

Analysis of the Recreational Value of the Coral-surrounded Hon Mun Islands in Vietnam

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TABLE OF CONTENTS

Abstract	1
1.0 Introduction	1
2.0 Objectives of Study	3
3.0 Review of Related Literature	4
4.0 Methodology	5
4.1 Hypotheses and Research Questions	5
4.2 Valuation Methodology	5
4.2.1 The Travel Cost Model (TCM)	5
4.2.2 The Contingent Valuation Method (CVM)	14
4.3 Data Collection Techniques	17
5.0 Characteristics of the Study Area	19
5.1 Physical Conditions	19
5.1.1 Flora and Fauna	19
5.2 Resources	20
5.2.1 Fishery	21
5.2.2 Bird Nests	21
5.2.3 Tourism	22
5.2.4 Scientific Importance	24
5.3 Management	25
5.4 Socio-economic Characteristics of Tourists	25
5.5 The Hon Mun Pilot Marine Protected Area	27
6.0 Analysis of the Recreational Value of the Hon Mun Islands	28
6.1 Visitors' Travel Cost Structure	28
6.2 The Individual Travel Cost Model	29
6.3 The Zonal Travel Cost Model	31
6.3.1 Domestic Visitors	31
6.3.2 Foreign Visitors	35
6.3.3 Total Recreational Value	36
6.4 The Contingent Valuation Method (CVM)	37
7.0 Conclusions and Policy Implications	40
7.1 Conclusions	40
7.2 Policy Implications	42
References	45
Appendix A – Map of the Hon Mun Islands	48
Appendix B – Questionnaire	49

LIST OF TABLES

Table 1.	Description of Variables	7
Table 2.	Zones of Origin	8
Table 3.	Recent Empirical Techniques to Estimate the Value of Time	13
Table 4.	Number of Samples Collected	18
Table 5.	Parameters of the Benthic Community of Coral Reefs at Selected Plots in the Area of the Hon Mun Islands	20
Table 6.	Main Characteristics of the Proposed Hon Mun Marine Protected Area	20
Table 7.	Estimated Revenues from Hon Mun's Resources	20
Table 8.	Revenue from and Number of Tourists to Nha Trang City (1994-2000)	22
Table 9.	Participation in Recreational Activities in the Hon Mun Islands	23
Table 10.	The Place of Origin of Vietnamese Visitors	23
Table 11.	The Place of Origin of Foreign Visitors	24
Table 12.	Means of Transportation of Vietnamese to Nha Trang City	24
Table 13.	Statistical Data on the Socio-economic Characteristics of Vietnamese Visitors to the Hon Mun Islands (180 respondents)	25
Table 14.	Statistical Data on the Socio-economic Characteristics of Foreign Visitors to the Hon Mun Islands (210 respondents)	27
Table 15.	Detailed Expenditure of Tourists to the Hon Mun Islands	28
Table 16.	The Travel Cost Regression Function for Two Functional Forms	29
Table 17.	Visitation Rate Per 1,000 of the Population Per Year for All Zones	31
Table 18.	The Domestic Demand for Visits to the Hon Mun Islands	33
Table 19.	Consumer Surplus and Price Paid for Hon Mun Visits in 2000	34
Table 20.	Visitation Rates and Travel Costs of Foreign Tourists by Region	35
Table 21.	Recreational Value of the Hon Mun Islands in the Year 2000	36
Table 22.	Statistical Data on Socio-economic Characteristics of Vietnamese Visitors to the Hon Mun Islands (252 respondents)	37
Table 23.	Statistical Data on the Socio-economic Characteristics of Foreign Visitors to the Hon Mun Islands (210 respondents)	38
Table 24.	Tobit Function for Vietnamese Visitors' WTP for the Hon Mun Islands MPA	38
Table 25.	Tobit Function for Foreign Visitors' WTP for the Hon Mun Islands MPA	39

LIST OF FIGURES

Figure 1.	Graphical Distribution of Domestic Visits in the Year 2000	26
Figure 2.	Graphical Relationship between the Visitation Rate and Travel Cost	32
Figure 3.	Demand Curve for Visits to Hon Mun	34

ANALYSIS OF THE RECREATIONAL VALUE OF THE CORAL-SURROUNDED HON MUN ISLANDS IN VIETNAM

Pham Khanh Nam and Tran Vo Hung Son

ABSTRACT

Understanding the recreational value of natural resources is crucial to effective conservation programmes. When natural resources are threatened with dire consequences by human activities, their recreational value is greatly reduced, thus affecting their contribution to conservation programmes.

