnaires made them decide to use different models for different sites. For Paos and Irazu, they used a Probit model with random effects because all visitations to these two parks were either for one day or no days. For Manuel Antonio, visitors stay up to 8 days at the beach therefore they used a Tobit model for the estimates. In their questionnaire, the "appropriate fee" visitors were willing to pay were also elicited using a payment card method with a question "If the entrance fee were increased only at this park, how high would the daily entrance fee per person have to be so that you would choose not to visit this park?". Their results showed that the tourists' responses to alternative fees, varied depending on the park in question. From their estimation, the own-price coefficients were all negative and significant and the cross-price estimates were positive and significant for the volcano park equations, confirming the expected substitute demand relationship between the two. Volcan Paos has the

highest elasticitiy of -2.86, Volcan Irazu second with elatisticity of -1.04, and lastly -0.96 for Manuel Antonio.

Lindberg and Aylward (1999) studied the same three parks as studied by Chase et al. (1998). They used different sets of data from Chase et al. (1998), that is the actual variations in price (entrance fee) and quantity demanded (visits) at each price. They also used different type of models compared to Chase et al., that is ordinary least squares, with log-linear form for it has a higher R^2. As hypothesised by them, foreign visitors were found to be demand inelastic. From their estimation, they found different results than Chase et al. where Volcan Irazu are more elastic than Volcan Paos but demand for Manuel Antonio that has less unique attraction was more elastic compare to the other two parks. The elasticities were also lower compared to the study by Chase et al., where they calculated elasticities at three prices: $5, $10 and $20. The estimated elasticities for all the three park at all three prices are less than 0.5 in absolute value. They concluded that demand was price inelastic at fee levels up to USD10.00. This is consistent with the findings of many stated and revealed preferences studies of foreign visitation at the US and Australian parks.

In Echeverría et al. (1995), they examined the conversion of the Monteverde Cloud Forest Preserve into pasture or other agricultural use. This Preserve also provides direct economic benefits from tourism to nearby communities. The conversion would eliminate the public and quasi-private amenities as well as most of the direct economic benefits from tourist expenditures in the area. This study used the CVM single-bounded dichotomous choice to estimate the economic benefits provided by the forest preserve.

There are 2 types of payment vehicle used in this study: type 1 is a lump sum payment and type 2 is recurring annual payments of $10 proceeded by $10 in increments up to $200 (20 bid levels for the lump-sum and annual payment). The study estimated the mean for all respondents to be $121.05 with differences between the Costa Rican and the non-Costa Rican visitors - $137.41 for Costa-Rican and $118.76 for non-Costa Rican. This is quite interesting as many studies found the opposite results where foreigners are found to pay higher amounts than the locals (Pham Khanh Nam and Tran Vo Hung Son, 2001; Seenprachawong, 2001). They also found differences between type 1 and type 2 bid questions where the mean WTP for type 1 is $130.43 and for type 2 is $110.64.

Hadker Nandini et al. (1997) used double bounded dichotomous choice to estimate WTP of the households who live nearby the highest visited national park in India, Borivli National Park (BNP). This is due to the park's fringe being threatened by illegal encroachments and deforestation. The park management face severe financial constraints to monitor and to prevent the illegal activities. This study used three sets of dollar amounts – ([5, 10, 15 for low income group], [20, 30, 45 for middle income group], and [45, 60, 75 for high income group]. There were two types of payment vehicle used. One, the amount of money the respondents were willing to contribute to a fund in a five year time period (monthly or annually) for an autonomous body (reputed for doing efficient and honest work) to undertook the task of protecting the National Park. Two, instead of payment, the author also gave an option for the respondents if they cannot afford to pay but were instead willing to do service work to maintain BNP. The respondents were asked to state the time they willing to contribute. The respondents

were divided into ‘green’, ‘pragmatic’ and ‘developmentalist’ based on a few variables namely education, age, gender, frequency of visit and how they see the benefits from preserving the park. The average WTP was found to be Rs40.85 for the ‘green’, Rs12.81 for the ‘pragmatic’ and Rs10.00 for the ‘developmentalist’.

Lee (1997) used the Dichotomous Choice Contingent Valuation Method to estimate the user value of securing traditionally agriculture-based jobs by preserving the area from being developed into a ski resort, with golf courses and hotels in Mt. Minju, located in Chungchungbuk-do province in the southern part of the Korean peninsula. The area has a high potential for preservation due to the existence of rare species of fauna and contains sources of clean water in the valley providing neighbouring urbanites with drinking water as well as recreation. The study used a Logit model with both linear and logarithmic Logit models with a payment vehicle of an entrance fee. They estimated the mean WTP of 5905 Won (USD7) per visitor. This implies that the significant economic value of natural resources will be lost from any large-scale development by degrading natural environments. This paper concludes that nature-based tourism also provides the locally-owned small tourist businesses with lower leakages than the externally-owned large-scale ones. Low leakage implies that local residents gain more direct income from nature-based tourism.

Maille and Mendelsohn (1993) used the travel cost method to estimate the value of preserving the remaining tropical forests that provide ecotourism in Madagascar by foreign tourists. Even though the researchers conducted their survey in Beza Mahafaly Special Reserve, a protected forest of about 640 ha. in southwest Madagascar, this study

measured the overall value of ecotourism in Madagascar. This is due to the fact that foreign tourists usually visit multiple sites upon reaching a distant country. This study used the ZTCM with both a linear and an inverse log models being estimated. The results from the inverse log model outperformed the linear model in the matter of higher R^2, and the fact that the coefficients were more significant. Consumer surplus was estimated by integrating between the average airfare of each country and the airfare that would drive visitation to zero. The airfare that would drive visitation to zero in the linear equation was $2,241 and $2,097 in the inverse log equation. The average consumer surplus per person per visit is $349 for the linear model and $265 for the inverse log model. The resulting average value per visitor is between $276 and $360. They conclude that Madagascar could raise its fees substantially in light of foreign demand.

Maharana and Sharma, (2000), raised the issue of the importance of ecotourism in the Khangchendzonga National Park (KNP). The Yuksam-Dzongri-Goechha La trekking corridor is the most popular destination for adventure (trekking and mountaineering) and nature tourism in the eastern Himalayan region. This study also provides useful estimation of the benefits of the park besides fuel-wood, fodder and timber so as to protect the critical habitats in this park. They also demonstrate the practicality of developing the WTP functions for managers in estimating the benefits of other environmental values of forests, such as soil erosion and recreation. They adopted the CVM with a random survey of respondents consisting of domestic visitors, foreign visitors and local community members. The categories of respondents were the international tourists, the Indian tourists and the people living in the area as local

community. The study used a bidding game to elicit WTP, which generated mean WTP of USD8.84, UD$1.91 and USD6.20 for foreign visitors, domestic visitors and the local community respectively. When OLS regressions were used to analyse WTP, age, education and income have a significant positive effect on the WTP. This study revealed that the visitors' WTP did not depend upon the benefits they personally would get in preserving the park, but most of them stated that their WTP was to keep the beautiful, unexploited landscape and rich biodiversity of this area intact. Annual WTP equals USD8,777 for the maintenance and preservation of the KNP when extrapolated to total visitors and the community household, which is a significant sum.

The most recent study was by Asafu-Adjaye and Tapsuwan (2008) on the elicitation of economic benefits associated with scuba diving in Mu Ko Similan Marine National Park, Thailand. The economic benefits was estimated using a single- and double-bounded dichotomous choice contingent valuation survey design. Estimation using the single-bounded model resulted in an average WTP of USD62.64 while estimation using the double bounded model resulted in an average WTP of USD27.07, which is half of the WTP estimated using the single-bounded model. The authors also compared the WTP between overseas divers with Thai divers. From using the single-bounded model, the WTP estimation using the single-bounded model indicate that there appears to be some differences between the WTP by overseas divers and local divers. Overseas divers average WTP is estimated to be USD64.18 while the Thai divers' average WTP is estimated to be USD44.02. Overall, they estimated that the average WTP for scuba diving in Mu Ko Similan Marine National Park to range between USD27.07 and USD62.64.

3.3 CONCLUSIONS

In this chapter, we presented past studies on national parks using the CVM and/or the TCM. Focusing on case studies carried out in Malaysia and selected South East Asian countries, particularly on the subject of recreation sites and other studies that are relevant to our studies, in other ways. Discussion on case studies done on Malaysia is critical as to convince the policy makers that valuation on environmental goods are viable and should be adopted in considering the approval of any projects that have the potential to incur impact upon the environment in any way. This is because, up to date, most developmental projects are subjected to the requirement of submitting an EIA (Environmental Impact Assessment) report to the Department of Environment. However, in the report, it is not mandatory to include the calculation of non-market goods such as the benefit of nice scenery or the benefit gone if a forest is transformed into an agricultural land. One of the implicit objectives of this study is to show the policy makers that they should consider using valuation methods such as the CVM in their policies.

The literature provides us with very useful guidelines such as the following:

1. It gives a broad picture of how Malaysians and people in the developing countries in general perceive payment for environmental goods. It is proven that Malaysians are willing to pay for environmental goods as found in the above literature. The mean WTP for recreational purposes in Malaysia ranging from as low as RM5.00 to as high as RM100.00 per visit. This is a good start in directing the researcher on the suitable bid values for this study. Findings of the study on Payar Marine Park by

Ayob et al. (2002) are particularly helpful as Payar is also one of the marine parks included in the present study.

2. In the revealed preference approach, most researchers used both the ITCM and the ZTCM. Instead of just getting the estimation of consumer surplus, the researcher can also compare the results between the two methods by using both the ITCM and the ZTCM. This is because the ZTCM uses a lot of proxies as it uses an aggregated data while in the ITCM, the data is more of an individual data. Therefore, it is interesting to see whether the two methods give similar results or not.

3. There are also some literature that found significant difference between average WTP of local respondents and foreign respondents where the foreign respondents have a higher average WTP or consumer surplus, such as Asafu-Adjaye and Tapsuwan (2008), Pham Khanh Nam and Tran Vo Hung Son (2001), Seenprachawong (2001) (using TCM), and Ayob et al. (2002). However, when Seenprachawong estimated WTP using CVM, the average WTP among local and foreign respondents are very similar. On the other hand, a study by Echeverría et al. (1995) finds the opposite results whereby the willingness to pay estimated for local respondents are found to be higher than that for the foreign respondents. Therefore, one of the objectives of the present study is to seek what will be the case for our study.

4. Studies on the Malaysian Marine Parks are limited, with only one study done in Payar Marine Park. All studies on the Malaysian recreation places look at one

specific site, whilst our study looks at three different areas. This gives us the advantage of comparing differences in WTP, if it exists, so that we can conclude whether to charge different prices at each site. We can also compare the results obtained in the study carried out in Payar alone that have their survey conducted in 1999 with our results on the WTP with the survey done in 2002.

5. A study aimed to calculate the elasticity of demand with respect to the entrance fee to national parks by Chase et al. (1998) is a good example that gives us an idea to do the same for our study. Since we have 3 Marine Parks for our study, it is necessary to examine differences in the elasticities of demand for each park so that we can decide whether the entrance fee for all the Marine Parks should be charged the same amount or otherwise.

6. The above literature also helps in choosing the right payment vehicle. The most common payment vehicle used by researchers in valuing recreational sites is an entrance fee. We found that this is the most appropriate vehicle especially if we are doing an on-site survey.

7. A few of the above studies used TCM as a mean of eliciting consumer surplus. In handling the time cost issue, Yaping (1998) found that it is insignificant. This leads to our decision for not to include time as one element of cost, but rather treating time as its own variable. Following Yaping, the present study also includes lodging as one of the costs makes sense because people in developing countries would rather avoid accommodation costs if they can stay with relatives or friends. Therefore,

even though most literatures do not include accommodation, and food and beverages as part of costs, we feel that accommodation should be included because if visitors to a recreational site pay to stay near the place they visited, it indicates that they really value the place highly.

CHAPTER 4

EMPIRICAL STUDY OF MARINE PARKS IN MALAYSIA: OBJECTIVES AND METHODOLOGY

4.1 OBJECTIVE

The general objective of this study is to calculate the recreational values of marine parks in Malaysia. The specific objectives are:

1. to examine tourists perception on the attributes and congestion levels of marine parks in Malaysia.
2. to estimate tourists' willingness to pay (WTP) for the preservation of marine parks in Malaysia.
3. to examine the differences in WTP between foreign and local tourists.
4. to analyse the difference in WTP between two issues: a) crowding and b) inland development.
5. to calculate the WTP and consumer surplus using contingent valuation methods and travel cost methods to examine differences in the calculated welfare measures between each approach.
6. to use the calculated values to determine the 'optimal' entrance fee for marine parks and to determine whether a standard fee may be used for all marine parks or alternatively, whether it is more desirable to charge different fees for different marine parks.

This study used both the Travel Cost Method and the Contingent Valuation Method to elicit WTP because both methods are suitable to estimate landscape amenity values as both methods allows one to elicit both use and non-use values. Even though TCM is more commonly focused for recreational purposes while CVM is more usable for any purposes, it is likely more appropriate to use both for the purpose of this study. Furthermore, the use of both methods has allowed the researcher to compare results from both methods as an attempt to address the issue of "accuracy" in CVM measures. Even though some literature found there are some differences in measures from both methods like Fisher (1996) but some literature found results from both methods to be quite consistent like Thayer (1981) and Seller, Stoll and Chavas (1985).

4.2 METHODOLOGY

4.2.1 Sample Size

Sample size can be crucial in determining the accuracy of the CVM and TCM estimation. Larger sample sizes imply larger costs, but at the same time the larger the correctly-selected sample, the greater the accuracy of estimation would be. However, to the author's knowledge, no specific study has been carried out specifically to address the ideal sample size for dichotomous choice contingent valuation studies and/or travel cost method.

In general, Roscoe in Sekaran (1992) proposes rules of thumb for determining sample size as "larger than 30 and less than 500 are appropriate for most research"; and "for

samples that are broken into sub-samples, a minimum sample size of 30 for each category is necessary". As a further guideline, Calia and Strazzera (1998) in their study on bias and efficiency of single vs. double bound CVM model, define "small size sample" as sample of 100 or less; categorize sample size of 250 – 400 as "medium size sample"; and more than 1000 as "large sample size". They conclude that even for a medium sample size, both single and double bound CVM perform well in giving point estimates for the parameters and of the mean WTP.

According to Ward and Beal (2000), many investigators conducting small to medium-scale (that is, not a national survey) Travel Cost studies like to have 300 – 500 usable records. So, if the response rate were expected to be about 20 per cent, the selected sample to gain 500 records would have to be 2,500. If, on the other hand, the response rate were expected to be about 50 per cent, the selected sample would only have to be 1,000.

In conclusion, given the limited time and budget constraints, we targeted to obtain at least 600 responses for both the TCM and CVM analysis.

4.2.2 Survey Design and Data Collection

The questionnaire was constructed to be as easily comprehensible as possible for the respondents due to past experience on the part of the researcher. Respondents would usually be busy in the water that the time available for them to allocate for answering the questionnaire would be very limited. The questionnaire is constructed in such a way

that the respondents were guided (answers are given in terms of options and they just have to tick boxes). From the pilot study done, respondents take, at most, 15 minutes to complete the questionnaire.

An in-person interview was conducted as we feel that it is very important for the respondents to fully understand the issues in the questionnaire. For this study, there are two issues raised. The issues are set separately in two sets of questionnaires. The issues that the researcher raised are about the effect of too many tourists on the parks; and the effect of inland development on the corals. Both sets of questionnaire have the same questions on section one and two but only the third section has some differences on the issues (Sample of the questionnaires is in Appendix 3).

In both cases, the first section aims to capture the background information on respondents. Questions 1 to 6 are on the country of origin; sex; age; highest education level attained; annual household income; and occupation. Questions 7 to 10(d) concern the respondent's visits to the marine park. How many times have they visited the park is asked in question 7 and 8 and activities that interest the respondent most is the subject of question 9. Questions 10 a to 10 d are on the opinion of the respondents on attributes of the park such as the water visibility; fish species; corals variety and development around the marine park that the respondents visited. This section also gathers information on whether respondents are members of any environmental group and the name of the group, and also whether they have visited other marine parks other than this marine park and the comparison between this park and other parks they have visited.

Section 2 concerns journey information. Questions included are the point where the respondents started their journey, time of the journey and the number of persons they travel with. Respondents' are also asked about their spending to come to this marine park on petrol (if travel is by car); bus fare or flight fare; boat; accommodation; and others; or if they come with a tour package, the price of their package.

The third section as mentioned above is different between the two sets of questionnaire. This section tries to elicit the willingness-to-pay of the respondents to this marine park. The first thing done in this section is the set-up of the hypothetical market for the marine parks. The hypothetical market is crucial since marine parks do not have a well-defined market and it is important for the respondents to understand the issues in the hypothetical market so that they know what they are paying for. The hypothetical market was set up to explain the issue of damage to corals done by human beings. The issue of the effect of inland development on corals is stated in the questionnaire as below:

> *Coral reefs are not only beautiful but also important for many reasons. Most importantly, they provide protection and shelter for many different species of fish. They also control how much carbon dioxide is in the ocean water; protect coasts from strong currents and waves by slowing down the water before it gets to the shore; and hold promise for scientists seeking new drugs to combat disease such as cancer. Furthermore, they also generate income to one's country from tourism industry; second largest to Malaysia.*
>
> *Nearly 80% of the reefs of Southeast Asia, the most species-rich on earth, are at risk, and more than half at high risk. Soil erosion, from deforestation or cultivation on steep slopes, when transported by rivers into coastal waters can smothers corals, preventing oxygen and nutrients from reaching coral polyps and preventing coral larvae from settling and forming new colonies. Sewage discharge from coastal communities promotes growth of algae that blocks sunlight, which corals need to survive.*

One way to protect corals from these kinds of damage is by establishing marine parks, to protect and conserve the marine eco-system, especially coral reefs. ***Right now****, the authority is* ***charging RM5.00*** *(equal to USD 1.30 or less than GBP 1.00) to every visitor to this marine park, but they only take care of the water areas, NOT the inland activity.*

The statement is followed by questions as below:

If the authority wanted to **combat threat to corals in this park from inland activity** by 1) treating sewage before it reaches reefs (which benefits human health too); 2) promoting economic activities that are good for both reefs and people; 3) implementing coastal zone management and planning; 4) and hiring more people to monitor and enforce rules and regulations, AND **increase the charge** to **RMXX** would you be willing to pay to visit this park?

Yes ☐ No ☐

The above questions are to give current scenarios and the hypothetical situations to the respondents. So, if they said "yes", they know what they are paying for; that is paying to reduce the damage to coral reefs. Since the researcher choose to use a referendum format question, pre-chosen amounts of willingness-to-pay are set. The discrete choice nature of the question provides respondents with a straightforward option of "yes" or "no". Less burden is placed on respondents because they are not required to determine their exact maximum willingness to pay, rather only whether they are willing to pay at least the amount asked.

There are 6 different bids given to different respondents randomly. Each respondent only have to say yes or no to the bid posed to them. 6 bids were selected for use:

RM10.00, RM15.00, RM20.00, RM25.00, RM35.00, and RM65.00. The same bids are used in both issues. The charges are chosen based on the previous study done on Payar Marine Park (Ayob et al., 2002) and a pilot study done by this researcher. In a pilot study on 50 respondents, researcher listed possible payment that respondents might be willing to pay above the current fee (RM5.00). The lists are as below and the respondents needed only to circle the highest payment they agreed to pay:

8 10 15 18 20 23 25 28 30 32 35 38 40 42 45 48 50 53 55 60

63 65 68 70 72 75 78 80 83 85 90 100

In the pilot study, the lowest WTP circled was RM8 and the highest WTP circled was RM80. However, only two respondents circled RM80. Therefore, RM10 and RM65 were chosen as the lowest and highest WTP respectively. Same method is used by Hall et al. (2002) to determine bid values; based upon results from pre-testing or pilot test. They used open-ended questions which give them values from USD0 to USD260. They choose to place a bid from USD2 up to USD100.

Since the researcher also chooses the double-bounded discrete-choice elicitation method (Hannemann et al., 1991) besides the single-bounded dichotomous choice valuation, the next question is to increase the WTP by RM5.00 if the respondent said YES to the above question and the next question is decreased the WTP by RM5.00 if the respondent said NO to the above question. The RM5.00 increase and decrease is chosen because of the payment that respondents choose in the pilot test. RM5.00 is considered a minimum increase/decrease that they feel is reasonable. For example if the first question has WTP of RM20.00, the next question is:

If YES, would you be willing to pay RM25.00? Yes ☐ No ☐

If NO, would you be willing to pay RM15.00?

Yes ☐ No ☐

The second issue was raised by putting a statement in the questionnaire as below:

> *Coral reefs are not only beautiful but also important for many reasons. Most importantly, they provide protection and shelter for many different species of fish. They also control how much carbon dioxide is in the ocean water; protect coasts from strong currents and waves by slowing down the water before it gets to the shore; and hold promise for scientists seeking new drugs to combat disease such as cancer. Furthermore, they also generate income to one's country from tourism industry; second largest to Malaysia.*
>
> *But tourism, when unregulated, can pose problems. Tourists are capable of loving a reef to death. Snorkellers can be a threat to the corals by accidentally kicking up sediment that can suffocate the corals. Snorkellers can also stand on the corals. This seems to be the case in Payar, where corals within 1 km from the shore are all dead. Divers also can damage corals by accidentally bumping into reefs because the water they are in is too shallow, or by scraping corals with diving equipment.*

The next questions (question 21 and 22) are posed as below:

21. In 2000, the number if visitor to Payar was 106,780; Redang 52,674 and Tioman 48,942. In your opinion, do you think there are too many people in the park today?

Yes ☐ No ☐

22. **Suppose the authority wants to limit numbers of visitors to half** the number who came in 2000 **to reduce the damage** to the corals, AND **increased the charge** to

RMXX (currently RM5.00 or equal to USD 1.30 or less than GBP1.00) and you were entitled to visit this marine park, would you still have visited today?

Yes ☐ No ☐

This set of questionnaire also uses the double-bounded discrete-choice elicitation method as in the inland development issue. The follow-up questions are done the same way as the inland development issue explained earlier.

The second thing to decide in constructing the questionnaire is to decide on the vehicle payment. There are many different possible bid vehicles namely income tax, value added or sales tax, trust fund payments, property taxes, changes in utility bills and entry charges. Certain bid vehicles are only suitable and viable in a certain given situation. According to Garrod and Willis (1999) the chosen bid vehicle should have a plausible connection with the amenity it is being used to value, and also be perceived to be 'fair' and 'equitable' in its incidence and in relation to those deriving benefits for the proposed good. In this study, the vehicle payment used is the entry fee to the marine park. This vehicle is used because the park has charged RM5.00 per adult since early 2002. Furthermore, since the survey is done on the site, there will be no free raider issue here. So, this study attempts to obtain the consumer surplus[2]. A study by Mathieu, Langford and Kenyon (2000) also used an entrance fee as payment vehicle to elicit consumer surplus while Leon (1996) choose a contribution to a fund to "introduce some neutrality by comparison with other payment vehicle…"

[2] Consumer surplus is defined as the difference between what people would be willing to pay for a good or a service and what they actually pay (Pearce and Turner, 1990).

This section also tried to capture the reasons the respondent were willing to pay the bid posed to them if they say YES to either first bid or second bid and the reasons they do not want to pay if they say NO to both bids. Reasons for not willing to pay at all are as below:

1. I feel the visitors to this marine park do not harm corals
2. I do not believe increasing the fee would solve the problem
3. I do not agree that visitor numbers should be limited
4. I fail to understand the question
5. Other (please specify)

The last reason (other) will also capture protest bids. The respondent can choose more than one answer.

The reason for respondent's willingness-to-pay is as below:

1. For my own benefit
2. For society as a whole
3. For the next generation
4. Others (specify)

Reasons above can be categorised as use-value, option value and bequest value. This will capture the use and non-use value of the respondent's WTP. The respondents can choose more than one answer to the above questions.

Before the main survey was conducted, a pilot study was performed. The pilot study was undertaken in Payar due to its location near to the researcher's home and also because of the season. The pilot test was conducted in December 2002. At this time, Malaysia was under the monsoon season where the east coast of Malaysia had strong winds and rough sea. Due to this, the pilot test was conducted only in Payar because Payar is the only Marine Park on the west coast. The pilot test was used to test whether respondents can understand the questions posed in the questionnaire and also to capture the range of WTP of the visitors. The researcher went to Payar twice for the pilot test in the second and third week of December 2002. 20 questionnaires were collected. Researcher did the survey on her own to get detailed comments on the questionnaire and luckily the visitors were very cooperative.

After the pilot test, minor corrections were made and sets of WTP bids were chosen. A major correction was on the description of the issues; it was shortened due to the respondent's complaint for having to read long passages. Therefore the researcher decided to make it as short as possible.

In-person interviews of foreign and local tourists were carried out in three of the main marine parks in Peninsular Malaysia. The three marine parks chosen for this study are Payar, Redang and Tioman. They are chosen for the following reasons:

1. Locations – Payar is located in the west coast of West Malaysia while Redang and Tioman are in the east coast of Peninsular Malaysia.
2. Attractions – the three marine parks have some degree of differences and similarities.

3. Fees – all three parks charge their visitors some conservation fees in the form of an entrance fee.

The first survey was done in Payar within 2 months starting from 2nd January 2003. The researcher went 7 times to Payar and managed to get 206 questionnaires filled. Only 205 are used since one of the questionnaires are not fully filled. It is pretty hard for the researcher to approach the visitors due to the situation in Payar where visitors normally have only 4 to 5 hours only on the beach. Payar, being a very small island without fresh water facilities, has only day trip visitors. The visitors normally arrived in Payar between 10 and 11 in the morning and left at 3 or 4 in the afternoon. At all times, visitors are busy in the water or on the beach for lunch. The researcher will have to wait for the visitors who relax on the beach to be interviewed. Therefore, the researcher and the two enumerators approached those who appear convenient to be interviewed with no particular specification chosen for sampling.