The purpose of this research is to explore the recreational value of the coral-surrounded Hon Mun Islands. The islands contain the richest coral biodiversity in the country and are only about six km from a port, which has been earmarked for expansion. This research employs the travel cost method and the contingent valuation method to measure and analyse impacts on the recreational value of the islands. The zonal travel cost model (ZTCM) estimates the annual recreational value at approximately USD 17.9 million while the result from the individual travel cost model (ITCM) is about USD 8.7 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 USD 3.1 million. Therefore, the port expansion proposal seriously needs reevaluation.

1.0 INTRODUCTION

Coastal areas, which have high total economic value including use and non-use values, play an important role in the economic development of Vietnam. Vietnam has a large coastal area over 3000 km long with diverse ecosystems and landscape. The recreational value of this coastal area could yield potential economic benefits. However, the report by the Ministry of Science, Technology and Environment on the status of the marine environment of Vietnam in 1994 (Tran, 1998) indicated increased levels of degradation and pollution in the coastal waters of Vietnam. Many important ecosystems in the coastal areas have been over-exploited, and marine biodiversity has decreased dramatically. Public recreational marine areas such as Ha Long Bay, the Son Tra Peninsula of Danang Province or the Hon Mun Islands of the city of Nha Trang have contributed significantly to the economy but have been polluted and over-exploited by various activities. It has been difficult for the Government to stem the loss of marine biodiversity due to the conflict between economic development and environmental protection.

Nha Trang City is situated 450 km from Ho Chi Minh City and 1,280 km from Hanoi (General Statistical Office, 1998). Nha Trang, with its attractive marine features like coral reefs and bird nests, is one of the most important tourism sites in Vietnam. With an airport and a seaport, Nha Trang is also strategically located along National Route 1 and the railway route linking the North and the South.

The Hon Mun Islands are located in the south of Nha Trang Bay. The islands support a variety of habitats and ecosystems including fringing coral reefs, mangrove and sea grass with an adjacent deep-water upwelling which supports the local fishing industry.

In recent years, with increasing economic development, the marine environment of Nha Trang City, especially in the Hon Mun Islands, has faced increased exploitation. Coral reefs have been destroyed by many factors, mainly human activities. Destructive exploitation by way of shipping, usage of dynamite, coral harvesting and marine tourism has led to a decrease in marine biodiversity and precious genetic resources such as the Hawksbill turtle, and species such as false killer whales and leatherback turtles from the South China Sea. These activities obviously diminish the benefits reaped from tourism in the islands. The question is: "How much recreational benefit is lost if these activities are not held in check?" Moreover, there is a plan to expand Nha Trang Port. If this plan becomes a reality, the quality of water in the Hon Mun area will deteriorate due to the increase in port traffic, affecting marine ecosystems and recreational activities. Policy-makers will have to choose between recreational activities and marine biodiversity, or the port. So far there has been no decision made by the government. The port expansion proposal is facing opposition especially from the Department of Science, Technology and Environment (DOSTE).

Local government authorities have not been able to effectively manage and protect the marine environment of the islands due to various socio-economic constraints such as inadequate knowledge of marine management and the poor living conditions of the villagers. The Ministry of Fisheries/the World Conservation Union (IUCN) conducted an initial survey of the four most important sites across the nation in early 1998. The Vietnamese Government then selected the Hon Mun Islands as a pilot Marine Protected Area (MPA) for a national system (Vo, 1998). According to the MPA investment project proposal for Hon Mun, issued by the Khanh Hoa Department of Science, Technology and Environment in 1996 (DOSTE, 1996), the purposes of the MPA are to maintain biodiversity, protect coral reefs, improve fisheries, control pollution, manage tourism, and create new jobs for local people hired to manage the MPA.