For Tioman, the number of days on which the survey was undertaken was longer because the researcher had the help of an officer of the Fisheries Department, Malaysia to distribute the questionnaires through students undertaking practical study in Tioman. The time range for survey in Tioman took two months between early May until the end of June. The researcher gave briefings to those students about the questionnaire and how to approach the visitors and what to answer if being asked by the visitors. But from the researcher's experience in Payar, the questionnaire can be self-administered and the visitors normally do not ask any questions. Tioman is quite a big island with five jetties all around the island. Places that have resorts are Tekek, Salang, Juara, Mukut and

Genting. The questionnaire was distributed at all these five places. The researcher went to Tioman for a week in the first week of May to monitor the survey and collected the filled questionnaires in from the Fisheries Officer at end of June. A total of 245 questionnaires were collected but only 233 are used since the 12 are not fully completed.

The researcher went to Redang on the 21 May 2002 with two enumerators. The enumerators were university students doing their masters degree in economics and were briefed by the researcher. The researcher and the enumerators stayed in quarters for staff of Fisheries Department in Pinang Island until 28 May 2002. The questionnaires were mostly distributed in front of the Marine Park Office in Pinang Island because most visitors are brought there by the tour operator since this location is rich in corals and fishes. That is also a place where the RM5.00 environmental charge is currently collected. Besides that, the staffs of the Fisheries Department were kind enough to bring the researcher and the enumerators to Perhentian Island and Redang Island for the survey to be done. A total of 217 questionnaires managed to be collected with useable questionnaires of 212.

To survey at least 600 respondents with a very limited budget is not an easy task. We managed to obtain the assistance of two masters students that were studying for their Masters in Economics in Universiti Utara Malaysia. We offered them explanation and instruction of the questionnaire and brought them to the marine parks to do the interview, along with the principle investigator. All together, we manage to collect 650 usable questionnaires to be analysed.

4.2.3 Method

This study used both the travel cost method (TCM) and contingent valuation method (CVM). Econometric estimation is undertaken using the LIMDEP program. We analyze foreign visitors and local visitors separately. This is due to the fact that there are differences in independent variables within these subgroups that can influence the dependant variable, and, we expect, differences in behavior and preferences.

4.2.3.1 Travel Cost Method

For TCM, both zonal and individual TCM is adopted. The individual model is based on individual or micro data for annual trips, trip costs and other socio-economic variables. From these, one directly estimates a price-quantity relationship for a typical individual. An alternative method presented first by Bell and Leeworthy (1990) utilizes the number of days on-site as the dependant quantity variable and cost per day on-site as the independent own-price variable rather than number of trips as the dependant variable as in the ITCM. They present this approach as a means of analyzing tourists that come from long distances to use beach resources in travel cost models (further discussion can be found in Chapter 2 page 46). Even though the approach taken by Bell and Leeworthy sounds promisingly suitable for our study, we decided not to adopt this approach for one good reason; Payar Marine Park, one of the parks in our study, is strictly visited by day trippers only. This is due to lack of fresh water in the island of Payar and the unavailability of hotels or chalets for overnight stays. Therefore, we think it is more appropriate and best to use the individual TCM.

Zonal methods are a commonly used alternative to individual travel cost methods. This is due to cases where households or individuals take only one or at most a few trips per year. A zonal method involves individuals being grouped into "zones" so that the variable's 'average travel cost per zone' and 'visits per thousand population per zone per year' are used in the regression analysis. Our study adopts both methods because the ITCM can be used to estimates the consumer surplus that can reflect the WTP of respondents to the marine parks. In contrast for ZTCM, we calculate the price elasticity of demand of each park in study. Since the ZTCM can also be used for calculating the consumer surplus, we present here the estimation of consumer surplus using ZTCM.

4.2.3.1.1 Zonal Travel Cost Method

This method implicitly assumes that all visitors from each zone have the same probability of visiting and the same travel cost. The general model of zonal TCM is as below:

$$VISITS_a = f(POP_z, TOTALSPE_z, P)$$

where $VISITS_a$ = number of visits made from each zone to site a for a year

POP_Z = population in zone Z

P = entry price

$TOTALSPE_Z$ = travel costs from zone Z

Zonal TCMs divide the area around the site to be valued into 'zones of origin'. These zones might be concentric zones radiating from the site, or they might be 'local

government administrative districts' (see Lansdell and Gangadharan, 2003 for a survey). For this study, zones are divided according to local government administrative districts. This is because it is easier to get population and demographic data for these zones. There are 14 states in Malaysia. Besides states in Malaysia, the study also included foreign countries that have visitors to the marine parks in study. The lists of zones are as below. These countries represent most respondents that are interviewed. Countries with two or less trips are not included.

Table 4.2: Number of Trips Made to Each Parks from the Survey

Country/States **States in Malaysia**	**Trip toTioman**	**Trip to Payar**	**Trip to Redang**
Johor	14	1	10
Kedah	2	27	6
Kelantan	1	3	2
Kuala Lumpur	22	12	76
Melaka	2	1	1
Negeri Sembilan	0	2	11
Pahang	5	3	2
Penang	3	19	9
Perak	4	12	16
Perlis	0	9	1
Sabah	1	1	1
Sarawak	0	1	5
Selangor	11	33	38
Terengganu	1	1	13
Rest of the World			
Thailand	0	0	2
Singapore	56	7	10
Indonesia	0	0	1
Australia	8	15	1
Austria	0	2	0
Canada	4	0	1
Denmark	16	0	1
Finland	5	5	1

France	9	1	0
Germany	16	6	2
India	8	1	1
China	1	6	7
Japan	1	21	1
Hong Kong	0	3	0
Netherlands	9	10	3
New Zealand	0	4	0
Norway	1	3	0
Russia	1	6	0
Sweden	12	4	2
Switzerland	15	2	0
UK	53	14	12
US	6	7	1

In general, Kuala Lumpur has the highest number of visitors to marine parks. Kuala Lumpur is a metropolitan city and is the capital of Malaysia. Working citizens from the city typically can afford to take holidays and are used to doing so and these parks are a getaway from city life. Transportation facilities are also readily available. For example there is a direct flight from Kuala Lumpur to Langkawi Island, the gateway to Payar; and a direct flight to Tioman; and many land transportation options to Terengganu, gateway to Redang.

For Tioman, the second highest number of visitors is from Johor. This makes sense because Tioman is near to Johor. One of the gateways to Tioman is Mersing, which is in Johor. The highest local visitors to Payar are from Selangor. The second highest is from Kedah; the state where Payar is located. For Redang, visitors from Kuala Lumpur are the highest number of our respondents. Redang is located in Terengganu but visitors from Terengganu are much less compared to visitors from Kuala Lumpur.

For foreign visitors, respondents from Singapore represent the highest number in Tioman. This is not surprising since it takes only one and a half hours by boat from Singapore to Tioman and there are also regular daily trips straight from Singapore to Tioman. Payar seems to be a popular attraction for Japanese visitors. This is likely to be because Langkawi Island, the main gateway to Payar, has a high visit rate by Japanese.

Travel costs were calculated as cost per kilometer traveled (if people come by car) or flight fare if they come by flight, boat fee, and accommodation cost; or package cost if the respondents come by package. Cost of travel by car per kilometer is 55 cents per kilometer. This figure is taken from the cost the government pays to government servants for their traveling expenses which are supposed to include petrol and cars' wear and tear. We take this to represent the marginal costs of travel.

Not all visitors come only to the marine parks in study especially the foreign visitors. Most foreign visitors visit marine parks as part of their holiday in Malaysia. Normally, they visit Kuala Lumpur, Kuala Terengganu, Kelantan and Pahang beaches for those who visit Tioman Marine Park or Redang Marine Park. Those who visited Payar Marine Park also stayed and visited other places in Langkawi Island. This study used proportions suggested by Sturgess (1999) for multiple destinations by regional park as in Table 4.3b below for foreign visitors, as they normally made multiple trips. From the literature, there is no single accepted method of allocating costs between visits. Shoeckl (1993) allocated costs according to the time spent on the island as a proportion of the total time spent at sites nominated by visitors as being important to their trip (Bennett, 1995). Bennett divided the total costs of a trip according to the relative importance of

the different destinations visited, as stated by the visitors. Sturgess (1999) did not have data on the other destinations that the visitors went to, to use either of these methods, as with this study. Sturgess made an assumption about the proportion of trips made by visitors traveling the distances in the two zonal models (Melbourne or City and Non-Melbourne or Regional) as shown in the tables below.

Table 4.3a Multiple Destinations for City Parks

Zone	Distance	% V	Av dest
1	5	100	1
2	9	100	1
3	13	100	1
4	17	100	1
5	21	100	1
6	25	100	1
7	50	100	1
8	100	90	1.1
9	250	70	1.43
10	250+	50	2

Table 4.3b Multiple Destinations for Regional Parks

Zone	Distance	% V	Av dest
1	50	100	1
2	100	100	1
3	150	90	1.1
4	200	80	1.25
5	250	70	1.43
6	300	60	1.67
7	800	50	2
8	1300	40	2.5
9	1800	30	3.3
10	1800+	20	5

Source: Sturgess (1999)

In the literature there is a rigorous debate about the cost of time in travel cost models generally. Including time costs in the model leads to the same problem that is involved

in valuing parks themselves: that is, time has no conventional market price and its price varies between individuals and situations (Lansdell and Gangadharan, 2003). A few approaches had been applied by several researchers, including assuming that time can be valued at a fraction (usually between ¼ and ½) of the wage rate. However, there are numerous difficulties with this approach (Bockstael, Strand, & Hanemann, 1987; Lew & Larson, 2005; Shaw, 1992). Other approach includes the use of labor supply model (Feather & Shaw, 1999) and the use of stated preference data (Alvarez-Farizo, Hanley, & Barberan, 2001; Shaw 1992; Casey, Tomislav & Danielson, 1995). Even though using stated preference data seems promising, difficulties still exist, including an increased cognitive burden associated with adding questions to travel costs surveys. The consensus is that the opportunity time cost component of travel cost has been its weakest part, both empirically and theoretically. As cited from Fletcher et al. (1990), "Site values may vary fourfold, depending on the value of time." And from Randall (1994), "... the cost of travel time remains an empirical mystery."

Therefore in ZTCM method, to overcome disagreements and criticisms of the opportunity time value component of travel cost, a model that eliminates the difficult-to-measure marginal value of income from the time cost value was utilized. Instead of attempting to estimate a "money value of time" for each individual in the sample we simply entered the actual time required for travel to the fishing site as first suggested by Brown and Nawas (1973), and Gum and Martin (1975). This is consistent with that of a number of other practitioners including Siderelis and Moore (1995), Whitten and Bennett (2002), Fleming and Cook (2008) and is also consistent with the findings of Beal (1995). Further discussions are found in Chapter 2.

We use ZTCM to calculate the price elasticity of demand of both the foreign and local visitors to each of the parks in our study, and also to calculate the average consumer surplus. It is suitable for our study since more than half of our respondents are first time visitors (refer to Chapter 5). Our study will use four functional forms for the ZTCM; linear, double log, log-linear and linear-log and the models are as below:

$$VISITS = \beta_0 + \beta_1 TOTALSPE$$

$$Log(VISITS) = \beta_0 + \beta_1 Log(TOTALSPE)$$

$$Log(VISITS) = \beta_0 + \beta_1 TOTALSPE$$

$$VISITS = \beta_0 + \beta_1 Log(TOTALSPE)$$

Where

VISITS	= dependent variable, number of visits made in the last 12 months
TOTALSPE	= respondent's total spending, which includes air/bus fare or petrol expenses, boat fare, accommodation on the island or package price if respondent came by package
Log(VISITS)	= natural log of VISITS
Log(TOTALSPE)	= natural log of TOTALSPE
β_i	= the coefficient estimates

The estimation of consumer surplus from the ZTCM in this paper closely follows the step listed out in Appendix E in Morris (1992) using the semi-log functional form as follows. However, this paper uses number of visits (VISITS) and total spending (TOTALSPE), instead of quantity and price as in Morris:

$$\text{Log(VISITS)} = \beta_0 + \beta_1 \text{ TOTALSPE , or} \quad (1)$$

$$VISITS = e^{B_0 + B_1 TOTALSPE} \quad (2)$$

An incremental change in consumer surplus (CS) due to a change in total spending for a given quantity of visits can be written as:

$$d\text{CS} = \text{VISITS} \,.\, d\text{TOTALSPE} \quad (3)$$

Integrating equation (3) produces CS as:

$$CS = \int dCS = \int_{TOTALSPE_1}^{TOTALSPE} VISITS.dTOTALSPE \quad (4)$$

The upper limit of integration is the choke or cut-off total spending, where VISITS equals to zero. The lower limit of integration defines the lower boundary of the CS area. Substituting equation (2) into equation (4) results in:

$$CS = \int_{TOTALSPE_1}^{TOTALSPE} e^{\beta_0 + \beta_1 TOTALSPE} dTOTALSPE \quad (5)$$

Next step produces:

$$CS = e^{\beta_0} \int_{TOTALSPE_1}^{TOTALSPE} e^{\beta_1 TOTALSPE} dTOTALSPE = \frac{1}{\beta_1} e^{\beta_0 + \beta_1 TOTALSPE} \Big|_{TOTALSPE_1}^{TOTALSPE} \quad (6)$$

Assessing equation (6) at both limits of integration:

$$CS = \left(\frac{1}{\beta_1} e^{\beta_0 + \beta_1 TOTALSPE} \right) - \left(\frac{1}{\beta_1} e^{\beta_0 + \beta_1 TOTALSPE_1} \right) \quad (7)$$

As the upper limit increases towards infinity for $\beta_1 < 0$:

$$\lim_{TOTALSPE \to \infty} e^{\beta_0 + \beta_1 TOTALSPE} = 0 \quad (8)$$

Substituting equation (2) in equation (7) gives:

$$CS = -\frac{1}{\beta_1}\left(e^{\beta_0+\beta_1 TOTALSPE_1}\right) = -\frac{VISITS}{\beta_1} \quad (9)$$

Therefore, the average consumer surplus per trip per person can be calculated as:

$$ACS = \frac{CS}{VISITS} = -\frac{VISITS}{\beta_1}\left(\frac{1}{VISITS}\right), \text{ or} \quad (10)$$

$$ACS = -\frac{1}{\beta_1} > 0 \text{ since } \beta_1 < 0 \quad (11)$$

4.2.3.1.2 Individual Travel Cost Method

The individual model is based on individual or micro data for annual trips, trip costs and other socio-economic variables. One advantage of using ITCM compared to ZTCM is that it is possible to include environmental attributes as explanatory variables assuming these are rated by respondents. It can also be used to calculate the consumer surplus per person for each visit from where it is then possible to transform into WTP for each park (since zonal models have a weak link to individual welfare measures). From these, one can directly estimate a price-quantity relationship for a typical individual. The basic premise of the TCM is that the number of trips to the recreation site will decrease with increases in distance traveled (Loomis & Walsh, 1997). The general form of the travel cost model is (Fix & Loomis, 1998):

Annual trips = f(travel costs, travel time, demographics, environmental attributes)

An important modeling issue for ITCM is a non-negative integers observed in individual recreational data (Hellerstein, 1991). For that matter, we applied a count data estimators since the count data models have been shown to provide a better modeling approach compared to traditional OLS regression procedures (Shaw, 1988; Grogger and Carson, 1991) and are particularly amenable to aggregated socio-economic data (Hellerstein, 1991). Count data models have been widely used to estimate demand for recreational amenities. See for example, Loomis et al. (2000) for whale watching; Chakraborthy and Keith (2000) for mountain biking; Font (2000) for national park recreation; and Meisner and Wang (2008) for water-based recreation. Our data are estimated using both Poisson and Negative Binomial estimates. In line with Chakraborty and Keith (2000), Fix and Loomis (1998) and Shrestha et al. (2002), since our data is collected from the people who actually visit the site, we also use the traditional models for truncation. The models are truncated at 0, as the data begins at 1 because everybody has visited the park at least once.

The generalized linear form of Poisson model is given by:

$$\mu_i = \exp(\beta_0 + \sum_{j=1}^{n} x_{ij}\beta_j)$$

where μ_i is the mean number of visits at marine park i in the last twelve months, x_{ij} are the values of the independent variables and β_j are coefficients to be estimated. In the Poisson distribution, the variance in the number of trips to the marine park is equal to the mean μ_i in the form of:

$$P(y_i) = \frac{\exp(-\mu_i)(\mu_i)^{y_i}}{y_i!}$$

where P(y_i) is the probability of y_i trips to the marine park. The Negative Binomial distribution adds a quadratic term to the variance representing over-dispersion. The Negative Binomial model takes the form:

$$P(y_i) = \frac{\Gamma(yi + \frac{1}{K})}{y_i!\Gamma\frac{1}{K}}(\frac{K\mu_i}{1+K\mu_i})^{y_i}(\frac{1}{1+K})^{\frac{1}{K}}$$

where K is the over-dispersion parameter and the variance is:

$$\mu_i + K(\mu_i)^2$$

If K equals zero, the Negative Binomial reduces to the Poisson model. The larger the value of K the more variability there is in the data over and above that associated with the mean μ_i.

The variables in our ITCM models are as listed below:

VISITS = dependent variable, number of visits made in the last 12 months

DUMRED = 1 if respondent is surveyed in Redang Marine Park, 0 otherwise

DUMTIOM = 1 if respondent is surveyed in Tioman Marine Park, 0 otherwise (recall there are three sites)

SEX = 1 if male, 0 if female

AGE = age range of the respondent, where 1 = < 20, 2 = 21 – 29, 3 = 30 – 39, 4 = 40 – 49, 5 = 50 – 59, 6 = > 60

DUMEDU = 1 if respondent received college degree or higher, 0 otherwise

INCOME = annual household income of the respondent in Malaysian Ringgit

DUMOCC = 1 if the respondent is in employment, 0 otherwise

DIVING = 1 if they come to the park for diving, 0 for other activities

WATERVIS = respondent's opinion on the quality level of the water visibility at the time they are at the park, where 1 = very clear, 2 = clear, 3 = cloudy, 4 = very cloudy

FISHSPEC = respondent's opinion on the fish species varieties at the time they are at the park, where 1 = amazingly many, 2 = many, 3 = not too many, 4 = very few

CORALSVA = respondent's opinion on the level of coral varieties at the time they are at the park, where 1 = amazingly many, 2 = many, 3 = not too many, 4 = very few

DEVELOPM = respondent's opinion on the level of development of the surroundings at the time they are at the park, where 1 = hardly any development, 2 = not much development, 3 = developed, 4 = very developed

ENVGROUP = 1 if member of any environment group, 0 otherwise

VISITOTH = 1 if respondent has visited other marine park in the world, 0 otherwise

TRAVELFR = 1 if respondent has travelled straight from home, 0 otherwise

TIME = travel time in hour

TOTALSPE = respondent's total spending, which includes air/bus fare or petrol expenses, boat fare, accommodation on the island or package price if respondent came by package

4.2.3.2 Contingent Valuation Method

We obtain separate WTP estimates for quality charges of the two issues being analysed (over-crowding and inland development). In addition, we also do estimation separately for local and foreign respondents.

4.2.3.2.1 Single-Bounded Dichotomous Choice Model

This study will use a standard approach to the single-bounded dichotomous choice WTP elicitation. We assume that there exists a distribution of WTP, denoted by W across the population of visitors to the marine parks in Malaysia, with a mean $\mu_W = X\beta$ and a variance σ^2_W:

(1) $$W = X'\beta + \varepsilon ,$$

Where ε has a cumulative distribution function (CDF) with the mean and variance $\varepsilon \sim \text{CDF}(0,\sigma^2_W)$. The term $X'\beta$ is a scalar found by multiplication of a transposed matrix of explanatory variables multiplied by a vector of parameters.

If the probability density function (PDF) is bell-shaped, the CDF will be S-shaped, with values that fall between zero and one. Two distributions that are typically used are the normal random variable and the logistic also used in our study.

The PDFs for the logistic and normal random variables with the mean equal to zero and variance σ^2 are given by:

(2) $$f(z) = e^z /(1+e^z)^2$$

(3) $$g(z) = \exp(-z^2 / 2\sigma^2)/(2\pi\sigma^2)^{1/2}$$

The CDFs, respectively, give the probability that the random variable takes on a value less than or equal to z, $P(Z \le z)$ and is geometrically equal to the area under the bell-shaped PDF to the left of z :

(4a) $$P(Z \le z) = \int_{-\infty}^{z} \{e^{y} /(1+e^{y})^{2}\} dy \equiv F(z) = e^{z} /(1+e^{z})$$
$$= 1/(1+e^{-z}),$$

where

(4b) $$P(Z > z) = 1 - P(Z \le z) = 1 - 1(1+e^{-z}) = 1/(1+e^{z}),$$

and

(5) $$P(Z \le z) = \int_{-\infty}^{z} \exp(-y^{2} / 2\sigma^{2}) /(2\pi\sigma^{2})^{1/2} dy \equiv G(z),$$

where *y* is just a variable of integration. For symmetric PDFs, the mean, median, and mode all occur at the same value, which is the case for the normal and logistic functions. The maximum value of the PDF is higher for the standard normal random variable because the tails for logistic PDF (2) are fatter than the normal PDF (3).

W from the WTP, is the unobserved or latent variable. What we observe is either "yes" or "no" to the asking price, A. To connect the underlying latent variable model to the CDF, the conditional probability of a randomly selected visitor responding "yes" is just the probability that the visitor's unobservable WTP is greater than the asking price. From (4b),

(6) $$P(Yes \mid X) = P(W > A) = P(X'\beta + \varepsilon > A)$$
$$= P(\varepsilon > A - X'\beta) = P(\varepsilon/\sigma > A/\sigma - X'\beta/\sigma)$$
$$= P(Z > A/\sigma - X'\beta/\sigma) = 1/(1+\varepsilon^{A/\sigma - X'\beta/\sigma})$$

To actually undertake the estimation, we use the LIMDEP computer package, using both Logit and Probit routines that estimate the parameters σ and β and provide "probability values" to test the hypotheses that the vector of parameters β equal zero (the LIMDEP programme is in Appendix 4). The approach is a form of maximum likelihood non-linear estimation. The Logit model takes the form of log odds (probability of saying "yes" vs. "no")

$$n_i = \log it(p_i) = \log\left(\frac{p_i}{1-p_i}\right)$$

while assuming a linear relationship between n_i and the independent variables

$$n_i = \sum_{k=1}^{K} \beta_k x_{ik}$$

Solving for p_i we get

$$p_i = \frac{\exp(\sum_{k=1}^{K} \beta_k x_{ik})}{1+\exp(\sum_{k=1}^{K} \beta_k x_{ik})}$$

This yields a Logit regression model or a generalized linear model with the Logit link function. The Probit model is a bit more complicated. It uses a CDF of standard normal distribution

$$n_i = probit(p_i) = \phi^{-1} p_i$$

where

$$\phi(n_i) = \int_{-\infty}^{n_i} \frac{1}{\sqrt{2\pi}} \exp(-\frac{1}{2}u^2)du$$

or

$$p_i = \phi(\sum_{k=1}^{K} \beta_k x_{ik})$$

where p_i = probability of saying "yes" to the bid amount

β_k = coefficients to be estimated

x_{ik} = variables that influence the probability including the bid amount

The expected value or mean of WTP and the median are calculated using formula from Hanemann (1984);

$$\text{Mean WTP} = \ln[1+\exp(\beta_0)]/|\beta_1|$$

$$\text{Median WTP} = \beta_0/|\beta_1|$$

where β_1 is the coefficient estimate on the bid amount and β_0 is the estimated constant or the grand constant calculated as the sum of the estimated constant plus the product of the other independent variables times their respective means.

4.2.3.2.2 Double-Bounded Dichotomous Choice Model

The double-bounded dichotomous choice model is an extension of the single-bounded dichotomous choice model. In this model, respondents are presented with two levels of bid where the second bid is contingent upon the response to the first bid. If the individual responds "yes" to the first bid, the second bid (denoted B_i^u) is an amount greater than the first bid ($B_i < B_i^u$); if the individual responds "no" to the first bid, the second bid (B_i^d) is some amount smaller than the first bid ($B_i^d < B_i$).

Thus, there are four possible outcomes: (a) both answers are "yes"; (b) both answers are "no"; (c) a "yes" followed by a "no"; and (d) a "no" followed by a "yes". The likelihoods of these outcomes are denoted γ^{yy}, γ^{nn}, γ^{yn}, γ^{ny}, respectively. Given the assumption that each respondent is maximizing their utility, the formulas for these likelihoods are as follows. In the first case, we have $B_i^u > B_i$ and

$$\begin{aligned}\gamma^{yy}(B_i,B_i^u) &= \Pr\{B_i \leq \text{max WTP and } B_i^u \leq \text{max WTP}\} \\ &= \Pr\{B_i \leq \text{max WTP} | B_i^u \leq \text{max WTP}\}\ \Pr\{B_i^u \leq \text{max WTP}\} \\ &= \Pr\{B_i^u \leq \text{max WTP}\} = 1 - G(B_i^u,\theta)\end{aligned}$$

since, with $B_i^u > B_i$, $\Pr\{B_i \leq \text{max WTP} | B_i^u \leq \text{max WTP}\} \equiv 1$. Similarly, with $B_i^u < B_i$, $\Pr\{B_i^d \leq \text{max WTP} | B_i \leq \text{max WTP}\} \equiv 1$. Hence,

$$\gamma^{nn}(B_i,B_i^d) = \Pr\{B_i > \text{max WTP and } B_i^d > \text{max WTP}\} = G(B_i^d,\theta).$$

When a "yes" is followed by a "no", we have $B_i^u > B_i$ and

$$\gamma^{yn}(B_i,B_i^u) = \Pr\{B_i \leq \text{max WTP} \leq B_i^u\} = G(B_i^u;\theta);$$

and when a "no" is followed by a "yes", we have $B_i^d < B_i$ and

$$\gamma^{ny}(B_i,B_i^d) = \Pr\{B_i \geq \text{max WTP} \geq B_i^d\} = G(B_i;\theta) - G(B_i^d;\theta).$$

Given a sample of N respondents, where B_i, B_i^u, and BID are the bids used for the *i*th respondent, the log-likelihood function takes the form

$$\ln L^D(\theta) = \sum_{i=1}^{N} \{d_i^{yy} \ln \gamma^{yy}(B_i, B_i^u) + d_i^{nn} \ln \gamma^{nn}(B_i, B_i^d) + d_i^{yn} \ln \gamma^{yn}(B_i, B_i^u) + d_i^{ny} \ln \gamma^{ny}(B_i, B_i^d)\},$$

where $d_i^{yy}, d_i^{nn}, d_i^{yn}$ and d_i^{ny} are binary-valued indicator variables. The ML estimator for the double-bounded model, θ^D, is the solution to the equation $\partial \ln L^D(\theta^D)/\partial\theta = 0$ subject to $\partial^2 \ln L/\partial Q^2 < 0$.

The double-bounded dichotomous choice model is estimated using log-normal and also log-logistic model.

The mean for the double bounded approach is calculated as the area under the probability function of accepting the bid using integration technique. The area shows the proportion of the population who would consume the good at each price level, and their associated utility. It can be expressed as:

$$E(WTP) = \int_{L}^{U} (1 + e^{a+bWILLING})^{-1} db$$

where $(1+e^{a+bWILLING})^{-1}$ is the probability of saying "yes" and U and L are the upper and lower limits of the integration respectively. Whereas the median is as follows:

$$\alpha/B_1$$

Since in our analysis, we include covariates, α is a linear function of the covariates, instead of the intercept. That is $\alpha = X\beta$ where X is a vector of covariates and β is a vector of parameters.

The variables used in our study are as listed below:

WILLING1 = dependant variable with 1 if respondent is willing to pay for the amount asked to them, 0 otherwise

DUMRED = 1 if respondent is surveyed in Redang Marine Park, 0 otherwise

DUMTIOM = 1 if respondent is surveyed in Tioman Marine Park, 0 otherwise

SEX = 1 if male, 0 if female

AGE = age range of the respondent, where 1 = < 20, 2 = 21 – 29, 3 = 30 – 39, 4 = 40 – 49, 5 = 50 – 59, 6 = > 60

FL = 1 if respondent is not from Malaysia (foreign visitor), 0 otherwise

DUMEDU = 1 if respondent received college degree or higher, 0 otherwise

ISSUE = 1 for inland development issue, 0 for crowding issue

INCOME = annual household income of the respondent in Malaysian Ringgit

DUMOCC = 1 if the respondent is in employment, 0 otherwise

FIRST = 1 if this is the first visit to the park; 0 otherwise

TWELVE = number of times respondents have visited the park in the last 12 months

DIVING = 1 if they come to the park for diving, 0 for other activities

WATERVIS = respondent's opinion on the quality level of the water visibility at the time they are at the park, where 1 = very clear, 2 = clear, 3 = cloudy, 4 = very cloudy

FISHSPEC = respondent's opinion on the fish species varieties at the time they are at the park, where 1 = amazingly many, 2 = many, 3 = not too many, 4 = very few

CORALSVA = respondent's opinion on the level of coral varieties at the time they are at the park, where 1 = amazingly many, 2 = many, 3 = not too many, 4 = very few

DEVELOPM = respondent's opinion on the level of development of the surroundings at the time they are at the park, where 1 = hardly any development, 2 = not much development, 3 = developed, 4 = very developed

ENVGROUP = 1 if member of any environment group, 0 otherwise

VISITOTH = 1 if respondent has visited other marine park, 0 otherwise

TRAVELFR = 1 if respondent has travelled straight from home, 0 otherwise

CROWD = respondent's opinion on the amount of visitors at the time they are at the park, 1 = too many visitors, 0 = not too many visitors

TOTALSPE = respondent's total spending, which includes air/bus fare or petrol expenses, boat fare, accommodation on the island or package price if respondent came by package

LBD = log of bid amount offer to respondents. There are 5 sets of bid; RM10, RM15, RM20, RM35, RM65

CHAPTER 5

DESCRIPTIVE ANALYSIS

This chapter focuses on the statistical results for respondents' background and the descriptive results of the survey. This chapter is organised as follows. The first section presents the descriptive statistics followed by discussions.

5.1 SOCIO ECONOMIC CHARACTERISITICS OF RESPONDENTS

A total of 650 questionnaires were usable for analysis. From this total, 205 were collected in Payar, 212 in Redang and 233 in Tioman. This section will cover the gender and age of the respondents, their origin, education background and occupation for all questionnaires.

5.1.1 Profiles of Respondents for Payar, Tioman and Redang

From a total of 650 respondents, 52.6 percent are foreign tourists and 47.4 percent are local tourists. Tioman was found to have the highest proportion of foreign respondents (73.8%) followed by Payar where 60.5 percent of the respondents are foreigners. The opposite is for Redang where 78.3 percent of the respondents are local visitors. The highest proportion of foreign respondents are from the United Kingdom (21.6%) followed by Singapore (11.7%). The highest local visitors are from the capital of Malaysia, Kuala Lumpur (28.9%) followed by Selangor (21.5%).

Table 5.1: Respondents Characteristics of Each Park

Variable	Payar	Redang	Tioman	Total
Respondents	205	212	233	650
Origin: Foreign (%)	60.5	21.7	73.8	52.6
Local (%)	39.5	78.3	26.2	47.4
Sex: Male (%)	50.2	45.8	54.5	50.3
Female (%)	49.8	54.2	45.5	49.7
Age: < 20 (%)	2.4	5.2	9.4	5.8
21 – 29 (%)	47.3	58.0	45.9	50.3
30 – 39 (%)	25.4	23.1	29.6	26.2
40 – 49 (%)	16.6	9.4	8.2	11.2
50 – 59 (%)	5.9	3.3	4.7	4.6
< 60 (%)	2.4	0.9	2.1	1.8
Education: Primary (%)	2.0	0	1.3	1.1
Secondary/high school (%)	20.5	25.9	23.6	23.4
College/polytechnic (%)	20.0	29.2	20.6	23.2
University (%)	57.6	44.8	54.5	52.3
Occupation: Self employed (%)	17.6	17.5	15.5	16.8
Government servant (%)	15.6	9.4	18.5	14.6
Student (%)	10.2	25.5	21.5	19.2
Private sector (%)	45.4	40.1	35.2	40.0
Retired (%)	2.0	0.9	3.0	2.0
Housewife (%)	3.4	0.9	2.1	3.4
Unemployed (%)	3.9	5.7	3.4	4.3
Other (%)	2.0	0	0.9	0.9

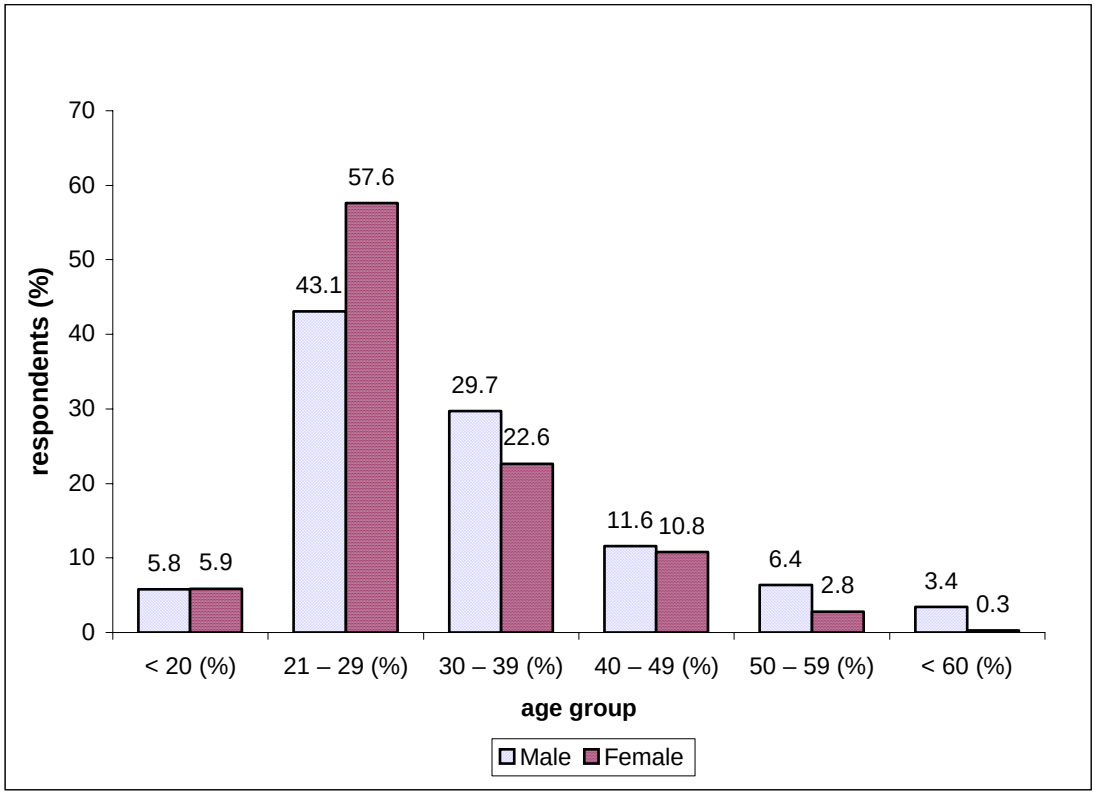
Of the total number of 650 respondents, 50.3 percent are males and 49.7 percent are females. A majority (76.5%) of the respondents are in the 20 – 39 years age group. Only 5.8 % are below 20 years old and 6.4% are over 50 years old. The over 50 year of age respondents are mostly foreigners (9.9%) compared to only 2.5% locals (refer to Table 5.2). This coincides with the statistics on occupation where 3.2% retirees are foreigners and only 0.6% is locals. This study also found that more than half of the respondents (75.5%) are highly educated, with at least a post-secondary education. Only 1.1% has a minimum of primary education, all of them are foreign visitors as shown in Table 5.2.

Table 5.2: Respondents' Age, Education and Occupation by Origin

Variable	Foreign	Local
Age: < 20 (%)	7.3	4.2
21 – 29 (%)	42.7	58.8
30 – 39 (%)	27.5	24.7
40 – 49 (%)	12.6	9.7
50 – 59 (%)	7.0	1.9
> 60 (%)	2.9	0.6
Education: Primary (%)	2.0	0
Secondary/high school (%)	19.6	27.6
College/polytechnic (%)	20.2	26.6
University (%)	58.2	45.8
Occupation: Self employed (%)	14.6	19.2
Government servant (%)	16.7	12.3
Student (%)	17.3	21.4
Private sector (%)	39.2	40.9
Retired (%)	3.2	0.6
Housewife (%)	2.6	1.6
Unemployed (%)	5.0	3.6
Other (%)	1.5	0.3

As for occupation, the highest number or 40% of the respondents report working in the private sector. The second largest respondents are students (19.2%) followed by self-employed (16.8%). The percentage of retirees, housewives and unemployed are higher among the foreign visitors compared to locals. The higher number of retired persons among the foreign tourists coincides with a higher percentage in foreign visitor's aged above 50 in Table 5.1.

Figure 5.1: Age Group Distribution between Gender



From Figure 5.1, equal percentages of respondents are found in the age range of less than 20, and in the range of 40 to 49 years of age. Higher female respondents are in the age range of 21 to 29, while the opposite are seen in the age range of 30 to 39. Less female respondents can also be seen for the age above 50.

5.1.2 Activity of Interest at Each Park

This section covers activities of interest at each island and the respondents' perception on attributes of the park they visited. In the questionnaire, the researcher asked respondents to choose only three activities that interest them most. Some of them only

chose one activity, this is apparent for those who chose diving as their activity of interest.

Table 5.3: Respondents' Activities of Interest in Each Park

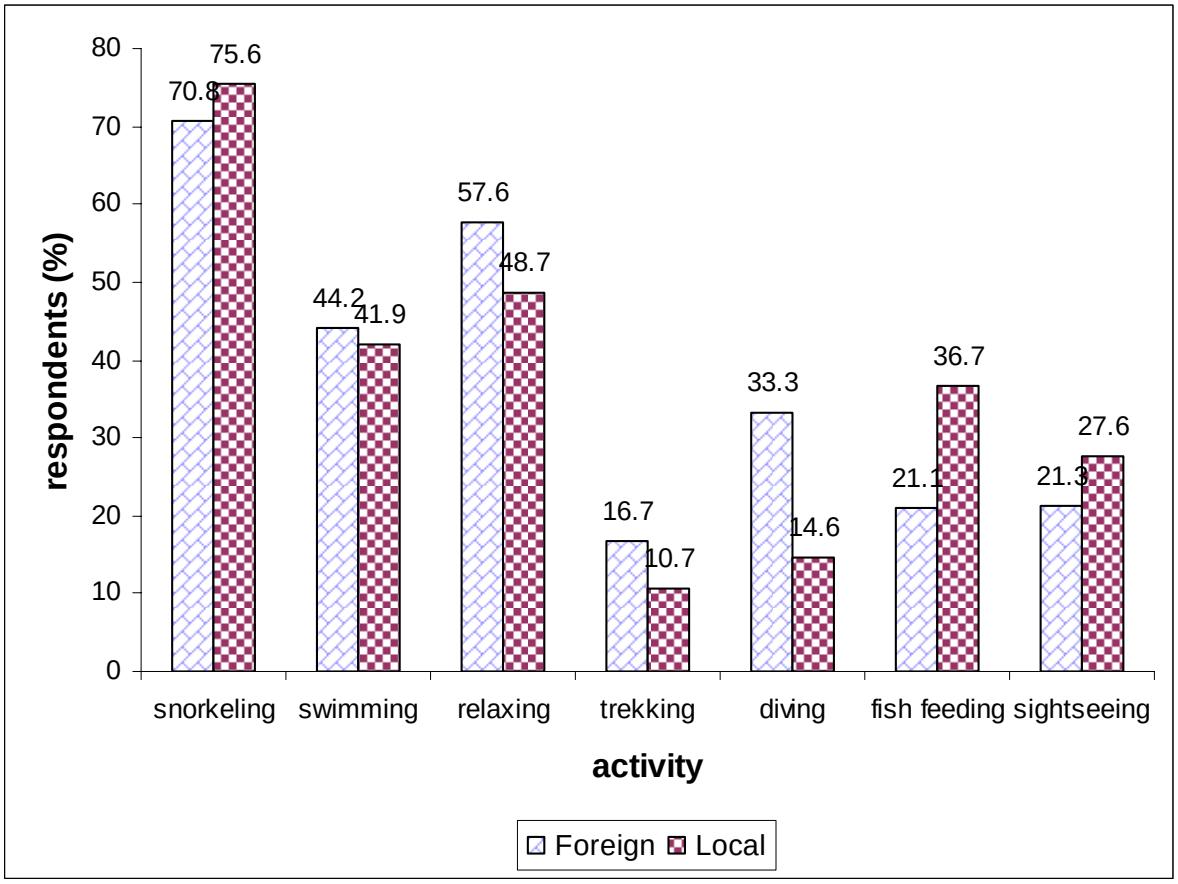
Activity	Payar	Redang	Tioman	All parks
Snorkeling (%)	68.8	81.1	69.5	73.1
Swimming (%)	31.2	43.4	53.2	43.1
Relaxing (%)	35.6	53.8	68.7	53.4
Trekking (%)	6.8	8.5	24.9	13.8
Diving (%)	23.9	17.5	31.3	24.5
Fish feeding (%)	35.1	31.1	20.2	28.5
Sightseeing (%)	20.5	19.8	31.8	24.3

The most popular activity of interest chosen by the respondents in all three parks is snorkeling with the highest participation in this activity in Redang (81.1%). The second in line is relaxing and the third is swimming. However, for individual islands, the ranking of activities differ. In Payar, swimming is ranked fourth while it is ranked third in Redang and Tioman. Trekking is not popular among respondents in Payar (only 6.8%) compared to 24.9% of respondents in Tioman who choose this activity. This is the opposite for fish feeding activity where respondents in Payar like this activity more (35.1%) than respondents in Redang (31.1%) and Tioman (20.2%). Overall, this makes the three most popular activities in Payar are snorkeling, relaxing, and fish feeding; while for Redang and Tioman are snorkeling, relaxing, and swimming.

Some activities vary between the local and foreign visitors. Activities where foreign respondents are more interested in compared to locals were swimming, relaxing, trekking, and diving. The biggest gap is diving where 33.3% of the foreign visitors are

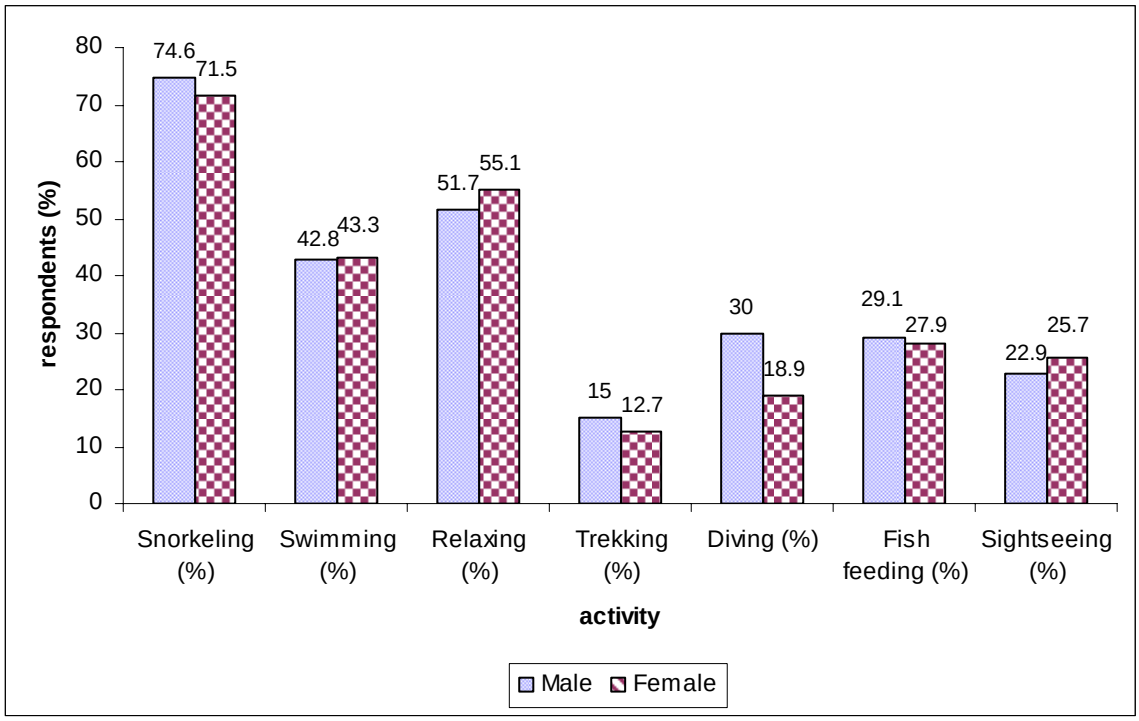
engaged in this activity compared to only 14.6% of the local visitors. On the other hand, fish feeding seems to attract the locals (36.7%) more than the foreigners (21.1%).

Figure 5.2: Activity of Interest by Origin



The types of activities chosen also vary with gender. Activities like snorkeling, trekking and diving tend to attract more male attention while relaxing and sightseeing are the activities that attract female visitors. This seems to suggest that men like to be involved in more adventurous activities. This can be seen in diving which shows the biggest gap between males (30%) compared to only 19% of females that is interested in this activity among respondents (Figure 5.3).

Figure 5.3: Activity of Interest by Gender



5.2 PERCEPTION ON ATTRIBUTES

Overall, respondents rated “clear” for water visibility (55.2%); “many” for fish species variety (64%); “many” for corals variety (48.9%); and “not too much” for development (49.2%) for all three parks.

Looking at an individual park, there are some significant differences of perceptions on attributes between the parks, especially for Payar. The respondents rated it more towards “cloudy” for water visibility and “not too many” for coral variety. In fact, Payar has the highest rate of extreme views for all attributes except development (3.4% said

"very cloudy" for water visibility; 2.9% said "very few" for fish species; and 18.5 said "very few" for coral variety). For Redang and Tioman, perceptions of respondents towards the attributes are pretty similar where more than 50% of respondents rated water visibility as "clear", in fact more than 30 % rated it "very clear"; more than 60% rated "many" for fish variety; and more than 50% rated "many" for corals variety. For development, Redang is said to be "very developed" (3.3%) compared to Tioman and Payar where only 0.9% and 1.5% rated them as being "very developed".

Table 5.4: Perceptions of Respondents on Attributes of Each Park

Variable	Payar	Redang	Tioman	All parks
Water visibility: Very clear	9.8	34.0	33.0	26.0
Clear (%)	49.8	56.6	58.8	55.2
Cloudy (%)	37.1	7.5	7.7	16.9
Very cloudy (%)	3.4	1.9	0	1.7
Fish species variety: Amazingly many (%)	9.3	16.5	15.5	13.8
Many (%)	60.5	65.6	65.7	64.0
Not too many (%)	26.3	16.5	16.7	19.7
Very few (%)	2.9	0.9	0.4	1.4
Corals variety: Amazingly many (%)	0.5	10.4	14.2	8.6
Many (%)	31.2	56.1	57.9	48.9
Not too many (%)	44.9	25.9	21.5	30.3
Very few	18.5	5.2	2.1	8.3
Development: Hardly any (%)	4.9	4.7	3.0	4.2
Not too much (%)	54.6	42.0	51.1	49.2
Developed (%)	38.5	49.5	44.2	44.2
Very developed (%)	1.5	3.3	0.9	1.8

There are no significant differences in perception towards the attributes of each park between the genders. However, women tend to give more extreme answers than men. For instance, 2.8% of women say "very cloudy" for water visibility compared to only 0.6% of men. For fish species variety question, 2.5% of women rated "very few" but

only 0.3% men rated it “very few” (Table 5.5). Overall, a higher percentage of women do not provide answers to all attributes (except development). The most probable reason is because a lower percentage of women participated in snorkeling activity (see Figure 5.3).

Table 5.5: Perceptions of Respondents on Attributes by Gender

Variable	Male	Female
Water visibility: No answer (%)	0	0.3
Very Clear	28.1	23.8
Clear (%)	54.7	55.7
Cloudy (%)	16.5	17.3
Very cloudy (%)	0.6	2.8
Fish species variety: No answer (%)	0.6	1.5
Amazingly many (%)	15.6	12.1
Many (%)	61.5	66.6
Not too many (%)	22.0	17.3
Very few (%)	0.3	2.5
Corals variety: No answer (%)	2.1	5.6
Amazingly many (%)	9.2	8.0
Many (%)	46.5	51.4
Not too many (%)	35.2	25.4
Very few	7.0	9.6
Development: No answer (%)	0.6	0.6
Hardly any (%)	4.3	4.0
Not too much (%)	52.9	45.5
Developed (%)	40.4	48.0
Very developed (%)	1.8	1.9

There are significant differences in the response between the foreign and local respondents about the attributes of the marine parks they visited. About 23 % of the foreign respondents rated water visibility as “cloudy” but only 13.6% of locals rated it as “cloudy”. But for fish species, more of the local respondents rated it “not too many”

compared to foreign respondents (26.9% compared to 15.8%). Similarly, for coral variety, 43.5% of the local respondents rated it as "not too many" compared to 34.2% by foreign respondents. For development, there seems to be similar perceptions between local and foreign respondents. Most of them feel that the park they visited have "not too much" development (49.1% and 49.4% for foreign and local respondents, respectively) (Table 5.6).

Table 5.6: Perceptions of Respondents on Attributes by Origin

Variable	Foreign	Local
Water visibility: No answer (%)	0.3	0
Very Clear	28.7	23.1
Clear (%)	48.0	63.3
Cloudy (%)	20.2	13.3
Very cloudy (%)	2.9	0.3
Fish species variety: No answer (%)	1.5	0.6
Amazingly many (%)	14.6	13.0
Many (%)	68.1	59.4
Not too many (%)	14.3	25.6
Very few (%)	1.5	1.3
Corals variety: No answer (%)	3.5	4.2
Amazingly many (%)	8.5	8.8
Many (%)	53.8	43.5
Not too many (%)	25.7	35.4
Very few	8.5	8.1
Development: No answer (%)	0.6	0.6
Hardly any (%)	3.5	4.9
Not too much (%)	49.1	49.4
Developed (%)	44.7	43.5
Very developed (%)	2.0	1.6

Another attribute that was only asked to those who answered the questionnaire in crowding issues will also be presented in Table 5.7 and 5.8 below. Out of the 338 respondents, 181 are foreign visitors and the rest are locals. Only 42.5% of foreign

visitors find the park they visit to be “crowded” and 50% of locals say that it is “crowded”.