In light of the imminent threat posed by the port expansion project, it became necessary to carry out a research project to estimate the recreational value of the islands so that decision-makers could compare this value with that of the proposed port expansion.

The estimated recreational value is particularly important in view of the fact that the Nha Trang Port is not the only one in the region that is suitable for expansion. There are alternatives. For example, Cam Ranh Port, situated 60 km south of Nha Trang City, is considered as one of the three best ports in the world in terms of natural characteristics and its strategic location near the point linking the highland area and the rest of the country. Then there is Vung Ro Port, situated 60 km north of Nha Trang City, next to the road to the central highlands of Vietnam.

On the other hand, there is no national substitute for the Hon Mun Islands in terms of coral-related tourism and research.

The estimated recreational value of the islands can be used to assess the economic impact of expansion of the port and to devise future recreational development plans for the islands. Policy-makers will obviously need to know the advantages of tourism over other activities at the islands (for example, fishing and bird nests collecting) in order to decide how to allocate resources among competing uses. Also, a willingness to pay (WTP) analysis will provide important supporting information to assess the financial sustainability¹.

2.0 OBJECTIVES OF STUDY

The overall objective of the research was to analyse the recreational value of the Hon Mun Islands.

Specific objectives were as follows:

1. Determining the factors that affect the recreational demand for the Hon Mun Islands.
2. Estimating the annual recreational value of the islands using the ITCM and the ZTCM.
3. Comparing the estimated recreational value of the islands with that of the proposed port expansion.
4. Calculating and analysing visitors' WTP for the management of the MPA using the contingent valuation method (CVM). The calculated WTP is interpreted as the additional amount of money that tourists are willing to pay towards the MPA on their trips to Hon Mun. Understanding this value and its implications will help policymakers develop conservation mechanisms financed by payments that visitors' are willing to pay, rather than by general tax revenue.

¹ The Hon Mun Islands group was declared an MPA in January 2001. So when this research project commenced, the proposal for the Hon Mun Islands to be declared as an MPA was still being considered.

A full cost-benefit analysis (CBA) of the port expansion versus recreational development was not feasible within the scope of this research project. This project aims only to measure the maximum recreational value that would be lost (in other words, the value at risk) and compare it with the benefits projected from the port expansion. Visitors' WTP for funding the MPA is also a benefit of the site, so it is included in the calculation.

This research project is not strictly a valuation of the recreational value of the coral reefs. Rather, it is a valuation of the recreational benefits of a group of islands of which coral is the main natural feature. The recreational value of the coral reefs can be roughly derived using indices such as the diver/tourist ratio.

3.0 REVIEW OF RELATED LITERATURE

Recreational value is usually measured using three techniques:

1. Productivity change method
2. Travel cost model (TCM)
3. Contingent valuation model (CVM).

Driml (1999) used the productivity change method to derive the gross recreation value of the Great Barrier Reef at AUD 769 million. The value is the gross financial value including expenditure by tourists on, inter alia, recreational fishing and boating. Driml stressed that the gross financial value is a useful indicator of the level of use and trends and thus, a relevant consideration in funds management. This estimated value, however, does not reflect the total recreational value of the coral reefs, which should include tourists' consumer surplus as well as their expenditure².

The productivity change method was also employed by Hodgson and Dixon (1988), as reported in Cesar (2000) to measure the gross revenue of tourism of the Palawan coral reefs in the Philippines. The estimates were based on mean hotel capacity, occupancy, and daily rates. The present value of tourism is USD 6,280 with logging, and USD 13,334 with logging ban, on the assumption that this valuation is solely attributable to the condition of the coral reefs.

Most studies on the recreational value of coral reefs use TCM and CVM to estimate the consumer surplus of tourists. Using TCM, Hundloe (1990) presented the consumer surplus for Australian visitors and international visitors to the 'Reef Region' as USD 117,500,000 per annum and USD 26,700,000 respectively. The researchers then isolated the value of USD 105,600,000

² "Recreational value" used by Driml, refers to the financial value only. The total recreational value, which is estimated in this report, equals consumer surplus plus expenditure (financial value).

(consumer surplus, not the total value) for visitation to coral sites, taking into account all attributes of the 'Reef Region'. The researchers further used CVM to estimate the value of the coral sites, with all other valued attributes removed.