Table 5.7: Perception of Respondents on Crowds by Origin

Foreign/local	Crowd	
	Yes	No
Foreign (%)	42.5	57.5
Local (%)	50.3	49.7

The perception of respondents on crowding differs by parks. Payar and Redang are perceived to be crowded by the respondents (59.3% and 51.4% respectively). Meanwhile for Tioman, only about 30% of the respondents rated it as crowded.

Table 5.8: Perception of Respondents on Crowds by Park

Park	Crowded	
	Yes	No
Payar (%)	59.3	40.7
Redang (%)	51.4	48.6
Tioman (%)	29.6	70.4

5.3 TRIP FREQUENCY

Between the 3 parks, Payar has the highest number of first-time visitors (90.7%) compared to Redang (89.6%) and Tioman (82.84%). Most of the foreign respondents (80%) say this trip is their first trip to the park and surprisingly, the same percentage of local respondents also visit the park for the first time. The number of repeat visitors is equal among foreign and local visitors (64 local and 65 foreign). In the past twelve

months, 24.6% of foreign visitors and 21.9% of local visitors have visited the same park once, while 29.2% of foreign visitors and 17.2% of local visitors have visited the same park twice. There are 2 foreign visitors who have visited Redang 60 times in the past 12 months for research purposes.

When asked how many times they have visited the same park all their life (up to the date the survey was done), 27.7% of foreign and 29.7% of the local visitors answered once and 24.6% of foreign and 37.5% of the local visitors answered twice. It is interesting to see that 3 foreign visitors had visited the same park at least 10 times before. Among repeat foreign visitors, the highest number is from Singapore (21) and the second is from the United Kingdom (10) and among the local visitors, almost half of them (48%) are from Selangor and Kuala Lumpur.

Table 5.9: Number of Trips Taken Previously by Respondents to Each Park

Trips taken previously to the park in the last 12 month	Park							
	Payar		Redang		Tioman		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
0 (first time visit)	186	90.7	190	89.6	193	82.8	569	87.5
1	9	4.4	5	2.4	16	6.9	30	4.6
2	5	2.4	11	5.2	14	6.0	30	4.6
3	3	1.5	3	1.4	5	2.1	11	1.7
4	1	0.5	0	0	4	1.7	5	0.8
7	0	0	0	0	1	0.4	1	0.2
10	1	0.5	0	0	0	0	1	0.2
12	0	0	1	0.5	0	0	1	0.2
60	0	0	2	0.9	0	0	0	0.3
Total	205		212		233		650	

Payar also has the most respondents who have visited other parks (49.8%) but when asked to compare Payar to other parks they have visited, they rated it as "worse" (41.6%). 32.5% of respondents to Redang are first time visitors and they rated Redang as "better" (37.7%) compared to other parks they visited before. Most of visitors to Tioman (42.5%) are first time visitors and more than half (54.4%) rated Tioman as "about the same" as other parks they have visited. Among respondents, more foreign respondents (51.5%) have visited other parks compared to the local respondents (30.5%). A majority of foreign respondents (51.7%) rated the park as "about the same" as other parks they have visited, as did the local respondents (nearly half or 43.0%). But more local respondents rated it as "better" compared to the foreign respondents (32.3% compared to 17.6%).

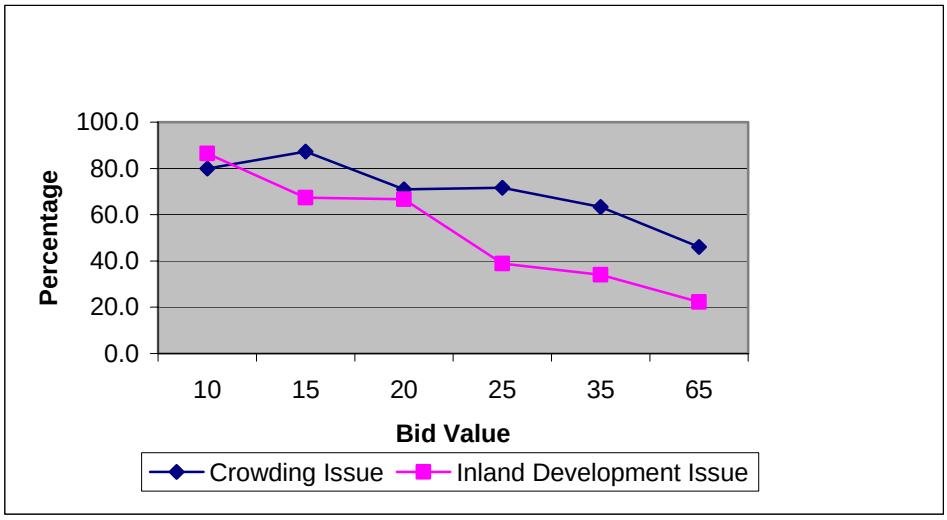
A high number of respondents travelled straight from home to the park they visited (228 respondents), and of this number, 15.2% are foreign respondents and 57.1% are local respondents. Foreign respondents that travel from home are mostly from Singapore (55.8%) because there are tour operators that arrange direct trips from Singapore to Tioman. It is also interesting to note that 7 respondents came straight from the United Kingdom to Tioman for research purposes.

There are 40 respondents who are members of at least one environmental group. Out of these, 27 are foreign respondents and more than half (62.5%) are male.

5.4 BID RESPONSES BY ISSUES AND BY LOCALITY

The percentage of respondents saying "Yes" to the first bid abide to the theory of demand; the higher the price, the lower the willingness to agree to pay. This is the case for both crowding and inland development issues, as shown in Figure 5.4. The highest percentage of "yes" saying is in the RM15 bid in the crowding issue (87.3%). On overall, crowding issue get more positive responses (more respondents say "Yes") compared to the inland development issue.

Figure 5.4: Percentage of Saying "Yes" to the First Bid by Issue



The percentage of saying "Yes" to second bid seems to have similar percentage among all bid values (Figure 5.5).

Figure 5.5: Percentage of Saying "Yes" to the Second Bid by Issue

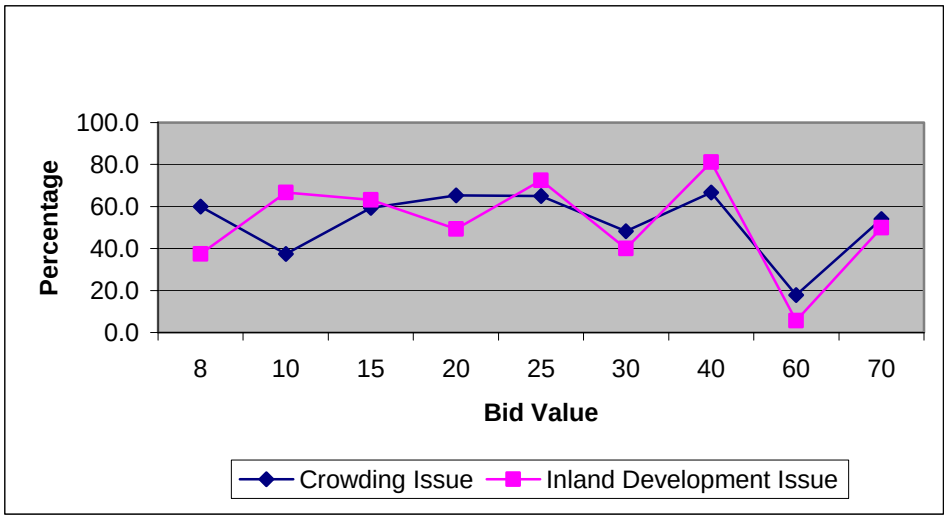


Table 5.10: "Yes" Response to the First and Second Bid for Crowding Issue

First bid	Park				Second Bid	Park			
	Payar	Redang	Tioman	Total		Payar	Redang	Tioman	Total
10	15(78.9)	14(87.5)	15(75.0)	44(80.0)	**8**	3(100)	1(50.0)	2(40.0)	6(60.0)
15	19(95.0)	14(73.7)	22(91.7)	55(87.3)	**10**	0(0)	2(40.0)	1(50.0)	3(37.5)
20	15(83.3)	11(64.7)	13(65.0)	39(70.9)	**15**	15(83.3)	9(45.0)	11(52.4)	35(59.3)
25	12(70.6)	10(62.5)	16(80.0)	38(71.6)	**20**	20(76.9)	8(40.0)	19(73.1)	47(65.3)
35	12(66.7)	9(47.4)	17(73.9)	38(63.3)	**25**	13(86.7)	6(54.5)	7(50.0)	26(65.0)
65	5(31.3)	7(38.9)	12(66.7)	24(46.1)	**30**	11(64.7)	4(20.0)	13(61.9)	28(48.3)
					40	8(66.7)	4(44.4)	14(77.8)	26(66.6)
					60	3(27.3)	1(9.1)	1(16.7)	3(17.8)
					70	3(60.0)	4(57.1)	6(50.0)	13(54.1)

For the crowding issue, more than 80% of the respondents say "Yes" to the first and the second bid and it reduces to only 46.1% for the biggest bid, RM65. The second bid

results in various responses varying from 17.8% to 66.6%. If compared between parks, the lowest percentage of respondents saying "Yes" to pay to any amount of the first bid is Redang. More respondents in Payar agreed to pay bid amount of RM15 and RM20 (95% and 83.3%, respectively) compared to the other two parks. But for a higher bid amount such as RM35 and RM65, respondents in Tioman seem to agree to pay more than respondents from the other two parks.

For the inland development issue, positive response to the first bid is the highest with 85% saying "Yes" and the lowest positive response to the highest bid is RM65 with 22% saying "Yes".

Table 5.11: "Yes" Response to the First and Second Bid for Inland Development Issue

First bid	Park				Second Bid	Park			
	Payar	**Redang**	**Tioman**	**Total**		**Payar**	**Redang**	**Tioman**	**Total**
10	28(96.6)	9(75.0)	14(77.8)		**8**	1(100.0)	1(33.3)	1(25.0)	3(37.5)
15	12(80.0)	7(36.8)	18(85.7)		**10**	1(33.3)	9(75.0)	2(66.7)	12(66.6)
20	11(78.6)	9(50.0)	18(72.0)		**15**	24(80.0)	6(33.3)	13(65.0)	43(63.2)
25	9(56.3)	4(21.1)	6(42.9)		**20**	13(68.4)	3(13.6)	17(65.4)	33(49.2)
35	4(33.3)	6(30.0)	6(40.0)		**25**	9(75.0)	5(55.6)	15(78.9)	29(72.5)
65	4(36.4)	2(10.5)	4(26.7)		**30**	6(35.3)	5(27.8)	9(60.0)	20(40.0)
					40	3(75.0)	4(66.7)	6(100.0)	13(81.2)
					60	0(0)	1(5.9)	1(9.1)	2(5.7)
					70	2(50.0)	2(100.0)	1(25.0)	5(50.0)

Table 5.12: WTP for Crowding, and Inland Development Issue by Locality

		Crowding Issue		Inland Development Issue	
		Willing to Pay (%)		Willing to Pay (%)	
	Bid	Foreign	Local	Foreign	Local
First Bid	10	80.6	79.2	87.9	84.6
	15	96.8	77.4	82.8	40
	20	83.9	54.2	82.8	40.9
	25	80.6	59.1	54.2	24
	35	89.3	40.6	50	20
	65	75	12.5	41.7	15.2
Second Bid	8	60	60	50	25
	10	0	42.8	33.3	83.3
	15	67.7	50	77.1	48.5
	20	75.7	54.3	60	33.3
	25	69.2	57.1	82.7	45.5
	30	67.8	30	50	30.8
	40	76	50	90.9	60
	60	42.8	9.5	0	7.1
	70	47.6	0	60	40

For both issues, at almost all bid value, the percentage of foreign respondents saying "Yes" is higher compared to the local respondents in both the first bid and the second bid. The most obvious difference can be seen in the bid of RM15 in the crowding issue, where 96.8% of the foreign respondents agree to pay whereas only 77.4% of the local visitors agree to pay and for the highest bid or RM65, 75% of the foreign respondents say "Yes" while only 12.5% of the local respondents do the same.

In the double-bounded analysis, as mentioned in Chapter 4, we can get 4 type of answer: "Yes-Yes" if the respondents agree to pay the first bid and the second bid; "Yes-No" if the respondents agree to pay to the first bid but do not agree to pay the second bid; "No-Yes" if the respondents do not agree to pay the first bid but agree to pay the second bid; and "No-No" if the respondents do not agree to both the first and the second bid.

Table 5.13: Percentage of Saying "Yes-Yes", "Yes-No", "No-Yes", and "No-No" Among Issues and Locality

Issue/WTP	Inland Development Issue			Crowding Issue		
	Foreign	Local	Total	Foreign	Local	Total
"Yes-Yes"	94 (57.7)	28 (18.9)	122 (39.1)	110 (60.8)	55(35.0)	165 (48.8)
"Yes-No"	24 (14.7)	25 (16.8)	49 (15.7)	43 (23.8)	30(19.1)	73 (21.6)
"No-Yes"	12 (7.4)	29 (19.5)	41 (13.1)	7 (3.9)	14(8.9)	21 (6.2)
"No-No"	33 (20.2)	67 (45.0)	100 (32.1)	21 (11.6)	58(36.9)	79 (23.4)
Total	163	149	312	181	157	338

*Note: Percentage in the parentheses

From Table 5.13, more than 50% of the foreign respondents is a "Yes-Yes" saying (57.7% for the inland development issue, and 60.8% for the crowding issue). It is also obvious that more local respondents refuse to pay any amount shown to them where 36.9% of the local respondents say "No-No" for the crowding issue, and 45.0% of the local respondents do the same for the inland development issue.

Table 5.14: Respondents' Reasons for Not Willing to Pay

	Inland Development Issue	Crowding Issue
No harm	13	20
Do not solve problem	46	50
No difference	13	n.r.
Do not agree	n.r.	22
Do not understand	4	8
Government's responsibility	40	n.r.

Note: n.r. means not related. There are questions asked in the inland development issue that are not asked in the crowding issue and vice versa.

Table 5.14 present reasons respondents refuse to pay any bid amount (or a "No-No" saying). The respondents are allowed to choose more than one answer. In the inland development issue, 46 out of 100 of the "No-No" saying respondents (46%) perceived payment will not solve the problem, and 40 respondents also believe that the costs of

preserving corals should all rest under the government. For the crowding issue, 50 out of 79 respondents (63.3%) do not believe cutting off the number of visitors to the marine parks can solve the problems raised.

5.5 DISCUSSIONS

5.5.1 Profiles of Respondents for Payar, Tioman and Redang

How representative the data are of the population is unknown since the tourists' population characteristics to these marine parks are unknown. However, there are several characteristics that match the characteristics of nature tourists in the literatures.

For instance, the distribution of foreign and local respondents to Payar in this study (60.5% of foreign respondents) match with the statistics from the Fisheries Department where 65 percent of visitors to Payar are foreigners (refer to Table 1.3). Most foreign tourists visit Payar because of the mass promotions done by the tour operators in Langkawi Island as part of a tour package. The opposite is found for Redang where 78.3% of the respondents are local visitors because Redang is a favourite place to visit by the locals and the promotion abroad or on the net on Redang are much less rigorous.

This study found almost an equal distribution of male and female respondents (50.3% males and 49.7% females). However, some literature shows that the distribution among genders are equal, some shows majority of male, and some shows majority of female nature tourists. For example, some studies, as quoted in Wight (1996) have reported a majority of males (Fennel and Smale, 1992; Backman and Potts, 1993; Tourism

Research Group, 1998; Nababan and Aliadi, 1993; Tourism Canada, 1995); a majority of females (Cook, Stewart and Repass, 1992; Reingold, 1993); and an even split of males and females (Boo, 1990; Ingram and Durst, 1987).

The modal class of respondents in this study are in the 20 – 29 years age group (50.3%), signifying that eco-tourism is a "youthful" activity (Ayob et al., 2002). This is supported by a study by Ayob et al. (2000), who also found the same pattern of visitors to Payar with 43% of the visitors are in the age group of 20 – 29 years. Only 4.8 % are below 20 years old and 5.8% are over 50 years old. This figure is also the same as findings in Ayob et al. (2002) with 8.7% of respondents over 50 years old and 6.7% below 20 years old. However, the literatures provide mix evidence on the age of nature tourists. For example, as quoted in Wight (1996), there are some studies which stated that nature tourists to be older than the average tourists (Boo, 1990; Backman and Potts, 1993; Eagles and Cascagnette, 1995). On the other hand, studies by Yuan and Moisey (1992), and Chudintra (1993) finds that nature tourists are younger than the average tourists.

Consistent with previous literature, this study also found that more than half of respondents (75.5%) are highly educated, with at least a post-secondary education. Only 1.1% has a minimum of primary education, all of them are foreign visitors. Previous literature also suggests that nature tourists tend to be more highly educated than general tourists (Wilson, 1987; Tourism Research Group, 1988; Butler and Hvenegaard, 1988; Fennell and Smale, 1992; Cook, Stewart and Repass, 1992; Backman and Potts, 1993), as cited from different sources in Wight (1996). Dimitrios Diamantis (1998) also stated

> "*the majority of UK ecotourists are also educated but tend to be a younger group as most of them are 17 – 35 years old*".

Obua and Harding (1996) found that their study support the findings by Ryel and Grasse (1991) who view ecotourism travellers to be educated and work as professionals. Their findings also show that students are the second most frequent visitors to nature tourism places.

5.5.2 Activity of Interest

This study finds that the most popular activity in all three parks is snorkeling (Payar - 68.8%; Redang - 81.1% and Tioman - 69.5%). This is also the finding of research by Ayob et al. (2002) in Payar stating that 69% of visitors engaged in this activity. Other popular activities include relaxing and swimming in all three parks. In Payar swimming becomes the fourth ranked because the visitors are more interested in fish feeding activity. This is also due to the fact that Payar has a very limited space to swim. Trekking became one of the activities of interest chosen by respondents in Tioman (24.9%) because Tioman is rich in forest areas with part of the forests are under protection.

There are two activities that show some significant differences between foreign and the local respondents. The first activity is diving. More than 33% of the foreign respondents choose this activity compared to 14.6% of the local visitors. This shows that diving as a sport is still unpopular among the locals. The most probable reason is because adventurous and dangerous sports such as climbing, sky diving, and diving are not the

type of sports that Malaysians feel like trying on. The second activity where the local respondents choose compared to the foreign respondents is fish feeding. This activity is readily provided by the tour operators in all three parks. From our interview with some foreign respondents, they are even against the fish feeding activity because for them this is not a 'healthy' activity as they fear one day the fish would not know how to hunt their own food and if there are no more visitors to the park, the fish will die of hunger.

5.5.3 Perception on Attributes

Overall, the four attributes that this study focus on is still in a good condition according to the perception of the respondents. Water visibility is still rated "clear" by more than 50% of the respondents. More than 60% of the respondents rated "many" for fish species variety, nearly half of the respondents rated "many" for corals variety and "not too much" for development for all three parks.

The scenario is a little bit different for individual parks. Corals variety in Payar is perceived to be in a bad shape where 63.4% of the respondents rated it negatively ("not too many" and "very few").

Foreign respondents seem to have a different perception on attributes compared to the local respondents of the marine parks they have visited. This can be seen in water visibility where about 23 % of foreign respondents rated it as "cloudy" but only 13.6% of locals rated it as "cloudy". This might be because foreign visitors have visited other places which have better water visibility. This is supported by the fact that more than

50% of the foreign visitors stated that they had visited other parks compared to only about 30% of the local visitors had the opportunity. It is the opposite case for fish species and corals variety. More of local respondents rated it “not too many” compared to foreign respondents (26.9% compared to 15.8%). Similarly, more of the local respondents rated corals variety as “not too many” compared to the foreign respondents (43.5% compared to 34.2% respectively). The most probable reasons might be because the locals compare the current situation with previous conditions or their expectations are higher than the foreign visitors. There are no significant difference in the development attribute between the foreign and local respondents where both perceived the park they visited as “not too much” development. Taken together, this variability suggests separate models for locals and foreigners in calculating the WTPs which are done in the next chapter.

Payar had the highest rate of respondents saying “yes” to the perception on crowds of all three parks. This is because Payar is a very small island with a beach of about half a kilometre long where almost all the visitors congregate. For Tioman, it can be concluded that there is no issue of too many tourists since only about 30% of respondents agree that it is crowded. This might be due to the fact that there are about 5 different places which can be visited by the visitors and that makes it seem not very crowded in any one place.

CHAPTER 6

ECONOMETRIC ANALYSIS

This chapter focuses on the results from the econometric analysis from both the TCM and the CVM methods. This chapter is organised as follows. The first section presents the results from using the TCM method followed by the results from using the CVM method and the last part is the discussions.

6.1 RESULTS OF TRAVEL COST METHOD STUDY

This study used both the individual and zonal travel cost methods. The analyses were carried out using LIMDEP. The analyses were initially done separately for foreign visitors and local visitors. After many attempts and data modification, the researcher decided not to include the analysis of foreign visitors for both individual and zonal TCM as the results were so poor.

This section describes the individual travel cost model using count data models. The two approaches used were the Poisson and Negative Binomial estimation techniques (as stated in Chapter 4). We found that the Negative Binomial estimation technique, which relaxes the assumption of mean equal to variance, was rejected relative to the Poisson. This means, there are no over-dispersion in the data and that the mean is equal to the variance. Therefore, the result is not presented here. The same insignificant influence of the over-dispersion problem is also found in a study by Shrestha et al. (2002). Below we

list all our explanatory variables which we used in our regressions to find the significant determinants of the number of visits to the parks.

Poisson and truncated Poisson models are specified as follows:

$$VISITS = \alpha + \beta_1 DUMRED + \beta_2 DUMTIOM + \beta_3 SEX + \beta_4 AGE + \beta_5 DUMEDU + \beta_6 INCOME + \beta_7 DUMOCC + \beta_8 DIVING + \beta_9 WATERVIS + \beta_{10} FISHSPEC + \beta_{11} CORALSVA + \beta_{12} DEVELOPM + \beta_{13} ENVGROUP + \beta_{14} VISITOTH + \beta_{15} TRAVELFR + \beta_{16} TIME + \beta_{17} TOTALSPE$$

Where

VISITS = dependent variable, number of visits made in the last 12 months

DUMRED = 1 if respondent is surveyed in Redang Marine Park, 0 otherwise

DUMTIOM = 1 if respondent is surveyed in Tioman Marine Park, 0 otherwise

SEX = 1 if male, 0 if female

AGE = age range of the respondent, where 1 = < 20, 2 = 21 – 29, 3 = 30 – 39, 4 = 40 – 49, 5 = 50 – 59, 6 = > 60

DUMEDU = 1 if respondent received college degree or higher, 0 otherwise

INCOME = annual income of the respondent

DUMOCC = 1 if the respondent is in employment, 0 otherwise

DIVING = 1 if they come to the park for diving, 0 for other activities

WATERVIS = respondent's opinion on the quality level of the water visibility at the time they are at the park

FISHSPEC = respondent's opinion on the fish species varieties of the marine park

CORALSVA = respondent's opinion on the level of coral varieties in the park

DEVELOPM = respondent's opinion on the level of development of the marine park

ENVGROUP = 1 if member of any environment group, 0 otherwise

VISITOTH = 1 if respondent has visited other marine park, 0 otherwise

TRAVELFR = 1 if respondent has travelled straight from home, 0 otherwise

TIME = travel time in hour

TOTALSPE = respondent's total spending, which includes air/bus fare or petrol expenses, boat fare, accommodation on the island or package price if respondent came by package tour

Table 6.1: Multicollinearity Test of Attributes of Marine Park in Malaysia Using Kendall's Tau b and Spearman's Rho

			watervisibility	fish species	corals variety	development
Kendall's tau_b	watervisibility	Correlation Coefficient	1.000	.396(**)	.281(**)	-.003
		Sig. (2-tailed)	.	.000	.000	.959
		N	305	305	305	305
	fish species	Correlation Coefficient	.396(**)	1.000	.356(**)	.040
		Sig. (2-tailed)	.000	.	.000	.455
		N	305	305	305	305
	corals variety	Correlation Coefficient	.281(**)	.356(**)	1.000	.007
		Sig. (2-tailed)	.000	.000	.	.896
		N	305	305	305	305
	development	Correlation Coefficient	-.003	.040	.007	1.000
		Sig. (2-tailed)	.959	.455	.896	.
		N	305	305	305	305
Spearman's rho	watervisibility	Correlation Coefficient	1.000	.422(**)	.307(**)	-.003
		Sig. (2-tailed)	.	.000	.000	.959
		N	305	305	305	305
	fish species	Correlation Coefficient	.422(**)	1.000	.383(**)	.042
		Sig. (2-tailed)	.000	.	.000	.463
		N	305	305	305	305
	corals variety	Correlation Coefficient	.307(**)	.383(**)	1.000	.008
		Sig. (2-tailed)	.000	.000	.	.893
		N	305	305	305	305
	development	Correlation Coefficient	-.003	.042	.008	1.000
		Sig. (2-tailed)	.959	.463	.893	.
		N	305	305	305	305

** Correlation is significant at the 0.01 level (2-tailed).

Before the regressions were carried out, tests for multicollinearity between the attribute variables were performed to see whether the variables were correlated with each other.

We present the Kendall's-tau-b and Spearman correlation coefficients which measure the association between rank orders in Table 6.1.

Spearman's rho correlation coefficients are higher than the Kendall's tau-b. The coefficients range between 0.003 to 0.422. The highest coefficient is between fish species varieties and watervisibility; 0.422 and it is still considered acceptable. Therefore, it concluded that there is no strong collinearity between the attribute variables and all are subsequently included in the regression.