Dixon et al. (1993) used CVM to get an inference of the visitors' general perception of and willingness to pay (WTP) for the Bonaire Marine Park. The average WTP value was USD 27.40 for a consumer surplus of USD 325,000. The USD 10 fee captured part of the WTP.

Recreational value associated with recreational use seems to be the most significant economic value of coral reefs. Spurgeon (1992) stated that tourism yielded the greatest direct financial benefit of all reef uses. According to Costanza et al. (1997, 1998) cited by Ruitenbeek (1999), the global coral reef average value in 1994 was about USD 6,075 per ha per year, of which the value of the recreation function was USD 3,008 per ha per year.

4.0 METHODOLOGY

4.1 Hypotheses and Research Questions

The research was conducted in the form of a survey that addressed the following questions:

- a) How do factors such as travel cost, income, and visitors' socio-economic characteristics affect the recreational demand for the Hon Mun Islands?
- b) What is the annual recreational value of the Hon Mun Islands?
- c) What is the composition of the recreational value of Hon Mun, which includes values gleaned from foreign visitors as well as from Vietnamese visitors?
- d) What is the visitors' WTP for funding the MPA that will be set-up surrounding the Hon Mun Islands and what factors affect their WTP?
- e) Is it reasonable to stop the port expansion project?

4.2 Valuation Methodology

4.2.1 The Travel Cost Model (TCM)

Obviously, the research project had to use some relevant valuation techniques to estimate the islands' recreational value. Hon Mun is a public site, with no admission fee. People who use the site's resources for fishing, aquaculture, and recreation do not pay for these privileges so it is impossible to

use market prices directly to value the site. Therefore, this research project chose to use the TCM to estimate the recreational value of the publicly managed Hon Mun Islands in Nha Trang.

The ZTCM and ITCM were selected from among the various travel cost models to estimate the recreational value of the islands.

Many of TCM studies in Asia have valued the recreational benefits of natural resources based on domestic tourist surveys. For example, the estimated tourism value of Cuc Phuong National Park (Francisco and Glover, 1999) did not include the value from international tourists although the authors had also interviewed foreigners. The TCM application for Lumpinee Public Park in Thailand (Dixon and Hufschmidt, 1986) also omitted this value. The reason for this omission is that the number of foreign tourists was too low to give a significant result. It is usually difficult to estimate recreational values from foreign tourists, mainly due to low visitation rates and multi-site visits. According to figures from the Department of Tourism of Khanh Hoa (So Du Lich Khanh Hoa, 1999), foreign tourists to Nha Trang make up one-third of the total number of visitors. Therefore, it would be unacceptable if foreign tourists were to be omitted from the calculation. In this research project, values for Vietnamese and foreign visitors are separately calculated and then summed up to derive the total recreational value of the Hon Mun Islands.

Individual Travel Cost Model (ITCM)

The ITCM function that relates an individual's annual visits to his/her travel cost is as follows:

$$V_i = f(TC_i, S_i) \quad (1)$$

where

V_i is number of visits made by individual i in a year

TC_i is travel cost of individual i

S_i represents other factors determining the individual's demand for visits to Hon Mun such as income, substitute costs, age, gender, marital status, and education level.

The most popular functional forms are linear, quadratic, semi-log and log-log. There is no consensus in the literature reviewed on the preferred choice. Because the dependent variable consists mostly of low values (i.e. skewed to the left), this study uses the semi-log form. The logarithm of the dependent variable helps to adjust its skewness to normal distribution.

The general semi-log function for the individual travel cost model is:

$$\ln V_i = a + bTC_i + cS_i + \varepsilon_i \quad \text{OR}$$

$$V_i = e^{a + \Sigma dD_i} \times e^{cS_i} \times e^{bTC_i} \quad (2)$$

where

S_i is the socio-economic variable representing income, gender, age, marital status, education level, and group size.

Table 1 shows details of the variables expected to affect demand for visits to Hon Mun.