In our study, we expect the number of visits to have positive correspondence with INCOME, DUMOCC, DIVING, WATERVIS, FISHSPEC, CORALSVA, ENVGROUP, VISITOTH and TRAVELFR. For income, since natural tourism such as visits to a marine park is considered a normal good where the higher the income, the more visits will be made to the parks, it is expected that INCOME will be positively related to VISITS. DIVING is expected to have a positive sign because one of the most popular activities in marine parks is diving. For the attributes, water visibility, fish species varieties and coral varieties are expected to have positive effects on number of visits, while development is expected to have a negative impact on the number of visits. Since marine parks are categorized as nature tourism sites, we expect the visitors to prefer the parks to have as little development as possible. TRAVELFR is also expected to have a positive relationship with the number of visits because people that make return visits are expected to be those who come solely to the parks. TIME and TOTALSPE are expected to have negative signs due to the recreational demand theory.

Table 6.2: Local Visitors using Poisson and Truncated Poisson – Full Model

Variables	Poisson		Truncated Poisson	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	0.0508995 (0.5132)	0.099	-1.5231569 (1.3623)	-1.118
DUMRED	0.2252925 (0.2316)	0.973	-0.1738857 (0.4890)	-0.356
DUMTIOM	-0.2795472 (0.2496)	-1.120	-2.1633826 (0.7952)	-2.720
SEX	0.1502935 (0.1410)	1.066	0.6633343 (0.3582)	1.852
AGE	-0.0295850 (0.0759)	-0.389	-0.3023329 (0.1791)	-1.688
DUMEDU	0.1936778 (0.1608)	1.204	0.8698873 (0.4340)	2.004
INCOME	-0.0000008 (0.0000)	-0.459	-0.0000058 (0.0000)	-0.974
DUMOCC	0.0700386 (0.1793)	0.390	0.4221769 (0.4978)	0.848
DIVING	0.4725210 (0.1715)	2.755	1.3340094 (0.3407)	3.915
WATERVIS	0.1937308 (0.1353)	1.432	0.1823480 (0.3618)	0.504
FISHSPEC	0.0655124 (0.1200)	0.546	0.0778348 (0.3042)	0.256
CORALSVA	-0.1328899 (0.1039)	-1.279	-0.3018177 (0.2342)	-1.289
DEVELOPM	-0.1196101 (0.1136)	-1.052	0.1311451 (0.2754)	0.476
ENVGROUP	0.1234420 (0.2871)	0.430	0.8341305 (0.6283)	1.328
VISITOTH	0.0992602 (0.1452)	0.683	0.0381984 (0.3464)	0.110
TRAVELFR	0.3203610 (0.1639)	1.954	1.4281407 (0.3972)	3.595
TIME	-0.0412853 (0.0246)	-1.676	-0.2166427 (0.0737)	-2.939
TOTALSPE	-0.0002037 (0.0002)	-0.756	0.0000597 (0.0007)	-0.084
Adjusted R^2	0.6229		0.7400	
χ^2	32.56695		301.9234	
Log likelihood	-229.6189		-94.94068	

N= 192 (after omission of observations with missing values)

Table 6.2 above reports our general model results that include all the possible explanatory variables. Our results show that only the DIVING variable is significant at the 5% significance level, while two variables (TRAVELFR and TIME) are significant at the 10% level in our Poisson model. In our truncated Poisson model, there are additional variables which are significant at the 10% level of significance; SEX and AGE. Meanwhile, DUMTIOM, DUMEDU, DIVING, TRAVELFR and TIME are significant at the 5% level of significance. It is interesting to note that the insignificant variables do however, have the correct a priori sign, like TOTALSPE and TIME. Unexpectedly, INCOME has the negative sign but weak (non-significant) relationship with the number of visits, suggesting that the number of visits did not appear to be

influenced strongly by the amount of income of the respondents. This result is similar to other studies that found small or even negative income effects in TCM models, which include Curtis (2002), Chakraborty and Keith (2000), and Grogger and Carson (1991). As can be seen from the results from both the Poisson and Truncated Poisson model, models using the latter model gave better results as the log likelihood function is smaller and the adjusted R^2 is higher. The truncated Poisson were used since our respondents were interviewed onsite. Therefore, the respondents have at least visited the park once, so we truncated our model at 0 which means that the data start at 1. Several previous studies also found that truncated models suit TCM better, for example studies by Chakraborty and Keith (2000), and Shrestha et al. (2002).

Table 6.3: Local Visitors using Poisson and Truncated Poisson – Reduced Form

Variables	Poisson		Truncated Poisson	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	-0.0820790 (0.3394)	-0.242	-3.2951444 (0.9363)	-3.519
DUMRED	0.0331349 (0.0807)	0.410	0.1027298 (0.1709)	0.601
DUMTIOM	-0.2905532 (0.1540)	-1.886	-1.2804176 (0.4166)	-3.073
SEX	0.1514450 (0.1101)	1.375	0.6479193 (0.2786)	2.325
DUMEDU	0.2312322 (0.1291)	1.791	1.1448351 (0.3762)	3.043
DIVING	0.4874370 (0.1286)	3.788	1.2309489 (0.2521)	4.882
WATERVIS	0.1988009 (0.0916)	2.169	0.5447224 (0.2134)	2.552
DEVELOPM	-0.1544719 (0.0877)	-1.761	-0.0889304 (0.1915)	-0.464
TRAVELFR	0.3325158 (0.1273)	2.611	1.3413380 (0.2979)	4.501
TIME	-0.0336938 (0.0185)	-1.819	-0.1990760 (0.0554)	-3.589
TOTALSPE	-0.0001405 (0.0001)	-0.752	-0.0002523 (0.0004)	-0.563
Adjusted R^2	0.6200		0.7357	
χ^2	46.648		460.934	
Log likelihood	-345.5752		-138.4322	

N = 288 (after omission of missing values)

Our reduced form model, after omitting the insignificant variables is shown above. The result shows that the truncated Poisson model fits our data better based on the smaller

log likelihood function. DUMRED, even though it is insignificant in both models, is still included in the reduced form model because it is necessary to put in for we have 3 parks where DUMRED shows the dummy variable for Redang Marine Park and DUMTIOM the dummy variable for Tioman Marine Park. From demographic variables, only SEX and DUMEDU are significant at the 5% significance level in the truncated Poisson model. The positive sign for DUMEDU suggests that local visitors to the marine parks have at least a college education. The significant SEX variable shows that men make more trips to the same park relative to women.

Only two out of four attributes are found significant in our specific model. WATERVIS and DEVELOPM are significant at the 90% level of confidence in the truncated Poisson model and both have the expected sign. Water visibility is one of the important attributes of the park that entices visitors to return to the park, especially when diving is an important activity in the parks. The negative sign of the DEVELOPM variable proves that visitors to marine parks prefer the park not to have too much development.

DIVING has a positive sign and is significant at the 1% level of significance. This means more trips are made for the purpose of diving activities in these marine parks. TIME shows the a priori correct sign and is significant at the 10% significance level in Poisson model and at the 5%level of significance in the truncated Poisson model. However, TOTALSPE is insignificant in both models. This means that it is not possible to use the model to calculate welfare measures. Our results are also supported by a study by Lindberg and Aylward (1999) for Paos National Park which found insignificant effects in cost (or price).

The conditional mean estimate (λ) of the trips taken to the Marine Parks is 1.2639. This does not vary much with the actual mean of 1.2721 trips observed in the sample.

The marginal effect of covariates on mean trips taken to Marine Parks is given by:

$$\frac{\partial E(VISITS \mid x)}{\partial x_i} = \lambda \beta_i$$

For every RM20.00 increase in the travel cost of a trip, the number of visits to the park will decrease by 0.0064 or approximately 0.50%. Increases in travel cost have very little effect on the number of visits and it is not significant. On the other hand, the time spent traveling has the right sign and is significant at the 1% level of significance. For each additional hour spent on the journey, 0.2515 or 19.9% less number of trips will be made to the parks.

Table 6.4 below show the results for TRAVELFR = 1, that is if visitors come straight from home to the parks. This is done in an attempt to see if there are any differences for people that purposely travel to the park and those on a multi trip. The analyses were done since the TOTALSPE is insignificant when regressed on all respondents. Therefore, another analysis was done just on respondents that come straight from home to see whether TOTALSPE will be significant for these respondents.

Table 6.4: Local Visitors that Come Straight from Home using Poisson and Truncated Poisson – Reduced Form

Variables	Poisson		Truncated Poisson	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	0.1748946 (0.4454)	0.393	-2.7856473 (1.2065)	-2.309
DUMRED	0.0099764 (0.0958)	0.104	0.0122824 (0.2799)	0.044
DUMTIOM	-0.4402554 (0.1847)	-2.383	-1.5219032 (0.4903)	-3.104
SEX	0.3082593 (0.1412)	2.182	1.1548383 (0.3719)	3.105
DUMEDU	0.3001342 (0.1532)	1.958	1.0675072 (0.4041)	2.641
DIVING	0.5451294 (0.1571)	3.470	1.3272671 (0.3101)	4.279
WATERVIS	0.2494204 (0.1253)	1.989	0.6009524 (0.2941)	2.043
DEVELOPM	-0.1802350 (0.1106)	-1.629	-0.0500791 (0.2432)	-0.206
TIME	-0.0450167 (0.0240)	-1.874	-0.2046346 (0.0622)	-3.290
TOTALSPE	-0.0001529 (0.0002)	-0.599	-0.0000985 (0.0006)	-0.147
Adjusted R^2	0.7516		0.8531	
χ^2	52.29229		297.4556	
Log likelihood	-202.5282		-79.94653	

After omitting variables that are not significant, we obtain the results presented in Table 6.4. The same variables that are found significant for all local visitors are also found significant in the Poisson and truncated Poisson models. The variable DEVELOPM is still found insignificant in truncated Poisson model. The DUMTIOM is significant and has a negative sign. This is because Tioman Marine Parks tends to consist of foreign visitors more than local visitors. TOTALSPE has the right sign but is still not significant for both models. In fact, it is much less significant than the models which include all local visitors. Moreover, the variable TIME is highly significant in the truncated Poisson model and has a negative sign. This shows that the longer the travel time, the fewer trips will be undertaken.

The conditional mean estimate (λ) is slightly higher than all local respondents, 1.3353 and does not vary much with the actual mean of 1.2997 trips observed in the sample.

The marginal effect of covariates on mean trips does not vary much from the model that used all visitors' data for all variables.

Since the results from the individual TCM show the insignificance of travel costs and thus makes it impossible to calculate consumer surplus, we estimated a Zonal TCM to obtain elasticity of demand estimates for all three parks. The only control variable used in this paper is the travel cost. As mentioned in Chapter 4, travel costs were calculated as cost per kilometer travelled (if people come by car), or flight fare if they come by flight, plus a boat fee, and accommodation cost; or the package cost if the respondents come by package tour (further measurement are in Chapter 4, page 124). A similar study that includes only travel cost as their independent variable is Lansdell and Gangadharan (2003). Several functional forms are consistent with economic theory such as linear, quadratic, reciprocal, linear-log, log-linear and double log. The double log form is commonly used as it accounts for extreme values (Ward and Beal, 2000). Beal (1995), Christiansen (1997) and Lansdell and Gangadharan (2003) found that the double log form fits their data better in their studies. However, there are studies which adopt other functional forms, for instance Allen, Stevens and Barrett (1981), who adopt the linear-log form for their TCM.

The functional forms that are presented here are linear-log, log-linear and double log forms for other forms do not give better results than these forms.

Table 6.5: Zonal TCM using Log-Linear Model for Each Park

Variables	Payar	Redang	Tioman
Constant	1.132 (1.95)	0. 768 (1.13)	0.498 (0.68)
Cost	-0.001 (-3.73)	-0.001 (-3.55)	-0.001 (-2.17)
Adjusted R^2	0.294	0.293	0.122

Note: t-statistic in parantheses

Table 6.6: Zonal TCM using Linear-Log Model for Each Park

Variables	Payar	Redang	Tioman
Constant	33.462 (6.69)	21.363 (2.49)	12.895 (4.07)
Cost	-4.272 (-6.16)	-2.530 (-2.11)	-1.568 (-3.58)
Adjusted R^2	0.514	0.091	0.253

Note: t-statistic in parantheses

Table 6.7: Zonal TCM using Double Log Linear Model for Each Park

Variables	Payar	Redang	Tioman
Constant	7.750 (4.56)	8.308 (3.42)	6.961 (2.80)
Cost	-1.178 (-5.00)	-1.362 (-3.90)	-1.073 (-3.15)
Adjusted R^2	0.437	0.337	0.250

Note: t-statistic in parantheses

Since the ITCM give results that make it not possible to elicit consumer surplus, the zonal TCM can also be used to elicit the consumer surplus. Using the log-linear model, average consumer surplus for each park can be calculated as below (details are in Chapter 4):

$$-\frac{1}{b}$$

A unique advantage of the log-linear functional form is the ease in estimating average consumer surplus, that is, one over the parameter estimate of travel cost. Anex (1995) and English and Bowker (1996) also used the log-linear functional form to calculate the average consumer surplus. With that, the average consumer surplus for Payar Marine

Park is RM1,000.00. The answers are also the same for both the other two parks since the parameter estimate is equal to -0.001 for all three parks.

The double log form seems to give good results in terms of adjusted R^2 where costs alone explained about 25% and 44% of the visits. The log-linear form performs poorly for Tioman Marine Park while linear-log does not work for Redang Marine Park.

The elasticities for the parks have negative sign and are not significantly different from one another. They are relatively elastic and range from -1.1 to -1.3. Therefore it can be concluded that the effect of increasing entry fees is not going to vary much across the three sites – although demand for Redang is slightly more elastic. This is probably because Redang receives local tourists more than foreign tourists. According to Lindberg and Halpenny (2001),

> "sites with more local use than foreigner use may be more affected by price increases, as locals may have lower income (and thus be price sensitive), as well as be more aware of potential substitutes".

Lindberg and Aylward (1999) hypothesized that price elasticities for foreign visitors are inelastic, but for local visitors they are more elastic. Their findings for foreign visitors to three national parks in Costa Rica were -0.0549 for Volcan Paos, -0.485 for Volcan Irazu and -0.345 for Manuel Antonio. Mungatana and Navrud (1994) estimated price elasticities of -0.17 to -0.84 for foreigners and -1.77 to -2.99 for residents viewing wildlife at Lake Nakuru National Park, Kenya. Chase et al. (1998) estimated price

elasticities for three national parks in Costa Rica and their findings were -2.87 for Volcan Poas, -1.05 for Volcan Irazu, and -0.96 for Manuel Antonio.

As a conclusion, the analysis of our data using ITCM does not give good results since more than half of the visitors are first-time visitors, especially the foreign visitors. Therefore, only analyses for local visitors are reported here. For local tourists, the calculation of consumer surplus is not made since the TOTALSPE are found insignificant for all local visitors and also for visitors that come straight from home. However, using ZTCM, an average consumer surplus of RM1,000 were estimated.

The ZTCM result shows little variation in the elasticities of demand between the three sites at between -1.07 and -1.36. This result corresponds with past studies such as Chase et al. (1998).

6.2 RESULTS OF CONTINGENT VALUATION METHOD STUDY

For the Contingent Valuation Method (CVM), our study used both the single and double-bounded dichotomous choice models. We examine two issues; a) the WTP for a programme to reduce visitor numbers to half the number in 2000 to reduce damage to the corals; and b) WTP for treatment of inland activity by 1) treating sewage before it reaches the reefs (which benefits human health too); 2) promoting economic activities that are good for both the environment and the general population; 3) implementing coastal zone management and planning; and 4) hiring more people to monitor and enforce environmental rules and regulations. Each issue is answered by different

respondents and we managed to get 338 usable questionnaires for the crowding issue and 318 usable questionnaires for the inland development issue. Our estimations are undertaken using both the single and double-bounded dichotomous choice models. For our single-bounded dichotomous choice model, we estimated the WTP using both a Logit and Probit model, while for the double-bounded dichotomous choice analysis we used a log-logistic and log-normal model. The explanatory variables we used are listed below:[3]

$$\text{Willing1} = \alpha + \beta_1\text{REDANG} + \beta_2\text{TIOMAN} + \beta_3\text{SEX } \beta + \beta_4\text{AGE} + \beta_5\ \text{FL} + \beta_6\text{DUMEDU} + \beta_7\text{ISSUE}^4 + \beta_8\text{INCOME} + \beta_9\text{DUMOCC} + \beta_{10}\text{TWELVE} + \beta_{11}\text{WATERVIS} + \beta_{12}\text{FISHSPEC} + \beta_{13}\text{CORALSVA} + \beta_{14}\text{DEVELOPM} + \beta_{15}\text{ENVGROUP} + \beta_{16}\text{TRAVELFR} + \beta_{17}\text{CROWD}^5 + \beta_{18}\text{TOTALSPE} + \beta_{19}\text{LBD}$$

Theory and intuition provide us with good indications on the expected signs on some explanatory variables. In our study we expect WTP to be positively related to FL, DUMEDU, INCOME, DUMOCC, DIVING, WATERVIS, FISHSPEC, CORALSVA, ENVGROUP. We expect FL to be positive as foreign visitors are likely to have a higher probability of saying yes to the bid amount compared to local visitors. In the study by Ahmad Mahdzan et al. (2000) on Payar Marine Park, foreign visitors have twice the WTP of the locals. For income, since natural tourism is widely considered to be a normal good, the higher the income, the higher the probability of saying yes to the bid amount. Past studies such as Carson, Wilks and Imber (1994), Radam et al. (2000) and Radam and Abu Mansor (2000) yield a positive relationship between income and WTP. A priori, we would expect that a higher level of education will lead to a higher

[3] For an in-depth discussion of these variables, see chapter 4
[4] The ISSUE variable is only included in the regression by locality (foreign and local)
[5] The CROWD variable is only included in the crowding issue (but the DEVELOPM variable is included in both the development issue and the crowding issue)

probability of the bid amount being accepted (hence DUMEDU > 0). This expectation is due to the assumption that educated people have more information and are more aware of environmental issues (also found in Arin and Kramer, 2002). In Lockwood, Loomis and DeLacy (1993), education has a positive effect on WTP because it is related to income where a higher level of education means a higher income. For a similar reason we would expect visitors that are presently working to have a higher probability of saying yes to the bid amount.

As diving usually attracts only a specific interest group, those visitors to the park for this purpose are expected to have a higher probability of saying yes to the bid amount. The attributes, water visibility, fish species varieties and coral varieties are expected to have a negative relationship with the probability of saying yes to the bid amount. It is expected that respondents who found that the quality of the corals, fish and water visibility to be not good will be more willing to pay to correct the situation. Finally, for LBD, the log of the bid amount, is expected to have a negative relationship with the probability of saying yes to the bid amount where the higher the bid amount, the smaller probability of saying yes.

6.2.1 Crowding in Marine Parks in Malaysia

In this section we present the results of our study on the first issue of interest – that is, reducing the number of visitors to 50 percent of those in 2000. The visitors are asked “if supposedly the authority wants to limit the number of visitors to half the number who came in 2000 to reduce the damage to the corals, and increased the charge to some

amount, and if they were entitled to visit the marine park, would they still have visited the park?" If they say "yes", they were then asked a follow-up question based on another amount higher than the first one and if they answer "no" they will be asked an amount lower than the first amount. For the first bid amount or what is called a single bounded model, we used both the Logit and the Probit model for the estimation. The double-bounded model that takes into account the follow-up bid, called the double-bounded model, is analyzed using log-logistic and log-normal models.

Table 6.8: Crowding Issue Using Logit and Probit Model – Full Model

Variables	Logit		Probit	
	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
Constant	4.276	2.486	2.477	2.431
REDANG	-0.995	-1.349	-0.567	-1.322
TIOMAN	-0.958	-1.502	-0.550	-1.477
SEX	0.541	1.411	0.318	1.419
FL	1.945	3.450	1.157	3.654
AGE	-0.319	-1.663	-0.193	-1.782
DUMEDU	-0.196	-0.411	-0.079	-0.290
INCOME	0.000	0.738	0.000	0.727
DUMOCCU	0.773	1.675	0.473	1.758
TWELVE	-0.418	-1.452	-0.276	-1.678
WATERVIS	0.028	0.077	0.026	0.118
FISHSPEC	0.063	0.194	0.027	0.142
CORALSVA	-0.360	-1.217	-0.216	-1.234
DEVELOPM	-0.038	-0.118	-0.061	-0.320
ENVGROUP	0.902	0.972	0.552	1.058
TRAVELFR	0.312	0.620	0.181	0.612
CROWD	0.697	1.818	0.439	1.939
TOTALSPE	0.001	1.369	0.000	1.296
LBD	-1.126	-3.048	-0.621	-2.979
Pseudo R^2	0.247		0.249	
Chi squared	52.729		53.110	

Table 6.8 present the results from the full model (where all variables are included) using both the Logit and the Probit models. In the model above, when INCOME is included,

the number of respondents falls to 209. This is because 129 respondents do not reveal their income and therefore their responses are eliminated from the regression. The result shows that the variables FL and LBD are of the expected sign and are significant at the 1% level of significance, while CROWD, DUMOCCU and AGE are significant at the 5% level of significance. Both Logit and Probit models give similar results.

Upon elimination of the insignificant variables, our final model is presented in Table 6.9. With the omission of INCOME, the sample size becomes 338.

Table 6.9: Crowding Issue Using Logit and Probit Estimation - Final Model

Variables	Logit		Probit	
	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
Constant	2.402	3.022	1.323	2.832
REDANG	-0.024	-0.071	-0.041	-0.202
TIOMAN	-0.142	-0.398	-0.093	-0.455
FL	1.828	5.917	1.054	6.073
DUMOCCU	0.592	1.994	0.328	1.902
CROWD	0.534	1.949	0.341	2.112
LBD	-0.940	-3.768	-0.517	-3.598
Pseudo R^2	0.183		0.180	
Chi squared	62.992		61.991	

The final model contains only the variables that are significant at least at the 10% level of significance, except for variables REDANG and TIOMAN. These two variables are included for there are three parks in sample and their inclusion demonstrates whether there are differences in the respondent's answers between the parks. From the above, we observe that these variables are not significant at even the 10 % level of significance. We conclude that there are no significant differences in WTP for the crowding issue between respondents in different parks across Malaysia. The DUMOCCU and CROWD are significant at the 5% level of significance and both have

positive signs, indicating that respondents who are employed and those that think the park has too many visitors on the day they were there, are more likely agree to pay to reduce the number of visitors. In addition, FL and LBD are significant at the 1% level. FL's positive coefficient indicates that foreign respondents are more likely to agree to pay to reduce the number of visitors. LBD has a negative sign denoting that the higher the dollar amount that the respondent was asked to pay, the lower the probability that the respondent would be willing to pay to reduce the number of visitors to the parks. All the signs are consistent with our a priori hypotheses outlined above.

In order to measure welfare, we can use either the mean or the median. The mean and median WTP are calculated using a formula outlined by Hanemann (1984) as presented in Chapter 4. The resulting mean willingness to pay per respondent from the Logit model is RM70.43 while the median is RM69.06. The 95% confidence interval for the mean bid is RM37.46 – RM127.32. It is typical of single-bounded dichotomous choice to have a large confidence interval (Hanemann, 1991). Our study chooses to use the median instead of the mean for welfare estimation for the reasons presented in Chapter 2.

Having completed our analysis of the single-bounded dichotomous choice model, we now proceed with the double-bounded approach. Table 6.10 presents the final model using log-logistic and log-normal models.

For the double-bounded dichotomous choice analysis, DUMOCCU is significant at the 5% level of significance, and FL and LBD are significant at the 1% level. DUMOCCU

has a positive sign indicating that the respondents who are employed are more likely agree to pay to reduce the number of visitors. Similar findings were also found by Quah and Tan (1999) where they conclude that respondents who are "highly educated, young adult who holds a professional or technical jobs" is most concerned in preserving the scenic views of East Coast Park in Singapore. FL also has a positive sign, the same as the single-bounded model. The LBD is highly significant and has a high influence on the willingness to pay of the respondents. All the variables in the double-bounded approach has the same sign as the single bounded approach and the variables are the same except for CROWD which is insignificant in the double-bounded approach and is therefore eliminated from the model. This means that the variable "CROWD" does not have a significant effect on the probability of saying "yes" to the bid amount offered.

Table 6.10: Crowding Issue Using Log-Logistic and Log-Normal Model

Variables	Log-logistic		Log-normal	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	5.88540	10.070	3.47321	10.765
REDANG	-0.39713	-1.326	-0.23942	-1.336
TIOMAN	-0.26111	-0.909	-0.15247	-0.918
DUMOCCU	0.52140	2.097	0.28964	1.977
FL	1.50555	6.033	0.86008	5.935
LBD	-1.97970	-11.539	-1.16307	-12.727
Log likelihood function	405.6674		406.2195	
Akaike's Information Criterion	823.3348		824.4389	
Chi squared	811.3348		812.4389	
Mean	66.22		61.45	
Truncated Mean	66.11		49.30	
Median	31.59		31.29	
95% Confidence Interval	27.98 – 35.66		27.64 – 35.43	
90% Confidence Interval	28.53 – 34.97		28.20 – 34.74	

For the welfare measure using the double-bounded approach, in contrast to the single-bounded approach, the mean WTP is calculated by finding the area under the Logit

probability function of "yes" response. The mean value is RM66.22 for the log-logistic model and RM61.45 with the log-normal model. The median is RM31.59 with a 95% confidence interval of RM27.64 – RM35.66 for the log-logistic model. The median is RM31.29 with a 95% confidence interval of RM27.64 – RM35.43 for the log-normal model.

6.2.2 Inland Development Issue in Marine Parks in Malaysia

As mentioned earlier, our study seeks to find the WTP on two issues. The first issue was presented earlier in Section 6.2.1. This section concentrates on the results on the second issue – reducing the threat to corals from inland development. The same methods are adopted here as with the crowding issue, using the single-bounded and the double-bounded approach. First, we present the results from the single-bounded approach using Logit and Probit models in table 6.11.

For the inland development issue, a total of 312 respondents were interviewed. In the full model above, since INCOME is included in the model, as before, a total of 116 respondents were eliminated from the regression for they do not reveal their income. With only three quarter of the respondents, INCOME is found to be insignificant for both the Logit and Probit models. The insignificance of income was also found in Loomis et al. (2000). Only two variables are found to be significant at the 5% level - FL and LBD. The Pseudo R^2 shows that the variables explain about 36 % of the variation in the dependent variable.

Table 6.11: Inland Development Issue Using Logit and Probit Estimation – Full Model

Variable	Logit		Probit	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	5.83884	3.215	3.496442	3.310
REDANG	-1.01270	-1.777	-0.583167	-1.718
TIOMAN	-0.60094	-0.996	-0.328928	-0.925
SEX	0.12453	0.317	0.062068	0.276
FL	1.13340	2.334	0.652760	2.267
AGE	0.16608	0.762	0.103263	0.815
DUMEDU	-0.00488	-0.011	-0.020464	-0.076
INCOME	0.000005	0.562	0.0000003	0.564
DUMOCCU	-0.30892	-0.632	-0.193035	-0.695
TWELVE	-0.02140	-0.094	-0.002513	-0.019
WATERVIS	0.04670	0.142	0.014791	0.076
FISHPEC	-0.02329	-0.072	0.005706	0.030
CORALSVA	-0.20235	-0.597	-0.137949	-0.718
DEVELOPM	0.27079	0.781	0.132622	0.661
ENVGROUP	-0.02623	-0.031	-0.014053	-0.029
TRAVELFR	-0.51318	-1.196	-0.313397	-1.230
TOTALSPE	0.00003	0.093	-0.000005	-0.025
LBD	-1.83667	-4.886	-1.059602	-5.109
Pseudo R^2	0.36172		0.36096	
Chi squared	74.77449		74.60703	

Upon elimination of most of the insignificant variables we obtain the final model presented in Table 6.12 below.

For inland development issue, the dummy variable for REDANG is significant at the 5 % level of significance, showing that respondents from Redang Marine Park are less willing to pay for the treatment of inland activity. This might be due to the slower level of development in Redang in recent years. This result contrasts with the lack of significance for site dummies in the crowding scenario. The FL variable has a positive sign signifying that foreign visitors are more likely to say “yes” to the bid amount offered to them. In contrast, TWELVE has a negative sign, indicating that the more

times the respondents visit the park, the less they are willing to pay. This might be because they do not think that inland activity damages the corals though our questionnaire did explain about the scientific evidence on coral damage. Also, if they come more often, they would be more affected by an increase in the admission fee than people who come less often. The LBD is significant at the 1% level of significance and has the expected negative sign (see Section 6.2.1 for the discussion).

Table 6.12: Inland Development Issue Using Logit and Probit Estimation – Final Model

Variables	Logit		Probit	
	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
Constant	5.21675	5.920	3.08596	6.100
REDANG	-0.82522	-2.235	-0.50451	-2.303
TIOMAN	-0.33459	-0.965	-0.20307	-1.007
FL	1.16200	3.687	0.67753	3.635
TWELVE	-0.37608	-1.982	-0.22370	-1.994
LBD	-1.63909	-6.301	-0.96383	-6.582
Pseudo R^2	0.30970		0.30869	
Chi squared	101.3822		101.0329	

The mean and the median WTP from the Logit model are RM25.80 and RM25.71 respectively. The 95% confidence interval is RM21.67 – RM30.50. The Pseudo R^2 drops to 0.309.

Next, we present the results from the double-bounded approach using log-logistic and log-normal models as in the crowding issue. Table 6.13 presents the final model where the variables used in the estimation equation are the ones that produce the best fit.

Table 6.13: Inland Development Issue Using Log-Logistic and Log-Normal Model

Variables	Log-logistic		Log-normal	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	7.531101	11.180	4.38297	12.015
REDANG	-0.907954	-2.753	-0.52584	-2.690
TIOMAN	-0.189697	-0.643	-0.12345	-0.720
FL	0.866385	3.183	0.49228	3.085
LBD	-2.407606	-12.612	-1.39357	-14.052
Log likelihood function	358.4262		359.2502	
Akaike's Information Criterion	726.9123		728.5003	
Chi squared	716.9124		718.5004	
Mean	54.59		52.89	
Truncated Mean	54.59		50.69	
Median	23.55		23.79	
95% Confidence Interval	21.36 – 25.97		21.56 – 26.26	
90% Confidence Interval	21.70 – 25.56		21.90 – 25.85	

As in the single-bounded analysis, the REDANG variable is significant at the 1% level of significance and has a negative sign indicating that the respondents from Redang Marine Park are less likely to say "yes" to the bid amount offered to them. The foreign visitors, as in the crowding issue, are still more likely to agree to pay for the treatment of the inland activity since the FL variable is significant at the 1% level and has a positive sign. LBD is also significant at the 1% level and has the already discussed negative sign.

The mean and the truncated mean for the log-logistic model are the same, RM54.59 whereas the mean using the log-normal model is RM52.89 and the truncated mean is RM50.69. The median is more consistent between the models with the median value using the log-logistic model is equal to RM23.55 and RM23.79 using the log-normal model. Confidence intervals are calculated using the median and are calculated at both the 95% and 90% levels. At the 95% confidence interval the range are between 21.36

and 25.97 for the log-logistic model and between 21.56 and 26.26 for the log-normal model.

6.2.3 Foreign and Local Visitors to All Parks

To examine the differences in the preferences of the foreign and the local visitors, we use all respondents with an insertion of one more dummy variable, ISSUE to indicate a different issue (i.e. pooling across WTP scenarios). The motivation for this estimation is to show how much the foreign visitors are willing to pay to preserve coral reefs from any kind of threat and whether it is significantly different from the local visitors.

Similar as before, we present the single-bounded approach first, both the full and the final model using Logit and Probit models. Table 6.14 shows the full model of the single-bounded approach.

Table 6.14: Foreign Visitors to All Parks Using Logit and Probit Estimation – Full Model

Variables	Logit		Probit	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	5.89185	4.168	3.35272	4.230
REDANG	-0.88167	-1.552	-0.55531	-1.720
TIOMAN	-0.88843	-2.034	-0.55033	-1.402
ISSUE	-1.00427	-3.233	-0.55509	-3.179
SEX	0.11792	0.390	0.08752	0.507
AGE	-0.22039	-1.741	-0.12841	-1.791
DUMEDU	0.58891	1.744	0.36959	1.888
INCOME	0.000001	1.474	0.0000006	1.650
DUMOCCU	0.41859	1.312	0.14393	0.495
TWELVE	-0.00259	-0.061	-0.20203	-0.082
DIVING	-0.08238	-0.238	-0.03770	-0.190
WATERVIS	-0.04502	-0.183	-0.01516	-0.107
FISHSPEC	0.00050	0.419	0.00023	0.328

CORALSVA	-0.54382	-2.190	-0.32250	-2.262
DEVELOPM	0.15622	0.645	0.09417	-0.674
ENVGROUP	0.56934	0.814	0.20472	0.587
TRAVELFR	-0.50291	-1.334	-0.28014	-1.268
TOTAL2	-0.00008	-0.616	-0.00004	-0.544
LBD	-0.83580	-3.158	0.47662	-3.145
Pseudo R^2	0.12976		0.15767	
Chi Squared	46.14174		46.05021	

In the full model only two variables are significant at the 1 % level of significance; ISSUE and LBD in the Logit model. TIOMAN and CORALSVA are significant at the 5% level of significance, and AGE and DUMEDU are significant at the 10 % level of significance.

Upon elimination of the insignificant variables our final model is presented in Table 6.15.

Table 6.15: Foreign Visitors to All Parks Using Logit and Probit Estimation – Final Model

Variables	Logit		Probit	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	6.17134	5.392	3.58852	5.583
REDANG	-1.07116	-2.099	-0.66291	-2.261
TIOMAN	-0.96341	-2.545	-0.58955	-2.696
ISSUE	-0.92284	-3.185	-0.51259	-3.134
DUMEDU	0.65528	2.068	0.38299	2.061
CORALSVA	-0.63824	-2.914	-0.37929	-3.005
LBD	-0.86215	-3.372	-0.48678	-3.323
Pseudo R^2	0.09688		0.09388	
Chi Squared	34.45033		34.54940	

The final model has a relatively low Pseudo R^2 for both the Logit and Probit models. It indicates that the variables included in the model only explain about 9.6 % of the variation in the independent variable. The variables included in the final model that are

significant at the 5% level are REDANG, TIOMAN, and DUMEDU; with ISSUE, CORALSVA and LBD that are significant at the 1% level. DUMEDU has the expected positive sign where the higher the education, the more likely the respondents are willing to pay for the preservation of the corals. ISSUE has a negative sign indicating that the respondents answering the questionnaire on crowding issue are more likely to agree to pay more than respondents answering the inland development issue questionnaires. CORALSVA indicates that those who think that there is less variety of corals are more likely to say "yes" to the bid amount. The coefficient on LBD, as expected, is significantly negative.

The mean and median of the WTP using the Logit model are pretty high, with a mean of RM119.99 and a median of RM117.75. The 95% confidence interval is between RM44.10 and RM314.45 and the 90% confidence interval is between RM51.64 and RM268.52.

Similar as in the crowding and inland development issues, we present the final model for the foreign visitors using the double-bounded approach using the log-logistic and log-normal models.

For the double bounded dichotomous choice, the coefficients on REDANG and TIOMAN are significant at the 5% level of significance and have negative signs, meaning foreign visitors from both parks are less likely to say "yes" to the bid amount offered to them. The coefficient on DUMEDU is significant at the 1% level of significance and has a positive sign indicating that the foreign respondents with at least

high school education are more likely willing to pay for the preservation of the corals. CORALSVA is also significant at the 1% level of significance and has a negative sign. Therefore, as one would expect, the worse the respondents think about the corals quality in the park, the more likely the respondents are willing to pay for the preservation of the corals. Consistent with our single-bounded estimation, ISSUE is significantly negative at the 1% level of significance. LBD is significant at 1% level of significance and has the expected negative sign.

Table 6.16: Foreign Visitors to All Parks Using Log-Logistic and Log-Normal Model

Variables	Log-logistic		Log-normal	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	8.9547	9.673	5.2307	10.439
REDANG	-1.0753	-2.517	-0.6588	-2.642
TIOMAN	-0.7972	-2.421	-0.4933	-2.602
DUMEDU	0.9918	3.626	0.5468	3.303
CORALSVA	-0.6659	-3. 515	-0.3847	-3.561
LBD	-1.9873	-11.168	-1.1545	-12.149
ISSUE	-0.7033	-2.935	-0.3767	-2.684
Log likelihood function	377.718		378.202	
Akaike's Information Criterion	769.436		770.405	
Chi squared	755.436		756.405	
Mean	39.04		68.95	
Truncated Mean	38.87		52.41	
Median	39.03		39.21	
95% Confidence Interval	33.98 – 44.81		33.90 – 45.35	
90% Confidence Interval	34.74 – 43.82		34.70 – 44.30	

The mean and median using the double-bounded methods give lower value compared to the single-bounded approach where the mean is RM39.04 with the truncated mean of RM38.87 using log-logistic model, and RM68.95 and RM52.41 for the mean and truncated mean respectively using log-normal model. The median WTP is RM39.03

using log-logistic model and RM39.21 using log-normal model. The 95% confidence interval is tighter compared to the single-bounded approach with value between RM33.98 and RM44.81 using the log-logistic model and between RM33.90 and RM45.35 using the log-normal model.

The next section presents the results for the local respondents. The same presentation is followed starting with the full model of the single-bounded approach using both the Logit and Probit models followed by the final model of the single-bounded approach. After that we present the result for the double-bounded approach.

Table 6.17: Local Visitors to All Parks Using Logit and Probit Estimation – Full Model

Variables	Logit		Probit	
	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
Constant	5.42729	4.142	3.22448	4.183
REDANG	-0.74498	-1.885	-0.46021	-1.953
TIOMAN	-0.64384	-1.443	-0.37979	-1.459
ISSUE	-0.73707	-2.615	-0.42421	-2.520
SEX	0.37291	1.304	0.23367	1.382
AGE	-0.04256	-0.238	-0.02732	-0.257
DUMEDU	-0.59213	-1.875	-0.36220	-1.923
INCOME	0.000004	1.161	0.000002	1.167
DUMOCCU	0.04512	-0.131	-0.01880	-0.093
FIRST	0.30303	0.855	0.16579	0.789
DIVING	0.04792	0.122	0.00335	-0.080
WATERVIS	0.18589	0.747	0.10505	0.698
FISHSPEC	-0.14601	-0.653	-0.09048	-0.667
CORALSVA	0.00083	0.943	0.00052	1.033
DEVELOPM	0.06000	0.265	0.03437	0.252
ENVGROUP	0.65558	0.883	0.42137	0.937
TRAVELFR	0.45358	1.433	0.26231	1.405
TOTAL2	0.00077	2.271	0.00047	2.336
LBD	-1.73816	-6.326	-1.01726	-6.673
Pseudo R^2	0.20205		0.20019	
Chi Squared	85.1168		84.7587	

For the local visitors, a full model with INCOME variable included, gives only four significant variables with REDANG, TIOMAN and TRAVELFR significant at the 10% level of significance and LBD significant at the 1% level of significance.

In the full model only two variables are significant at the 1 % level of significance; ISSUE and LBD in the Logit model, as it is in the model for foreign visitors. TOTAL2 is significant at the 5% level of significance, and REDANG and DUMEDU are significant at the 10 % level of significance.

Upon elimination of the insignificant variables our final model is presented in Table 6.18.

Table 6.18: Local Visitors to All Parks Using Logit and Probit Estimation – Final Model

Variables	Logit		Probit	
	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
Constant	5.91706	6.679	3.50773	7.031
REDANG	-0.54242	-1.682	-0.34021	-1.767
TIOMAN	-0.37865	-0.965	-0.22762	-0.980
DUMEDU	-0.54108	-1.853	-0.33258	-1.864
ISSUE	-0.77553	-2.863	-0.44562	-2.761
TOTAL2	0.00071	2.312	0.00042	2.290
LBD	-1.66400	-6.429	-0.98261	-6.756
Pseudo R^2	0.1729		0.1713	
Chi Squared	72.8586		72.3793	

The final model includes variables that give the best fit overall. The Pseudo R^2 for this model is a bit higher compared to the model for foreign visitors. It indicates that the variables included in the model explain about 17.3 % (compared to only 9.6% in model for foreign visitors) of the variation in the independent variable. As mentioned above, REDANG and TIOMAN are included even if they are not significant but in this case,

REDANG is significant at the 10% level of significance showing that respondents at Redang Marine Park is less likely to agree with the bid amount offered to them and answers from respondents at Tioman Marine Park is not significantly different from Payar Marine Park. DUMEDU gives an unexpected negative sign indicating that respondent with at least high school education are less likely to agree to say "yes" to the bid amount offered to them. This might be due to the pretty high number of local respondents who are still studying (21.4%). ISSUE as in the model for foreign visitors, is significantly negative at the 1% level of significance. TOTAL2 is the amount that the respondent spent for the whole trip to the park and it is significant at the 5% level of significance. Its positive coefficient suggests that the respondents that spent more are more likely to agree to the stated bid amount. The LBD once more is consistent with a priori expectations and is significant at the 1% level.

The mean and the truncated mean using the Logit model are RM19.98 and RM19.67 respectively. The median is RM19.90 used for calculating the 95% confidence interval between RM17.04 and RM23.23 and 90% confidence interval between RM17.47 and RM22.66.

Next, we presented in Table 6.19 the results for final model using the double-bounded approach with the log-logistic and log-normal models.

Using the double bounded dichotomous choice, variable REDANG is significant at the 1% level and has a negative sign indicating that the local respondents in Redang Marine Park are less likely to say "yes" to the bid amount offered compared with the other

parks in the study. ISSUE once again is significantly negative at the 10% level of significance. DUMEDU still gives a negative sign as in the single-bounded approach and is only significant at the 15% level of significance for the Logit model and significant at the 10% of significance for the Probit model. This might be due to the same reason stated in the single bounded analysis for foreign visitors (page 209). TOTAL2 is significant at the 5 % level of significance and has a positive sign consistent with that found above in our Logit and Probit models. Once more, the LBD variable is significant at the 1% level of significance and has the expected negative sign.

Table 6.19: Local Visitors to All Parks Using Log-Logistic and Log-Normal Model

Variables	Log-Logistic		Log-Normal	
	Coefficient	t-statistic	Coefficient	t-statistic
Constant	8.2839	12.275	4.7891	13.632
REDANG	-1.1759	-3.592	-0.6347	-3.250
TIOMAN	-0.5581	-1.592	-0.2585	-1.265
ISSUE	-0.4340	-1.776	-0.2058	-1.427
DUMEDU	-0.4196	-1.579	-0.2648	-1.723
TOTAL2	0.0011	2.472	0.00059	2.186
LBD	-2.4930	-12.854	-1.4466	-14.366
Log likelihood function	371.520		372.692	
Akaike's Information Criterion	757.041		759.384	
Chi squared	743.041		745.383	
Mean	52.78		51.45	
Truncated Mean	51.43		50.24	
Median	19.51		19.63	
95% Confidence Interval	17.73 – 21.48		17.81 – 21.65	
90% Confidence Interval	18.01 – 21.15		18.09 – 21.31	

The mean and the truncated mean using the log-logistic model is RM52.78 and RM51.43; and RM51.45 and RM50.24 using the log-normal model. The median WTP for the entrance fee is RM19.51 with a 95% confidence interval of RM17.73 – RM21.48 using the log-logistic model; and a median of RM19.63 with a 95% confidence interval of RM17.81 – RM21.65 using the log-normal model.

6.3 DISCUSSIONS

Analysis using the Individual Travel Cost Model does not make it possible for us to estimate the consumer surplus since the result shows that the expenditure variable is statistically insignificant. Another attempt was done by the researcher by including only the respondents that come straight from home also failed. Therefore, we decided to use the ZTCM to calculate the consumer surplus. The average consumer surplus per trip is RM1000.00 for Payar Marine Park. Since the coefficient of travel cost for Redang and Tioman is equal to Payar, so the consumer surplus for both marine parks are also the same as Payar Marine Park.

For the CVM method, this study produced several results using several models as shown in Table 6.20. For the single-bounded dichotomous choice, we used two models, namely the Logit and Probit models. From both models, the Logit model shows a better fit according to the AIC and chi-squared test. For example, in the estimation for inland development issue, the AIC for the Logit model is 1.09055 while the AIC for the Probit model is 1.09167[6]. Another way to compare the two models is to look at the chi-squared test. For example, for our local respondents, the chi-squared with Logit model is 67.95, while for the Probit model is 67.77. Therefore, once again the Logit model would appear to give the better fit. Our inclination toward the Logit model is consistent with other studies such as Loomis et al. (2000).

[6] lower value equals to better fit

Table 6.20: Willingness to Pay from Contingent Valuation Method (Ringgit Malaysia)

Item/Model	Crowding Issue	Inland Development Issue	Foreign Visitors	Local Visitors
Logit – Truncated Mean	70.43	25.17	119.99	19.67
- Median	69.06	25.71	117.75	19.90
- 95% Confidence Interval	37.46-127.32	21.67-30.50	44.10-314.45	17.04-23.23
- AIC	1.06968	1.09055	0.97429	1.18432
- Chi Squared	62.992	101.382	34.45033	72.8586
Probit – Truncated Mean	89.44	26.98	154.62	21.08
- Median	74.22	25.82	128.55	20.01
- 95% Confidence Interval	36.72-149.99	21.85-30.51	43.89-376.55	17.08-23.45
- AIC	1.07264	1.09167	0.97400	1.18589
- Chi Squared	61.991	101.033	34.54940	72.3793
Log-Logistic – Truncated Mean	66.11	54.59	38.87	51.43
- Median	31.59	23.55	39.03	19.51
- 95%Confidence Interval	27.98-35.66	21.36-25.97	33.98-44.81	17.73-21.48
- AIC	823.334	726.912	769.437	757.041
Log-Normal – Truncated Mean	49.30	50.69	52.41	50.24
- Median	31.29	23.79	39.21	19.63
- 95% Confidence Interval	27.64-35.43	21.56-26.26	33.90-45.35	17.81-21.65
- AIC	824.439	728.500	770.408	759.384

For the double-bounded dichotomous choice analysis, the log-logistic model appears to fit better than the log-normal model according to the AIC test. Take as an example, for the analysis of the crowding issue, the AIC for the log-logistic model is 823.33 and 824.44 for the log-normal model. This result holds for all other analysis.

Our study uses the median for the welfare estimates as it is more consistent between models. As stated in Hanemann (1984),

> "The estimate of the median of the distribution is likely to be less sensitive to such perturbations than the estimate of the mean – it is generally a more robust measure of central tendency".

This can be clearly observed in the estimation for foreign visitors where the truncated mean (truncated at 1000) using log-logistic model gives an estimation of RM38.87 while estimation using the log-normal model is RM52.41. In contrast, the median are more consistent, with the estimation using the log-logistic and log normal models giving values of RM39.03 and RM39.21, respectively.

As shown by Hanemann (1991), the confidence intervals for the double-bounded model are tighter than the single-bounded model. As an example take the 95% confidence interval for the inland development issue. Using the single-bounded Logit model gives a range between RM21.67 and RM30.50; while using the double-bounded log-logistic model gives a range between RM21.36 and RM25.97. Calia and Strazzera (1998) in attempt to find the bias and efficiency of the single and double-bounded models for CVM using a Monte Carlo analysis also found that the double-bounded model performs better. They stated that

> "Especially for small sample size, the double bound secures a relevant gain in efficiency, although, as usual, the differences tend to decrease when working with more observations".

They specially noticed the efficiency of the double-bounded models in the average width of the confidence intervals. The proportion of the single-bound interval width with respect to the corresponding double bound interval is about 3.5 for the sample size of 100.

The results show differences between the WTP for different issues and also between foreign and local respondents. The WTP for reducing the number of visitors to twice the number in year 2000 are higher than the WTP for protection from inland activity. The median WTP for the crowding issue is RM31.59 with a 95% confidence interval of between RM27.98 and RM35.66; while the median WTP for the inland development issue is RM23.55 with a 95% confidence interval of between RM21.36 and RM25.97. This might indicate that the respondents perceived the crowding issue as more crucial than the inland development issue. The second reason might be due to the fact that the respondents understand the problems brought by too many visitors compared to the problems brought by inland development to damage of the corals.

The differences between the foreign and local respondents are larger with the median WTP for foreign respondent of RM39.03 compared to local respondents of RM19.51. Ayob (2002) also found foreign visitors' WTP to be higher than local visitors in valuing the preservation of Phi Phi's reef sites in Thailand. So does Pham Khanh Nam and Tran Vo Hung Son (2001), Maharana and Sharma (2000), and Asafu-Adjaye and Tapsuwan (2008).

As mentioned in Chapter 2, there are also issues about the validity of the CVM estimates. The measures used to validate the estimates of CVM are as follows:

Table 6.21: Validity Tests of Contingent Valuation Method

Validity type	Description	Methods used
Content Validity	Involves issue of whether the measure adequately covers the constructs' domain. It is subject to the wording of the question and description of the subject matter.	Pilot tests were used to make sure respondents understand the explanation and scenarios given to them about what they were paying for. Before the final version of the questionnaire is distributed, we also consult the authority (Department of Fisheries, Malaysia) about the appropriateness of the payment vehicle (entrance fee) and the hypothetical scenarios presented in the questionnaire.
Scope/Scale Validity	Involves the issue of assessing scale or scope tests, demonstrating that respondents should be willing to pay greater amounts for larger benefits.	In our study, we present a scenario where reducing the number of visitors to half of the number of visitors in 2000 resulted in an average WTP of RM31.59 (using log-logistic model). We expected that the figure should be higher than that if, for example the number of visitors reduced to three third of the number of visitors in 2000, where the more visitor number reduced, the bigger the benefits to the preservation of the corals. This test are not covered in our study.
Construct Validity	Involves the degree to which the particular measure in question relates to other measures as predicted by theory.	Most of the variables display the expected signs as predicted by theory. For an example, the bid value has a negative sign indicating the higher the bid value, the smaller the probability of the respondents to say "yes". The TOTAL2 variable also has the expected positive sign that indicates the more people spend, the higher probability of them saying "yes".

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

Nature-based tourism has grown in importance over the past decades and is now a major contributor to the economies of numerous developing countries including Kenya, Nepal, Thailand (Lindberg and Huber, 1993) and Malaysia. The growing importance of the tourism industry is shown in Malaysia's revenue where tourism had become the second largest contributor to GDP in 2000. Part of that tourism is nature-based tourism as Malaysia is rich in natural resources such as caves, beaches, forests, and marine resources such as coral reefs. Malaysia, in common with other developing countries, faces difficult issues of nature-based tourism management. Some of the more pressing issues in nature-based tourism industry are protecting natural attractions from degradation due to over use, and more effective management of ecotourism as a vehicle to generate economic growth compatible with sustainable natural resource use. In this respect, the current study contributes to an understanding of the role that economic analysis can play in the management of protected areas. This study used two methods: TCM to estimates the per trip values to three parks (Payar, Redang, and Tioman); and WTP to prevent damage of coral reefs in Malaysia's marine parks by using CVM. More specifically, this study concentrates on two main issues:

a) combating threat to corals from inland development by:

1. treating sewage before it reaches the reefs (which benefit human health too)
2. promoting economic activities that are good for both reefs and people
3. implementing coastal zone management and planning
4. hiring more people to monitor and enforce rules and regulations

b) restricting visitors to half the number of those who came in 2000 to reduce the damage to the corals.