The consumer surplus for each individual is estimated by the integral calculus of the demand function with respect to the travel cost between the price paid and the choke price. In other words, the consumer surplus is the area below the demand curve and above the price paid line.

$$CS_i = 1/b \times e^{a + \Sigma dD_i} \times e^{cS_i} \times (e^{bTC_i2} - e^{bTC_i1}) \quad (3)$$

Table 1. Description of Variables

<i>Variables</i>		<i>Description</i>
LnV	Logarithm of number of visits	Logarithm of number of visits
TC	Travel Cost	Sum of travel cost (VND)
Y	Income	Monthly income (VND)
Ps	Substitute price	Price of substitute site in VND
GEN	Gender of visitors	Equals 1 if male, 0 if female
AGE	Age	Age in years
MAR	Marital status	Equals 1 if married, 0 otherwise
EDU	Education	Equals 1 if graduate and above, 0 otherwise
GR	Group	Visitor's group size

The consumer surplus per visit is calculated as follows:

$$CS_i \text{ per visit} = CS_i \text{ per visitor} / \text{average visits of a visitor per year} \quad (4)$$

Zonal Travel Cost Model (ZTCM)

The area around Hon Mun is divided into ten zones with increasing distances from the point of departure of the visitor to Hon Mun. The first zone is Nha Trang and the farthest zone is Hanoi. There are some characteristics of zoning. In a zone, the inhabitants have similar preferences. Next, the number of zones used can be quite large. Lastly, each zone is an administrative area or a group of several administrative areas. Table 2 shows the zoning structure.

Table 2. Zones of Origin

<i>Zone</i>	<i>Distance (km)</i>	<i>Administrative district</i>	<i>Population</i>
1	5	Nha Trang	341,000
2	33.3	Dien Khanh, Ninh Hoa, Cam Ranh, Van Ninh	647,700
3	110	Phan Rang, Tuy Hoa	350,200
4	217	Da Lat, Buon Ma Thuot,	786,200
5	250	Phan Thiet, Binh Dinh	545,900
6	441	HCMC	5,155,700
7	497	Long An, Tay Ninh, Vung Tau, Dong Nai	925,600
8	516	Da Nang, Hue	1,112,600
		Quang Nam, Quang Ngai	
9	677	An Giang, Can Tho, Ca Mau, Tien Giang	1,456,000
10	1,140	Ha Noi, Hai Phong, Nam Dinh, Thanh Hoa, Nghe An	5,050,500

Source: Estimated from General Statistical Office (1999) with a population average growth rate of 1.65%³.

As in the Khanh Hoa Tourism Report (So Du Lich Khanh Hoa, 1998), the origins of foreign visitors are divided into two regions, namely (1) Asia and Oceania (Australia and New Zealand) and (2) North America and Europe. Visitation rates were calculated for both these regions. Domestically, zones should be divided on the premise that the further the zone is, the fewer visitors

³ When this table was established, the data on population from the General Statistical Office was only available for 1999. The data in Table 2 was estimated for the year 2000 based on the average growth rate of the population.

from it will visit the site. But internationally, if zones are divided by country, this premise will not be sensible. For example, Cambodia, Laos and the Philippines are close neighbours of Vietnam, but the Hon Mun Islands have received no visitors from these countries. It is also very difficult to divide zones by country because of the limitation of sample size. Brown and Hendry (1989) used this two-region zoning method to estimate the recreational value of elephant viewing in Kenya.

The trip generating function for the zonal model is:

$$V_i = V (C_i , POP_i , S_i) \quad (5)$$

where

V_i is visits from Zone i to the Hon Mun Islands

POP_i is the population of Zone i

S_i are socio-economic variables such as the average income for each zone. In this project, the dependent variable is expressed as (V_i/POP_i) , or the visitation rate.

The form of the demand function may be linear or semi-log. Given the demand function for visits to the islands, consumer surplus and recreational value can be estimated. Consumer surplus is calculated using the integral formula.

Zonal Travel Cost Model versus Individual Travel Cost Model

There are two variants of the simple⁴ TCM. They are the ITCM and the ZTCM. The former aims to establish an individual's recreational demand curve. The number of visits made by an individual over a period of time is used as a function of the travel cost. The individual's recreational value is estimated by the area under his/her demand function. So the total recreational value of the site is calculated by integrating the demand function of each individual. The ZTCM divides the area surrounding the site into zones. So the unit of observation is the zone. The number of visits per capita from each zone as a function of the travel cost.

Georgiou et al. (1997, p.38) discussed some characteristics of the applicability of both models. One noted issue of the individual travel cost model is that "... (a) model requires that there is variation in the number of trips individuals make to the recreational site in order to estimate the demand function". So the application of the ITCM would face difficulty when the variation is very small or, when individuals do not make several trips to the

⁴ The multi-site model or the hedonic travel cost model is only applicable if the effects of the addition or subtraction of a site from a set of sites or a change in the quality of site attributes, on visitors' welfare is sought.

recreational site. Therefore, if every visitor were to visit the site only once per year, it would not be possible to run a regression function.

DeShazo (1997) used the ITCM to re-estimate the recreational value of Khao Yai National Park in Thailand based on data collected in 1994. The mean value of the number of visits per year was 1.88 (p.14). Although the median value and the standard deviation were not shown, it is clear that 1.88 was too small to expect a large variation in the number of visits. His results of the estimation of three forms of the trip generation function indeed proved this limitation. In DeShazo's study, the R-squared values in the three functions were very small: 0.11, 0.13 and 0.09 (p.17), reflecting the fact that the variation of the dependent variable (number of visits) was too small to support the estimation. This result coincides with Georgiou's (Georgiou et al. 1997) arguments about the individual model above.

However, this drawback of the ITCM is not a problem for the ZTCM, which uses the number of trips per capita from each zone as a function of the travel cost. However, the ZTCM has its own limitations. As Georgiou et al. (1997, p.39) pointed out, "The zonal model is statistically inefficient, since it aggregates data from a large number of individual observations into a few zonal observations. In addition, the zonal model treats all individuals from within a zone as having the same travel costs, when this is often clearly not the case."

The zonal model is, nevertheless, considered applicable for measuring the recreational value of Hon Mun Islands. The reasons are as follows:

First, according to the Department of Tourism, almost all tourists make from one to three visits to the Hon Mun Islands each year. The Hon Mun Islands are about eight kilometers from the port. So it is difficult even for visitors living in Nha Trang City to frequently take holidays at the islands because their willingness to travel by boat to the islands depends very much on the weather. This is different from the case of a park or a lake. In the case of a park like Khao Yai National Park (DeShazo, 1997) or various city parks, local residents visit the park several times a week for recreation, so it is possible to use the ITCM to estimate the recreational value in such cases. Moreover, going far away for a holiday has not become a habit of the Vietnamese yet. The constraint here may lie in the low income of most Vietnamese. With few visits per visitor per year, the ITCM is not the most applicable for this study.

Secondly, the ZTCM has been widely applied in evaluating recreational sites in developing countries. According to Hanley and Spash (1993), the ITCM works better for fishing and hunting trips, which are likely to be individual habits rather than popular preferences.

Specific Issues in the Travel Cost Method

Analysis of Factors in the Calculation of Travel Cost

The travel cost of visiting the Hon Mun Islands comprises three components: transportation cost, time cost and other costs. Various arguments on the methods of calculation of these costs are given below:

a) Transportation Cost

According to DeShazo (1997), transportation cost consists of the cost of train, bus or airplane tickets, or the cost of gasoline and vehicle maintenance. Therefore, the transportation cost of visitors depends on the distance and means of transportation. Hanley and Spash (1993) argued that transportation cost is the 'cost of distance traveled', so the price per mile must be calculated by choosing between two options: (1) using petrol costs only as an estimate of marginal cost, or (2) using full cost of motoring figures to include an allowance for depreciation, insurance, etcetera. (p.88)

The following are some applications of the above basis of calculation.