Based on the statistical analysis of the visitors' profile**,** only 155 respondents out of the 338 respondents (45%) interviewed think that the parks they visited were crowded on the day of the interview. More than half of the respondents in Payar and Redang said that it was crowded but for Tioman, only 30% of respondents found the place to be crowded. It can be concluded that visitors perceived Payar and Redang to be crowded but visitors to Tioman found that it was not.

Overall, respondents rated the attributes of the parks they visited as of "average" condition. About 55% of respondents rated "clear" for water visibility; 64% rated "many" for fish species variety; 49% rated "many" for corals variety; and 49 % rated "not too much" for development. However, among the parks, Payar had the highest negative perception regarding water visibility and corals variety. This corresponds to the conditions of Payar where corals were found dead within 1 kilometer from the beach (confirmed by both researcher observation and conversation with the marine park authority).

Using the Contingent Valuation Method (CVM), it was estimated that the willingness to pay (WTP) to moderate the environmental impacts of inland development is RM23.79 per person per visit, and RM31.59 per person per visit to reduce crowding. From the literature, overall, the mean WTP per person per visit for recreational purposes in Malaysia range from RM5.00 to RM100.00. It can be concluded that the results from our study is within this range and therefore are reasonably acceptable.

The WTP per person per visit for foreign visitors was estimated to be RM39.21 while for local visitors, RM19.63. Based on the statistics of tourists' arrivals in 2002, the total values of coral preservation of all three parks in this study were estimated to be between RM4.109 million and RM4.973 million a year for local visitors and between RM6.097 million and RM8.053 million a year for foreign visitors. These values were calculated by multiplying the number of foreign and local visitors in 2002 with the confidence interval of WTP calculated in this study[7]. Differences between the WTP figures for local and foreign respondents are commonly found in the literatures. For instance, a study by Ayob et al. (2002) using Logit model to elicit WTP of visitors to Payar Marine Park found that the WTP per person per visit for local visitors is RM12.00, lower than the foreign respondents (RM26.00). Pham Khanh Nam and Tran Vo Hung Son (2001) also found a higher WTP from foreign respondents (VND26,786) compared to local respondents (VND17,956) using Tobit model in estimating recreational value of the coral-surrounded Hon Mun Islands in Vietnam.

[7] Based on the 2002 figures of total local and foreign visitors to all three parks in study of 231,616 and 179,157 visitors respectively.

Since our data set consisted of more than two thirds of the visitors as first-time visitors, the analysis using Individual Travel Cost Method (ITCM) does not turned quite well. As mentioned in Chapter 4, an alternative model such as used by Bell and Leeworthy (1990) that used the number of days on-site as the dependant variable rather than the number of trips also cannot be adopted in this study since one of the Marine Park in study, that is Payar Marine Park, are only visited by day trippers. We present in Chapter 6 only the results using ITCM for local visitors and the results using Zonal Travel Cost Method (ZTCM) for all visitors. We cannot calculate the consumer surplus from the ITCM since the variable TOTALSPE (respondent's total spending) was found to be insignificant, even though we tried to separate visitors that came straight from home from multiple trippers. However, we calculated consumer surplus using the ZTCM, resulted with RM1,000 of consumer surplus per person. Another finding from the ZTCM conclude that the effect of an increase in entry fees will not vary much between the three parks since the price elasticity of demand does not vary much between the three parks. The price elasticity of demand for Payar is -1.17, Redang -1.36 and Tioman -1.07. However, as can be seen, Redang has a slightly higher price elasticity because three quarter of visitors to Redang were local visitors (according to visitor numbers in 2002). According to Lindberg and Halpenny (2001),

> "sites with more local use than foreigner use may be more affected by price increases, as locals may have lower income (and thus be price sensitive), as well as be more aware of potential substitutes".

But we believe that an increase in the entry fee to Redang will not have much impact on the visitation rate compared to the other two parks. In fact, looking at the statistics of

visitors arrival to these three parks in 1998 and 1999 where entry charges were first introduced in 1999, visitors to Payar and Tioman decreased by 4.9% (Payar) and 8.2% (Tioman) while visits to Redang increased by of 20% (refer to Table 1.5). The increase number of visitors to Redang was contributed mostly by local visitors.

For the TCM method, which expenditures to include in travel costs are always being debated. For our study, we include costs of travelling like petrol or bus fare or plane fare plus expenditure such as hiring diving or snorkelling gear. For time (either travelling time or time spent on the study area), we use the "real time" spent on the area as its own variable and not the estimated "value" of time spent. This method is used by Fix and Loomis (1998). The good thing about using real time is that we eliminated the consequences of choosing which proxy to calculate for time and we believe that this is the best option to be used here.

Another way of doing this study is to use the Contingent Ranking Method (CRM) as a tool to calculate the WTP of the visitors. By using the contingent ranking method, we could possibly gain different results with different issues. The good thing about contingent ranking method is that we can obtain the degree of substitutability among the marine parks in Malaysia with emphasis on the attributes of each park. From this study, we will be able to know how much to charge for each park without jeopardizing the visitors' number. However, to use this method, we need to have more than just three parks as the area of study. The limitations of this method are the available time and the research budget. Even to do a survey to these three parks takes more than 2 months;

adding more sites will definitely take more time. Therefore, after considering the drawbacks of this method, we decided to use TCM and CVM instead.

Another more recent method is the Choice Modelling method. The advantage of this method is its natural ability to separately identify the value of individual attributes of a good or programme. One small limitation of this method lies in the difficulty associated with multiple complex choices or rankings between bundles with many attributes and levels. There is ample evidence of a limit to how much information respondents can meaningfully handle while making a decision. Foster and Mourato (1997) detected significant numbers of inconsistent responses in even simple ranking tasks. In addition, learning and fatigue effects can occur among respondents that can lead to irrational choices because respondents are typically presented with large number of choice sets (Shafir and Tversky, 1992). From our experience in handling the surveys for this research, we think it will be more difficult to even find visitors who are willing to answer our questionnaire, especially among the local visitors.

7.2 RECOMMENDATIONS

Even though this study did not contribute towards methodological advances, it has important indications for policy makers. The policy makers should really consider the impact of any policy made on these marine parks. From the study it is proven that preserving the marine parks, especially their corals should be the government's priority. This can be seen from the willingness to pay of the visitors, both foreign and locals, for preserving the corals in these three marine parks in study.

Malaysian government can be categorized as one nation that does care about its environment. An overall policy on environmental protection and preservation are taken care through the Environmental Quality Act 1974. More specifically, the Fisheries Act 1985 was created for protection of the marine reserves. However, the government seemed "very reluctant" to implement economic tools as one of their ways of handling environmental issues. Most of the recreational sites, gazetted or non-gazetted, still do not or do impose only a very marginal entrance charge. Take for an example the entrance fee to the Marine Parks, which is just RM5.00 per person per adults and normally they will waive the fee for school children coming in groups or persons who claim that they enter for educational purposes. Another example is the entrance fee to the Taman Negara, Malaysia's biggest national park which is still RM1.00 up to now. Therefore, we would very much like to suggest to the authority to start using economic tools to protect the environment while providing funding for the same purpose.

A benefit capture instrument should be implemented in order to target tourists' consumer surplus. From the two issues brought up in this study, the WTP of visitors per visit is between RM23 to RM31, we suggest that the fee to all the marine parks in Malaysia should be increased from the current charges of RM5.00 for adults and RM2.50 for children below 12. We would like to suggests a basic fee of RM10.00 (equivalent to one combo meal at McDonalds comprising a regular soft drink, a regular fries and a hamburger) per person per visit for adult and RM5.00 for children. The basic fee is to be charged to local visitors only. The suggested figure is lower than the

willingness to pay calculated from the study because we believe that increasing the fee bit by bit will be preferred by the visitors rather than a big increase in one shot.

We also would like to suggest a different higher fee for foreign visitors, following the concept of adopting a discriminatory pricing scheme as a means to increase the total revenue for the marine park authority. The rationale for charging foreigners a higher entrance fee is firstly, foreigners do not pay income tax or business tax to the local government and secondly, foreigners have a higher WTP for the park visitation as mentioned above. The fees for foreign visitors are suggested at RM20.00 for adult and RM10.00 for children below twelve, which is twice the fee charged to local visitors. It corresponds with our estimation where foreign WTP is found to be 66 % higher than the local WTP.

It is common for marine parks to charge higher fees for foreigners than for nationals. Indeed, such two-tiered pricing may be more common in marine parks than in terrestrial parks. For example, in Belize foreigners pay $2.50 at Hol Chan and $5 at Half Moon Caye, but Belizeans are not charged. In Egypt, foreigners at Ras Mohammed pay $5, while Egyptians pay $1.20. There are various political, economic, and managerial reasons for such a policy. As noted by one source in the context of Bunaken Marine Park in Indonesia, foreigners pay approximately $7 while locals pay about $0.25. The goal is to raise revenue from foreign divers while subsidizing local day-trippers. Both groups pay, but locals pay much less in order to encourage greater interest in the conservation of national parks (Lindberg and Halpenny, 2001).

Another price discriminatory pricing scheme can also be applied to different activities. In this case, the focus is not so much on the difference in resource quality as in wealth and willingness-to-pay (WTP). Though formal evaluations of WTP across these groups are lacking, anecdotal information indicates that divers are wealthier than snorkelers, and that diving is a more specialized experience (Lindberg and Halpenny, 2001). Therefore, one would expect a greater WTP by divers than for snorkelers, and differential fees allow one to better capture this in the form of agency revenue. Therefore, we would like to suggest a fee of RM30.00 for diving activity.

For example the Bonaire Marine Park charges its divers a flat annual fee of US$10 and a dive tour at Miramare MR in Italy costs $22, while a snorkel tour costs $11. In Saba, Netherlands Antilles, divers pay $3 per dive while snorkelers pay $3 per week. However, these fees can be significantly higher as suggested by the Tubbataha Reef National Park in the Philippines, which imposes a conservation fee of US$50 per person on foreign divers and only US$25 for Filipino divers (Spergel, 2001). Indeed, according to Roberts and Hawkins (2000), “divers are willing to pay significant sums to protect marine habitats, on the order of $20-$30 per trip”. In general, divers prefer to travel to good quality reefs and are willing to pay for this. A study compiled by Rudd et al. (2000) in the Turks and Caicos Islands have indicated that high fees can be sustained if the marine site is comprised of high quality reefs (Lindberg and Halpenny, 2001). Therefore, Marine Park Area with high quality reefs could significantly benefit from the introduction of diver fees (Gallagher-Freymuth, 2002). It is therefore suggested that a different higher fee be charged to divers to marine parks in Malaysia. The authority can either charge per diver according to the diving time or per diving trip. Since the current

study did not do an in-depth study on divers, future research could be done to capture the WTP of divers alone so that the fee to divers could be determined.

The visitor numbers to Payar really have to be reduced. The corals condition there worsens every year and unless this trend is reversed, Payar would soon hold little attraction for visitors. According to Lim (1997), even though the carrying capacity of Payar cannot be calculated, "further efforts to increase tourism development and related activities are not recommended". But in his opinion, the number of visitors to Payar is a bit "disturbing". The reduction of visitors can be done in two ways: 1) by introducing a quota system, and 2) by implementing a shut down period. The quota system will need the agreement and full participation from the industry involved because fewer people mean less income to the industry. On this issue, the authority should take charge of explaining the potential long run benefits to those involved in the industry.

The shut down period is necessary to replicate the natural shut down that occurs in Redang and Tioman. Marine parks that are located in the South China Sea, always have a natural shut down period because of the monsoon season that normally appears during the period from December to March every year. Payar Marine Park is the only marine park in Peninsular Malaysia that is not located in the South China Sea. Therefore Payar needs a shut down period to give the corals a chance to rejuvenate and go through the natural process of growth undisturbed. However, this action will also generate bitter resentment from the industry but once again the park authority should take charge of explaining of the need for shut down period.

Involving local communities in coastal resource management has proven to be extremely effective in many regions of the world. There are several benefits from doing this, amongst which are: reef users tend to have an extensive knowledge of local ecology based on observation and experience; community participation helps to ensure that traditional management systems are documented, respected and built upon; response to community needs is more immediate when there is a process of community participation and communities are more likely to accept a solution when they are involved in the decision-making process (Gallagher-Freymuth, 2002). This can be adopted by the park authority of Redang and Tioman that have local communities living on the islands. The local involvement might be more effective if the authority shares the entrance fee with the communities. If this can be made to function, revenue sharing is a focal point for cooperation between parks authority and local residents (Laarman and Gregersen, 1996).

Another issue that we would very much like to suggest is for all the government agencies to coordinate their activities so that they do not jeopardize the Malaysian Environmental Policy. As raised in Chapter 1, as an example, the Ministry of Agriculture and Agro-based Industry (under the Fisheries Department) are held responsible of protecting marine parks, whereas the land areas (the islands where the water areas surrounding them has been gazetted as marine park) are under the jurisdiction of the state government. If the state government does not understand that some activities can do a lot of damage to the corals, they would give approval to projects that only after it is executed leave a bad impact on the corals. Malaysian

government should find a way to coordinate the decisions of the federal government agencies with the state government's decision, and the decisions between all government agencies too. Maybe all the decision makers have to be made aware that preservation of environmental goods and conditions are everybody's responsibilities; not just the responsibility of any one particular agencies only.

To conclude, we would like to summarize the recommendations above as follows:

1. Charge RM10.00 for local adults and RM5.00 for local children.
2. Charge a higher fee to the foreign visitors: RM20.00 for adult and RM10.00 for children.
3. Charge a different higher fee to divers: RM30.00.
4. Introduce a shut-down period or a quota system for Payar Marine Park.
5. Get the local communities involvement in the coastal resource management.
6. Coordination among government agencies is a must.

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APPENDIX 1: List of National Parks in Malaysia

List of National Parks in Malaysia and summary of the attractions in the parks

Name of the Park	Location	Attractions
1. Taman Negara	Within three states' boundaries - Pahang, Kelantan and Terengganu but most of this park area is in Pahang's state.	It's Malaysia's premier national park and the first to be gazetted as National Park in the 1930's. Being the largest in the country extends over some 434,300 hectares of primary forests and more than 130 million years old. It contains the canopy walkway, which is 30 metres high where visitors can see the jungle from amidst the trees. There are also wildlife observation hides near the saltlicks where animals can be seen coming for their mineral intakes.
2. Endau-Rompin National Park	Johor-Pahang border	Second largest in Peninsular Malaysia, covering an area of 49,000 hectares. Rock formations date back to 248 million years characterise the many steep vertical falls down the plateaus and faults, steep-sided cliffs and deep gorges. The tropical rainforest of Endau which is mostly hilly with some prominent sandstone plateau is the watershed of several rivers including the Sungai Endau, Sungai Selai and Sungai Jasin. It's a rich tropical rainforest with a wide variety of flora and fauna and is home to endangered species like the Sumatran rhinoceros.
3. Tanjung Piai Johor National Park	Johor	Declared as national park on 12 September 2001 by the Johor State Government. It thereafter came under the jurisdiction and management of the Johor National Parks Corporation. It is wetlands that consist of coastal mangroves and extensive intertidal mudflats. This is the only mangrove corridor that connects two other key wetland areas in south-west Johor – these being Pulau Kukup and the Sungai Pulai wetlands. Visitors can have a guided tour, do bird watching or fishing. Fishing is allowed along parts of the Boardwalk and at the jetty. A fishing permit must first be obtained at the park office, and costs RM5 per rod. Anglers however are not allowed to gut fish or mess up the Boardwalk or jetty while fishing.
4. Penang National Park	Penang	Gazetted in April 2003, become the first protected area legally gazetted under the National Park Act of 1980. In the past 70 years, ten pieces of legislation were enacted to protect

		wildlife and habitat in Peninsular Malaysia, ranging from the Perak River Right Enactment 1925 to the National Park Act 1980. The Penang National Park, spanning 2,562 hectares of land and sea, was set up to preserve and protect flora and fauna as well as objects with geological, archaeological, historical, ethnological and other scientific and scenic interests. The park is unique as it contains several different types of habitat including a meromictic lake (a lake in which some water remains partly or wholly unmixed with the main water mass at circulation -periods), wetlands, mangroves, mudflats, coral reefs and turtle nesting beaches.
5. Payar Marine Park	Kedah	Gazetted in 1985, it covers 2 nautical miles off four little islands - Payar (the largest), Kaca, Lembu and Segantang. The four islands of the Payar Marine Park are surrounded by enchanting coral reefs and entice visitors to swim, snorkel and scuba dive. The calm and clear water enables the visitors to enjoy the enchanting marine life.
6. Redang Marine Park	Terengganu	The Redang archipelago, gazetted in 1985, is Malaysia's oldest marine park. It comprises nine islands, Redang Island is the largest, Pinang is much smaller and there are seven islets; Kerengga Besar, Kerengga Kecil, Paku Besar, Paku Kecil, Ekor Tebu, Ling (also called Chipor) and Lima. Redang Island has a land area of about 25 square kilometres. The best time to visit is from the month of March until October.
7. Tioman Marine Park	Pahang	Consists of 9 islands i.e. Pulau Tioman, Pulau Labas, Pulau Sepoi, Pulau Gut, Pulau Tokong Bahara, Pulau Chebeh, Pulau Tulai, Pulau Sembilang and Pulau Seri Buat. Tioman is the biggest island among all with 39 km long and 12 km wide. (Sepoi, and Labas are uninhibited). Mountainous and covered in dense forest, Pulau Tioman is a haven for birds, bats, lizards and Mouse Deer. The underwater topography is a combination of patches of coral gardens and huge granite boulders, many over 15m high, on sand. Some are quite bare though many are completely covered in colourful soft tree corals and small sea fans.

8. Mersing Marine Park	Johor	The Mersing Marine Park consists of waters surrounding 13 islands off the north-east coast of the State of Johor which is situated between 8 nautical miles and 35 nautical miles from Mersing. The 13 islands involved are Pulau Harimau, Pulau Mensirip, Pulau Goal, Pulau Besar, Pulau Tengah, Pulau Hujong, Pulau Rawa, Pulau Tinggi, Pulau Mentinggi, Pulau Sibu, Pulau Sibu Hujung, Pulau Pemanggil and Pulau Aur. The islands have many beautiful white beaches which are suitable for relaxation and picnics. It has got chalets for rental and there is a wide range of corals in the water around it.
9. Labuan Marine Park	Labuan, Sabah	Comprises of 3 islets: Pulau Kuruman, Pulau Rusukan Kecil and Pulau Rusukan Besar. The island is surrounded by hard corals, the most conspicuous species of the coral reef is the *Acropora tubinaria*. The corals are found in water 8 - 13 meters deep and very suitable for snorkelling and swimming. There are places for camping and picniking as well. For divers, they can make trips to some "wreck" where corals, especially soft corals and marine lives are found in abundance. These wrecks are known as *"Cement Wreck", "American Wreck", "Australian Wreck"* and *"Blue Water Wreck"*.
10. Tunku Abdul Rahman Park	located between 3 to 8 km off Kota Kinabalu, Sabah	Comprises a group of 5 islands of Pulau Gaya, Pulau Sapi, Pulau Manukan, Pulau Mamutik and Pulau Sulug. The park is the home to the bearded pig, scaly pangolin, rats, squirrels and monkeys. Snakes and monitor lizards make up the reptile population. Large birds such as the white breasted sea-eagle, pied hornbill and green heron are found in large numbers. The best coral reefs are those between Pulau Sapi and Pulau Gaya. The colourful and delicately beautiful corals are living organisms which feed on the plankton floating in the sea.
11. Crocker Range National Park	Situated in the rugged Crocker Range that divides the western coastal plains from the rest of Sabah	The vegetation is predominantly a mix of dipterocarp forests and the montane forests of the upper slopes. The bright yellow flowers of Dillenia suffruticosa a woody shrub usually found on infertile deforested soil are common features here. So too are the Tetrastigma the wild vine, playing host to the Rafflesia pricie, one of the three parasitic rafflesia species found

		on Sabah's mountain ranges. The forest is a home to at least five species of primates - orang utan, gibbons, and the furry tarsier(kera hantu) with its enermous round eyes and frog-like hands and feets, the long tailed macaques and the pig tailed macaques.
12. Pulau Tiga Park	Sabah	Comprises of three islands - Pulau Tiga, Pulau Kalampunian Besar and Pulau Kalampunian Damit. A seven km coral reef around the islands is home to some 35 general species and 98 species of hard corals and their accompanying 'guests' - the brightly coloured fish and other marine life to whom the reef is home. The undisturbed shoreline abounds with a colourful variety of plant life. One particularly important tree among tropical islanders is the Hibiscus tiliaceus, a tree with bright yellow flowers whose fibrous bark is used for ropes and boat culking. There are also many varieties of birds include the fish eating frigate birds which roost on Pulau Kalampunian Damit (Snake Island). As it names, large population of sea snakes could be found on this island including the grey-tailed racer snake and the beautiful yellow ringed cat snake.
13. Kinabalu Park	Sabah	With a fascinating geological history that began approximately a million years ago when the granite core Iying beneath the earth's crust was solidifying. This granite massif was later thrust upwards through the crust to the surface. Subsequent erosion removed thousands of feet of the overlying sand and mud stone exposing this massif. During the Ice-Age, glaciers running through the summit plateau, smoothed it out but the jagged peaks that stood out above the ice surface, remained unaffected by these 'cosmetic' touches and retained their extremely ragged surfaces. This rugged mountain, 4,101 metres above sea level, and still imperceptibly rising, is the focal point of the National Park.
14. Turtle Islands Park	Situated 40 km north of Sandakan in the Sulu Sea off Sabah's east coast	The islands are built over shallow rocky shoals from shingle from the surrounding reef on the fringes. The main attractions here are the turtles which come to nest on their shores. Pulau Selingan is the main nesting area for the green turtles chelonia mydas while the hawksbill turtles Eretmochelys seem particularly

		attracted to the shores of Pulau Gulisan.
15. Tawau Hills Park	East coast of Sabah	Serves as an important water catchment area for Tawau and Semporna, was gazetted as a National Park to protect the natural environment with its unique flora and fauna and to ensure an uninterrupted water supply for the region. Rugged volcanic terrains cover the natural landscape, in sharp contrast to the neatly cultivated plantations of oil palm, cocoa and rubber on the flat coastal plains. It covers an area of 27,972 hectares.
16. Gunung Mulu National Park	Miri and Limbang Division, Sarawak	Houses one of the largest cave systems in the world. This UNESCO World Heritage site is thought to be one of the most cavernous mountains in the world. The limestone mountains have underground river systems and extraordinary cave passages like Clearwater Cave that have a 3 km long underground river system.
17. Niah National Park	Miri, Sarawak	Inhabited by flying lizards, long-tailed macaques and hornbills, this park is also known for its caves, primarily the Painted Cave that has thousand-year-old, iron-age cave paintings; and Great Cave where in 1873, Palaeolithic and Neolithic tools as well as human remains were found. The Chinese delicacy, bird's nest is harvested in this cave while the Penan people collect guano here. Apart from caves, visitors can trek or climb a 400 m high limestone ridge. An Iban longhouse is located on the boundary of the park.
18. Bako National Park	37 km from Kuching, Sarawak	Known for extraordinary variety and contrast in its natural scenery, habitats, plant life and its wildlife. Its most significant features include secluded coves and rugged rocky headlands with magnificent steep cliffs carved by weathering and erosion over millions of years. The seaspray, wave action and the wind have also carved out magnificent sea arches and sea stacks at the base of the cliffs, some rearing above the waves like a mighty serpent's head.The attractive sandstone formations appear as pink and iron patterns on the cliff faces. Further inland, waterfalls tumble down into freshwater pools in a tranquil and idyllic jungle setting.
19. Similajau National	Situated in the Bintulu Division,	The natural attractions of the area include fast folowing streams with rapids in the upper