- Hai and Thanh (1998) (cited by Francisco and Glover, 1999), in their analysis of Cuc Phuong Park, used the adjusted price of VND 150/km/person on the assumption that the means of transportation was a hired car.
- Du (1998) used local statistics on passenger turnover to derive the weighted averages of the various means of transportation used and calculated the transportation cost using these.
- Kramer et al. (1995) used the round trip airfare cost from the capital city of the respondents' country of residence to the destination site.
- Based on individual respondents' information on means of transportation and place of origin, DeShazo (1997) calculated the transportation cost for each individual by multiplying the distance and unit cost.
- Tobias and Mendelsohn (1991) used the average cost per kilometre and distance between the zone of origin and the site to calculate transportation cost.
- Leeworthy and Wiley (1991) calculated transportation cost as round trip mileage multiplied by the cost per mile which was derived from a survey on the cost of owning and operating automobiles and vans.

b) *Time Cost*

Since time is a scarce resource and has an opportunity cost (i.e. time spent in one activity could be spent on another.), time needs to be included in the estimation of travel costs. Since the wage rate reflects the opportunity cost of time, it could be used as an approximate shadow price of time. However, the wage rate may be distorted by some institutional constraints. Therefore, appropriate ways to estimate the value of time have to be found.

Deaton and Muellbauer (1980), cited by Hanley and Spash (1993), argued that if individuals are giving up working time in order to visit a site, the wage rate is the correct opportunity cost. However, most recreation time is spent at the expense of alternative recreational activity. This means the opportunity cost should be measured with reference to the marginal value of other recreation activities foregone. Ideally, a separate value should, therefore, be calculated for each individual. However, collecting such information would be too complicated.

According to the Organization for Economic Cooperation and Development (OECD, 1994), because visitors may derive utility or dis-utility from the time spent travelling to the site, Cesario (1976) suggested that the shadow price of time may lie somewhere between one-fourth and one-half of the wage rate, and that the value of one-third of the wage rate may be appropriate.

Hanley and Spash (1993) cite McConnel and Strand (1981) who suggested a simulation process to estimate the value of time. After the simulation process, the value that maximizes the R-squared value would be chosen.

According to Hanley and Spash (1993), the Department of Transport in the United Kingdom calculated values for leisure time obtained from revealed and stated preference approaches. These approaches elicit information from individuals, as to whether or not they can substitute work for leisure and model the two groups differently (Bockstael, 1995, p.658). Hanley and Spash (1993, p.89) cited an empirical example that “used an average figure of £0.00/hour for those respondents stating that they. enjoyed the drive to the forest and a value of £2.68/hour for those who indicated that they disliked the drive”.

Chevas et al. (1989), cited by Hanley and Spash (1993), distinguished between the opportunity cost measure of travel time and the commodity value measure of travel and on-site time. They used a household production function approach to estimate the commodity value of time. They found that this varied across sites, because it depended on the characteristics of the most frequently used approach routes to a site.

The specific techniques used by various authors in their studies are given in Table 3.

Table 3. Recent Empirical Techniques to Estimate the Value of Time

<i>Studies By</i>	<i>Sites</i>	<i>Techniques used</i>
Du (1998)	East Lake, China	Full wage rate and 1/3 wage rate
DeShazo (1997)	Khao Yai Park, Thailand	Full wage rate
Leeworthy & Wiley (1991)	Island Beach State Park, USA	Wage was modeled as a function of an individual's socio-economic characteristics.
Hai & Thanh (1998) in (Francisco and Glover, 1999)	Cuc Phuong Park, Vietnam	Full wage rate and 1/3 wage rate

c) Other Costs

Other costs may consist of entrance fees, guide fees and other incidental expenses at the site.

Distribution of Travel Costs in Cases of Multi-purpose Trips

A multi-purpose trip is one in which a visitor's trip is not restricted to the site in question but includes other recreational sites. Only a portion of the total travel cost reflects the cost paid for the recreational site in question.

Tourists generally visit not only the Hon Mun Islands but also various places in Nha Trang City and the neighbouring areas. Although coral is the unique characteristic of the Hon Mun Islands, few tourists make a trip from their home to Hon Mun only for the benefit of admiring coral unless they live in Nha Trang City. This argument is supported by the fact that tourism is still a luxury commodity in Vietnam and that no foreign tourists come to Vietnam to visit only one site unless their journey is for some special purpose, for example, meetings or research.

However, information on transportation costs from the questionnaire covered the cost of a visitor's whole trip, and not just the trip to the Hon Mun Islands. In order to estimate the recreational value of the islands, the travel cost for visiting the islands had to be identified and calculated and extracted from the total cost of the trip.