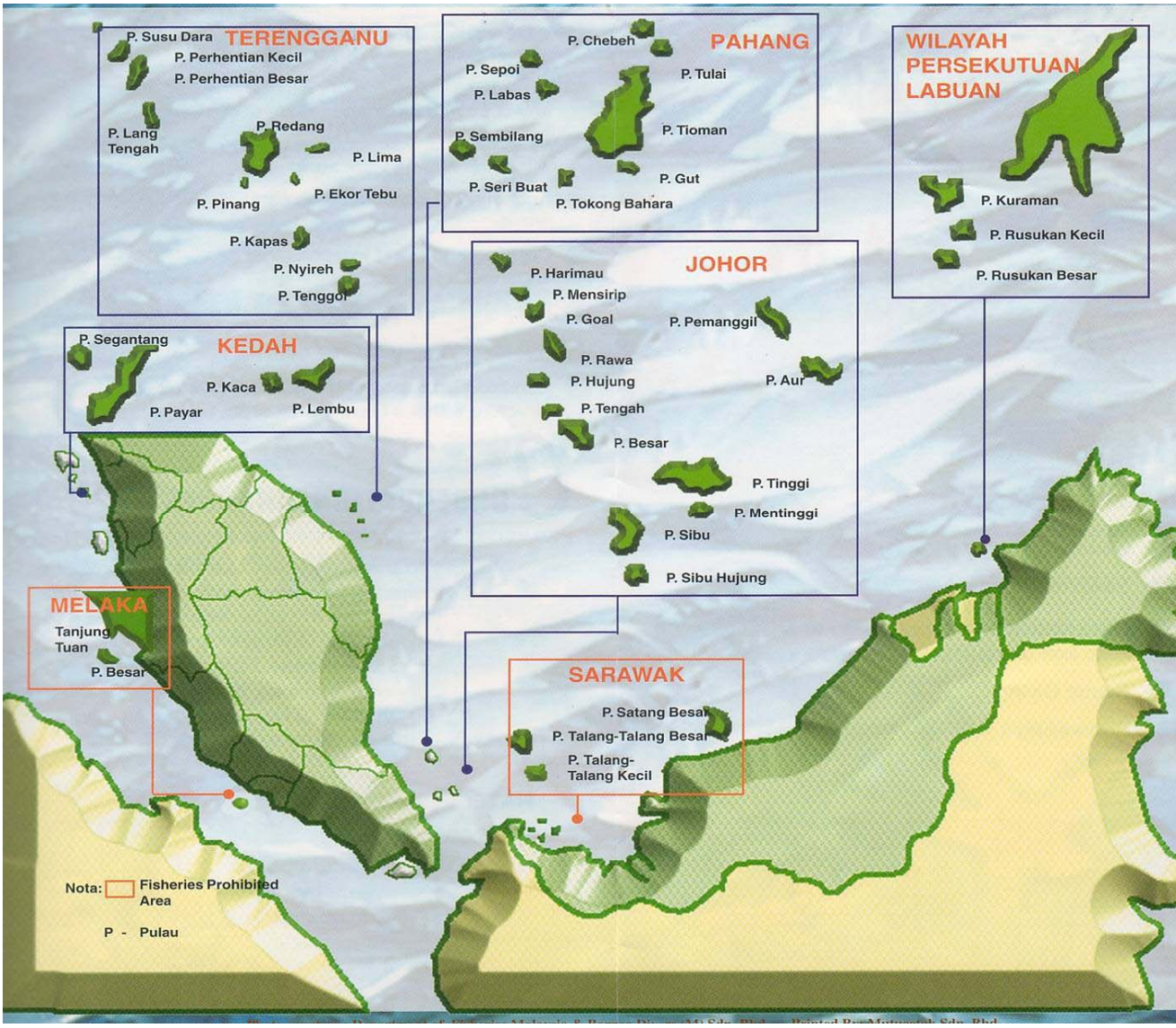
Park	Sarawak	reaches set amidst a cool jungle setting. The clear waters of these streams are stained by the tannin acid of the peat swamp lending it an attractive ruby red tinge. The park is covered with a mix of vegetation types ranging from those commonly found on the littoral fringes to heath and mixed dipterocarp forests. Such diverse habitats naturally support an equally diverse wildlife.
20. Kubah National Parks	Situated approximately 20 km west of Kuching, Sarawak	Covering an area of 2,230 hectares, it was gazetted as a National Park in 1989. The area is largely composed of sandstone, siltstone and shale and lies in the shadow of three mountains - Gunung Serapi, Gunung Selang and Gunung Sendok. The crystal clear waters of fast flowing streams run down a series of waterfalls, some as high as 10 metres.
21. Lambir Hills National Parks	South-west of Miri, Sarawak	Gazetted in 1975, covers an area of approximately 6,952 hectares. The highest peak rises some 450 metres above sea level, in a chain of sandstone hills bounded by rugged cliffs. The lush valleys and lower slopes are covered with mixed dipterocarp forests while heath forests dominate the upper regions. The silence within this green wilderness is broken only by the calls of various birds and the roar of the mighty waterfalls plunging down into the emerald green depths of rocky pools below.
22. Gunung Gading National Park	Lundu area, north-east of Kuching, Sarawak	Gazetted in 1983, covers an area of approximately 4,106 hectares. It features a complex of mountains rising into several peaks, the highest being Gunung Gading, (906 metres) from which the park derived its name. Numerous waterfalls tumble down in series in the upper reaches of the Lundu River creating an idyllic jungle setting, in the cool shade of the rain forest.
23. Batang Ai National Park	Division of Sri Aman, Sarawak	covering some 24,040 hectares and gazetted in 1991. It shelters many protected animals within its extensive wilderness. It also serves as a water catchment area for a huge artificial lake, created by the construction of the Batang Ai Hydro-electric dam. The lake extends up to the Engkari and Ai valleys, its wide scenic expanse lending an atmosphere of peace and tranquility to the surroundings. The main mode of transport is by river-fast flowing and reflecting the forest

		canopy in its crystal clear waters.
24. Tanjung Datu National Park	Located in the Kuching Division, at the westernmost tip of Sarawak near the Indonesian border.	Gazetted in 1994, it is Sarawak's latest addition to its string of National Parks and also the smallest, covering an area of only 1,379 hectares. Situated in a mountainous region whose steep ranges almost hug the shore, the area features swift flowing rivers whose crystal clear waters bear no traces of pollution. Its shoreline comprise some of Sarawak's most beautiful beaches with sparkling sand and seas of aquamarine glittering in the sun. The existence of a coral shore also sets it apart from the other coastal areas of Sarawak.
25. Loangan Bunut National Park	Tucked away on the upper reaches of the Sungai Bunut in the Miri Division, is a huge lake, the largest natural lake in Sarawak. The local Berawan Fishermen call it Loagan Bunut.	In 1991, an area of about 10,736 hectares encompassing the 650 hectare lake was gazetted as a National Park as part of the on-going effort to preserve the unique habitats, rare and valuable plants and wildlife indigenous to the region. The lake is utterly dependent on the Sungai Bunut, Sungai Tinjar and Sungai Baram whose water levels are subject to seasonal fluctuations and this accounts for the fluctuating levels of the water in Logan Bunut. During spells of extreme dryness, usually lasting between 2 to 3 weeks, the lake is converted to vast expanses of dry cracked mud.
26. Talang-Satang National Park	Sarawak	Gazetted at 4 November 1999, is the first marine park for Sarawak. This park includes all four islands of Pulau Satang Besar, Pulau Satang Kecil, Pulau Talang-Talang Besar, and Pulau Talang-Talang Kecil, It has been created primary purpose of marine turtle conservation.
27. Bukit Tiban National Park	Bintulu Division, Sarawak	Gazzetted in 2000, the park encloses the headwaters of two major rivers in the Miri Division, namely Sungai Nyalau and Sungai Timong (a tributary of Sungai Suai), and Sungai Sigrok, a tributary of Sungai Similajau in the Bintulu Division. It is therefore a vital catchment area for surrounding plantations, industries and residential areas within the three river systems. Its unique features provide for the development of water-based recreation, wildlife watching and jungle trekking. The peak of Bukit Tiban (764 m) serves as a good viewing point, overlooking the whole area including the surrounding plantations.
28. Maludam	Sri Aman	Gazetted in 2000, the entire area is a low-lying,

National Park	Division, Sarawak	flat swam. It encompasses all the described phases of the peat swamp formation. The park is critical for protecting the only viable population of the red banded langur (*Presbytis melalophos cruciger*) remaining in the world today. This species is one of the world's most beautiful monkeys that only occur in Borneo.
29. Rajang Mangroves National Park	Sarikei Division, Sarawak	Also gazetted in 2000, it is a mangroves forest. The Rajang Mangroves is unique in that it has a drier mangrove not commonly found in other mangrove areas in Sarawak. There is a rise of up to 3.5 m from low-lying river banks to a distance of 3.65 km inland. This provides a better opportunity for seeing a wider variety of mangrove species in a more different mangrove environment.
30. Gunung Buda National Park	Limbang Division, Sarawak	Being gazetted in 2001, it is the newest national park in Sarawak. It encompasses, among others, the Mulu Formation and the Gunung Buda limestone massif, made of the Melinau Limestone. Gunung Buda or White Mountain (in the language of Penan, one of Sarawak's indigenous tribes) is a 963 m high limestone massif directly north of Gunung Mulu National Park. The mountain houses many magnificient caves. The Melinau limestone includes unique flora, extensive tropical karst terrain and, to date, over 60 km of mapped caves. The Green Cathedral-Turtle Cave System, mapped for 22 km, is the second longest cave in Borneo and the fifth longest in Asia. Recent work has indicated that only a small percentage of the total cave passage has been explored.

Source: http://www.malaysiamydestination.com
http://www.geocities.com/TheTropics/Cabana/2035/index.html

APPENDIX 2: Map of Marine Parks in Malaysia


TERENGGANU
P. Susu Dara
P. Perhentian Kecil
P. Perhentian Besar
P. Lang Tengah
P. Redang
P. Lima
P. Pinang
P. Ekor Tebu
P. Kapas
P. Nyireh
P. Tenggol
PAHANG
P. Chebeh
P. Sepoi
P. Tulai
P. Labas
P. Sembilang
P. Tioman
P. Seri Buat
P. Gut
P. Tokong Bahara
WILAYAH PERSEKUTUAN LABUAN
P. Kuraman
P. Rusukan Kecil
P. Rusukan Besar
JOHOR
P. Harimau
P. Mensirip
P. Goal
P. Pemanggil
P. Rawa
P. Hujung
P. Aur
P. Tengah
P. Besar
P. Tinggi
P. Mentinggi
P. Sibu
P. Sibu Hujung
KEDAH
P. Segantang
P. Kaca
P. Payar
P. Lembu
MELAKA
Tanjung Tuan
P. Besar
SARAWAK
P. Satang Besar
P. Talang-Talang Besar
P. Talang-Talang Kecil
Nota: Fisheries Prohibited Area
P - Pulau

APPENDIX 3a: Questionnaire
for
Inland Development Issue

These questionnaires are to be used in a study of nature tourism in Marine Parks in Malaysia. The findings from this study will provide more information on conservation and preservation issues in marine parks in Malaysia. This study needs your opinion on conservation and preservation of marine parks in Malaysia. I greatly appreciate it if you would answer the following questions as best as you could. All answers will be kept completely confidential and are for research purposes only.

Name of Marine Park : _____

Date : _____

CLASSIFICATION INFORMATION

1. Country of origin. (**If Malaysian** please state home postcode if known, and/or town and state) _____

2. Sex : Male ☐ Female ☐

3. Age

< 20	☐	40 – 49	☐
21 – 29	☐	50 – 59	☐
30 – 39	☐	> 60	☐

4. Highest education level attained

Primary education	☐	College/Polytechnic	☐
Secondary education/ high school	☐	University	☐

5. Approximate **annual household income** (your income plus everybody that is working in your house; if student please state parents' income) _____ and please state the currency _____

6. Occupation

Self employed	☐	Retired	☐
Government servant	☐	Housewife	☐
Student	☐	Unemployed	☐
Private sector	☐	Other (please specify) _____	

7. Is this your first visit to this marine park?

Yes ☐ No ☐

8. If no, how many times have you visited this park?

   a. In the last 12 months? _____

   b. Ever? _____

9. Which activities interest you most in this park? (please choose **ONLY THREE**)

Snorkelling	☐	Scuba diving	☐
Swimming	☐	Fish feeding, viewing	☐
Relaxing	☐	Sightseeing/nature walk	☐
Jungle tracking	☐	Others, please specify _____	

10. What is your opinion about this park in terms of the following features? (We are interested in your opinion, not what you think experts might think)

a. Water visibility

Very Clear	Clear	Cloudy	Very Cloudy
☐	☐	☐	☐

b. Fish Species

Amazingly Many	Many	Not too many	Very few
☐	☐	☐	☐

c. Corals variety

Amazingly Many	Many	Not too many	Very few
☐	☐	☐	☐

d. Development (bathhouses/toilets, tables and benches, hotels, shops)

Hardly any Development	Not Much Development	Developed	Very Developed
☐	☐	☐	☐

11. Are you a member of any environmental group/non-governmental organization?

Yes ☐ No ☐

12. If Yes, please state the name of the group _____

13. Have you visited other marine parks either in Malaysia or elsewhere in the world?

Yes ☐ No ☐

14. If yes, please state the name and country of the marine park. _____

15. What do you think about this park compared to the other parks you have visited?

Better ☐ About the same ☐ Worse ☐

Journey Information

16. Did you travel from home straight to this marine park?

Yes ☐ No ☐

17. If No, where did you travel from? Please state the main town and place name. _____

18. How many people have you come to this marine park with? (for example, your family, partner, friends etc) _____

19. How long did it take you to get to this park today, i.e. what was your journey time from your home/your last stop (before coming here) to the island, in hours and minutes (one way)? _____

20. How much money in total do you think you have spent for the journey to **this marine park alone**? The following spending categories may help you:

Petrol for your car _____

Bus fare/flight fare _____

Boat/ferry _____

Accommodation if staying on the island _____

Other (please specify) _____

If in tour package, state the amount you paid for package to **this marine park alone**

_____

21. Are you on a day trip : A. Yes B. No

If No, how many days do you plan to stay on the island:_____

I would now like you to read the below box, which tells you about coral reefs and marine parks. It is important for you to read to answer the following questions.

Coral reefs are not only beautiful but also important for many reasons. Most importantly, they provide protection and shelter for many different species of fish and other marine organism. They also control how much carbon dioxide is in the ocean water; protect coasts from strong currents and waves by slowing down the water before it gets to the shore; and hold promises for scientists seeking new drugs to combat disease such as cancer. Furthermore, they also generate income to one's country from tourism industry; second largest to Malaysia.

Nearly 80% of the reefs of Southeast Asia, the most species-rich on earth, are at risk, and more than half at high risk. Soil erosion, from deforestation or cultivation on steep slopes, when transported by rivers into coastal waters can smothers corals, preventing oxygen and nutrients from reaching coral polyps and preventing coral larvae from settling and forming new colonies. Sewage discharge from coastal communities promotes growth of algae that blocks sunlight, which corals need to survive.

One way to protect corals from these kinds of damage is by establishing marine parks, to protect and conserve the marine eco-system, especially coral reefs. **Right now**, the authority is **charging RM5.00** (equal to USD 1.30 or less than GBP 1.00) to every visitor to this marine park, but they only take care of the water areas, NOT the inland activity.

21. If the authority wanted to **combat threat to corals in this park from inland activity** by 1) treating sewage before it reaches reefs (which benefits human health too); 2) promoting economic activities that are good for both reefs and people; 3) implementing coastal zone management and planning; 4) and hiring more people to monitor and enforce rules and regulations, AND **increase the charge** to **RM25.00** would you be willing to pay to visit this park?

Yes ☐ No ☐

22. If YES, would you be willing to pay **RM30.00** ?

Yes ☐ No ☐

23. If NO, would you be willing to pay **RM20.00** ?

Yes ☐ No ☐

24. If NOT willing to pay at all, what is the reason for your not wanting to pay/ refuses to answer?

☐ I feel inland developments do not affect the corals in the way described

☐ I do not believe paying will solve the problem

☐ I believe the preservation of the corals will take place without my contribution

☐ I fail to understand the question

☐ I believe the Government should provide all the cost

☐ Others (please specify) _____

25. If YES, what is the reason for your wanting to pay to preserve this park?

☐ For my own benefit ☐ For the next generation

☐ For society as a whole ☐ Other (specify) _____

26. How well do you feel you understand the issues raised in this questionnaire (about the effects of inland developments on coral reefs).

Very well	Well enough	Not so well	Not at all
☐	☐	☐	☐

27. Do you feel this questionnaire provided you with

Too much information	About the right amount of information	Not enough information
☐	☐	☐

Thank You Very Much for Your Time

And Have A Nice Holiday

APPENDIX 3b: Questionnaire
for
Crowding Issue

These questionnaires are to be used in a study of nature tourism in Marine Parks in Malaysia. The findings from this study will provide more information on conservation and preservation issues in marine parks in Malaysia. This study needs your opinion on conservation and preservation of marine parks in Malaysia. I greatly appreciate it if you would answer the following questions as best as you could. All answers will be kept completely confidential and are for research purposes only.

Name of Marine Park : _____

Date : _____

CLASSIFICATION INFORMATION

21. Country of origin. (**If Malaysian** please state home postcode if known, and/or town and state) _____

22. Sex : Male ☐ Female ☐

23. Age

< 20	☐	40 – 49	☐
21 – 29	☐	50 – 59	☐
30 – 39	☐	> 60	☐

24. Highest education level attained

Primary education	☐	College/Polytechnic	☐
Secondary education/ high school	☐	University	☐

25. Approximate **annual household income** (your income plus everybody that is working in your house; if student please state parents' income) _____ and please state the currency _____

26. Occupation

Self employed	☐	Retired	☐
Government servant	☐	Housewife	☐
Student	☐	Unemployed	☐
Private sector	☐	Other (please specify) _____	

27. Is this your first visit to this marine park?

Yes ☐ No ☐

28. If no, how many times have you visited this park?

c. In the last 12 months? _____

d. Ever? _____

29. Which activities interest you most in this park? (please choose **ONLY THREE**)

Snorkelling	☐	Scuba diving	☐
Swimming	☐	Fish feeding, viewing	☐
Relaxing	☐	Sightseeing/nature walk	☐
Jungle tracking	☐	Others, please specify _____	

30. What is your opinion about this park in terms of the following features? (We are interested in your opinion, not what you think experts might think)

e. Water visibility

Very Clear	Clear	Cloudy	Very Cloudy
☐	☐	☐	☐

f. Fish Species

Amazingly Many	Many	Not too many	Very few
☐	☐	☐	☐

g. Corals variety

Amazingly Many	Many	Not too many	Very few
☐	☐	☐	☐

h. Development (bathhouses/toilets, tables and benches, hotels, shops)

Hardly any Development	Not Much Development	Developed	Very Developed
☐	☐	☐	☐

31. Are you a member of any environmental group/non-governmental organization?

Yes ☐ No ☐

32. If Yes, please state the name of the group _____

33. Have you visited other marine parks either in Malaysia or elsewhere in the world?

Yes ☐ No ☐

34. If yes, please state the name and country of the marine park. _____

35. What do you think about this park compared to the other parks you have visited?

Better ☐ About the same ☐ Worse ☐

Journey Information

36. Did you travel from home straight to this marine park?

Yes ☐ No ☐

37. If No, where did you travel from? Please state the main town and place name. _____

38. How many people have you come to this marine park with? (for example, your family, partner, friends etc) _____

39. How long did it take you to get to this park today, i.e. what was your journey time from your home/your last stop (before coming here) to the island, in hours and minutes (one way)? _____

40. How much money in total do you think you have spent for the journey to **this marine park alone**? The following spending categories may help you:

Petrol for your car _____

Bus fare/flight fare _____

Boat/ferry _____

Accommodation if staying on the island _____

Other (please specify) _____

If in tour package, state the amount you paid for package to **this marine park alone**

_____

21. Are you on a day trip : A. Yes B. No

If No, how many days do you plan to stay on the island:_____

I would now like you to read the below box, which tells you about coral reefs and marine parks. It is important for you to read to answer the following questions.

Coral reefs are not only beautiful but also important for many reasons. Most importantly, they provide protection and shelter for many different species of fish. They also control how much carbon dioxide is in the ocean water; protect coasts from strong currents and waves by slowing down the water before it gets to the shore; and hold promise for scientists seeking new drugs to combat disease such as cancer. Furthermore, they also generate income to one's country from tourism industry; second largest to Malaysia.

But tourism, when unregulated, can pose problems. Tourists are capable of loving a reef to death. Snorkellers can be a threat to the corals by accidentally kicking up sediment that can suffocate the corals. Snorkellers can also stand on the corals. This seems to be the case in Payar, where corals within 1 km from shore are all dead. Divers also can damage corals by accidentally bumping into reefs because the water they are in is too shallow, or by scraping corals with diving equipment.

21. In 2000, the number of visitors to Payar was 106,780; Redang 52,674 and Tioman 48,942. In your opinion, do you think there are too many people in the park today?

Yes ☐ No ☐

22. **Suppose the authority wants to limit numbers of visitors to half** the number who came in 2000 **to reduce the damage** to the corals, AND **increased the charge** to **RM35.00 (**currently RM5.00 or equal to USD 1.30 or less than GBP 1.00) and you were entitled to visit this marine park, would you still have visited today?

Yes ☐ No ☐

23. If YES, would you be willing to pay **RM40.00** ?

Yes ☐ No ☐

24. If NO, would you be willing to pay **RM30.00** ?

Yes ☐ No ☐

25. If NOT willing to pay at all, what is the reason for your not wanting to pay/ refuses to answer?

☐ I feel the visitors to this marine park do not harm corals

☐ I do not believe increasing the fee would solve the problem

☐ I do not agree that visitor numbers should be limited

☐ I fail to understand the question

☐ Other (please specify) _____

26. If YES, what is the reason for your wanting to pay to preserve this park?

☐ For my own benefit ☐ For the next generation

☐ For society as a whole ☐ Others (specify) _____

27. How well do you feel you understand the issues raised in this questionnaire (about the effects of too many tourists on coral reefs).

Very well	Well enough	Not so well	Not at all
☐	☐	☐	☐

28. Do you feel this questionnaire provided you with

Too much information	About the right amount of information	Not enough information
☐	☐	☐

Thank You Very Much for Your Time

And Have A Nice Holiday

APPENDIX 4: LIMDEP Program for Double-Bounded Contingent Valuation Method (Foreign Visitors)

```
? Log-logistic Model for double-bounded

namelist ; W = one, redang, tioman, dumedu, coralsva, issue $
namelist ; Z = W, dzero  $
maximize ; labels = cons, c_red, c_tiom, c_edu, c_coral, c_isu, c_bid
         ; start = B
         ; maxit = 1000
         ; fcn = BVH=LGP(-DOT[Z]-c_bid*LOG(bidhi)) |
                 BVL=LGP(-DOT[Z]-c_bid*LOG(bidlo)) |
                 BVM=LGP(-DOT[Z]-c_bid*LOG(bid1)) |
                 willing1*willing2*Log(1-BVH)
                +willing1*(1-willing2)*Log(BVH-BVM)
                +(1-willing1)*willing2*Log(BVM-BVL)
                +(1-willing1)*(1-willing2)*Log(BVL)
                $
calculate ; list
          ; K = Row(B)
          ; K1 = K - 1 $
matrix ; list
       ; Nobs = NREG
       ; Vec = Part(B,1,K1)
       ; Bid = Part (B,K,K)
       ; Xvec = Mean(W)
       ; Const = Vec'*Xvec $
calculate ; list
          ; Nab1 = -1/Bid
          ; Nab2 = Const/((Bid)^2) $
matrix ; list
       ; Nab3 = Xvec*Nab1
       ; Nab = [Nab3/Nab2]
       ; AsyVar = Nab'*VARB*Nab  $

Fintegrate ; fcn = LGP(Const+Bid*log(x))/Nobs
           ; labels = x
           ; start = 1000
           ; pts = 100
           ; limit = 0.001,Trun_v
           ; vary(x)  $
calculate ; list
          ; A1 = Const
          ; B1 = Bid
          ; Myu_Est = -Const/Bid
          ; WTP_Median = exp(-Const/Bid)
          ; WTP_Mean = INTEGRAL
          ; MaxP = 1-LGP(-(Const+Bid*log(Trun_V)))
          ; Trun_Mean = (WTP_Mean-Trun_V*MaxP)/(1-MaxP)
          ; AVar = AsyVar
          ; CInt95L = Exp(Ntb(0.025, Myu_Est, AsyVar^(0.5)))
          ; CInt95U = Exp(Ntb(0.975, Myu_Est, AsyVar^(0.5)))
          ; CInt90L = Exp(Ntb(0.050, Myu_Est, AsyVar^(0.5)))
          ; CInt90U = Exp(Ntb(0.950, Myu_Est, AsyVar^(0.5)))
          ; Log_L = Logl
          ; AIC = -2*(Logl-K)
          $
```

```
? Log-Normal Model

maximize ; labels = cons, c_red, c_tiom, c_edu, c_coral, c_isu, c_bid
         ; start = B
         ; maxit = 1000
         ; fcn = BVH=PHI(-DOT[Z]-c_bid*LOG(bidhi)) |
                 BVL=PHI(-DOT[Z]-c_bid*LOG(bidlo)) |
                 BVM=PHI(-DOT[Z]-c_bid*LOG(bid1)) |
                 willing1*willing2*Log(1-BVH)
                +willing1*(1-willing2)*Log(BVH-BVM)
                +(1-willing1)*willing2*Log(BVM-BVL)
                +(1-willing1)*(1-willing2)*Log(BVL)
                $
calculate ; list
          ; K = Row(B)
          ; K1 = K - 1
          $
matrix ; list
       ; Nobs = NREG
       ; Vec = Part(B,1,K1)
       ; Bid = Part (B,K,K)
       ; Xvec = Mean(W)
       ; Const = Vec'*Xvec
       $
calculate ; list
          ; Nab1 = -1/Bid
          ; Nab2 = Const/((Bid)^2)
          $
matrix ; list
       ; Nab3 = Xvec*Nab1
       ; Nab = [Nab3/Nab2]
       ; AsyVar = Nab'*VARB*Nab
       $

Fintegrate ; fcn = PHI(Const+Bid*log(x))/Nobs
           ; labels = x
           ; start = 1000
           ; pts = 100
           ; limit = 0.001,Trun_v
           ; vary(x)
           $
calculate ; list
          ; A1 = Const
          ; B1 = Bid
          ; Myu_Est = -Const/Bid
          ; WTP_Median = exp(-Const/Bid)
          ; WTP_Mean = INTEGRAL
          ; MaxP = 1-LGP(-(Const+Bid*log(Trun_V)))
          ; Trun_Mean = (WTP_Mean-Trun_V*MaxP)/(1-MaxP)
          ; AVar = AsyVar
          ; CInt95L = Exp(Ntb(0.025, Myu_Est, AsyVar^(0.5)))
          ; CInt95U = Exp(Ntb(0.975, Myu_Est, AsyVar^(0.5)))
          ; CInt90L = Exp(Ntb(0.050, Myu_Est, AsyVar^(0.5)))
          ; CInt90U = Exp(Ntb(0.950, Myu_Est, AsyVar^(0.5)))
          ; Log_L = Logl
          ; AIC = -2*(Logl-K)
          $
```