Hanley and Spash (1993, p.87) called multi-purpose trip visitors 'meanderers' and provided two options: "The first is to ask people to score the relative importance of a visit to... This score... can be used to weigh their total travel cost. Second, meanderers may be excluded from the TCM analysis..."

In case of the Hon Mun Islands, meanderers could not be excluded from the analysis because information collected from the survey showed that almost all visitors were meanderers. Therefore, in this analysis, we suggested two ways to distribute the travel cost.

- The time criteria basis: Time spent for the whole trip and specifically for the Hon Mun visit would be identified. The coefficient to calculate the travel cost for the Hon Mun visit would be equal to the percentage of time spent for Hon Mun over the total time spent for the whole trip to Vietnam
- The number of site visits basis: The number of sites that had been visited or will be visited would be counted. So the coefficient to calculate the travel cost for the Hon Mun visit shall equal one (site) over the total number of sites for the whole trip.

However, neither method takes into account the satisfaction of visitors, which represents their willingness to pay for the recreational activities.

In the questionnaire, there was a question related to the satisfaction of visitors. The question asked respondents to rank the islands according to their level of satisfaction. Time criteria and the coefficient of satisfaction were used jointly to distribute the travel cost.

4.2.2 The Contingent Valuation Method (CVM)

According to Hanley and Spash (1993), there are six stages in a CVM analysis:

- a. Setting up a hypothetical market
- b. Obtaining bids
- c. Estimating the mean WTP
- d. Estimating a bid curve
- e. Aggregating the data
- f. Evaluating the CVM exercise

a. Setting up a Hypothetical Market

The Hon Mun Islands shall be turned into a Marine Protected Area (MPA). Experts and residents of the islands believe that turning the islands into an MPA is the best way to preserve the environment around the islands, but they are not sure if it will be successful. They are uncertain as to what an appropriate budget for the MPA would be and they also lack experience in

managing an MPA. It would be useful to establish a fund for the conservation of the MPA. It is assumed that visitors to the islands will derive benefit from such measures and it is also reasonable to presume that they would be willing to invest in order to enjoy such benefit for present and future visits.

b. Obtaining Bids

There are several ways to derive the WTP (Hanley and Spash, 1993):

1. The bidding game
2. The closed-ended referendum
3. The payment card
4. The open-ended question.

For this research project, the bidding game was not so suitable. From the authors' experience in field surveys, Vietnamese tend to choose the first bid the interviewer raises. It is easier to get a more accurate result if a range of values is presented for them to choose from. The payment card method was applied here.

c. Estimating the Mean WTP

WTP for funding the Marine Protected Area was calculated using the following formula below (equation 6).

The expected value of willingness to pay $E(y)$ is the sum of components for uncensored and censored cases.

$$E(y) = [\text{Pr}(\text{Uncensored}) \times E(y | y > \tau)] + [\text{Pr}(\text{Censored}) \times E(y | y = \tau_y)] \quad (6)$$

where

$\text{Pr}(\text{Uncensored})$ is the probability of an observation not being censored

$\text{Pr}(\text{Censored})$ is the probability of an observation being censored

$E(y | y > \tau)$ is the expected value of WTP greater than τ

$E(y | y = \tau_y)$ is the expected value of WTP equal to τ

d. Estimating a Bid Curve

A bid curve traces out the impact of people's characteristics on their willingness to pay for environmental goods or services. Some respondents refused to pay any amount of money for the MPA trust fund. This does not mean that their desirability for coral biodiversity does not exist. In fact, they do think

that the coral reefs are valuable, but they are unwilling to pay because they assume their money will be wasted or that people who pollute the coral reefs should pay. This is a case of censored outcome. The outcome is censored because it cannot be ascertained how much a respondent who does not want to pay due to the above reasons values the coral reef biodiversity. The Tobit censored regression model, was employed in this case.

In the canonical censored regression model, the observed data y is given by:

$$y_i = \begin{cases} \tau_y & \text{if } y_i^* \leq \tau \\ y_i^* & \text{if } y_i^* > \tau \end{cases} \quad (7)$$

where

y_i^* is the latent variable that is observed for values greater than τ and is censored for value less than or equal to τ .

e. Aggregating the Data

The mean WTP estimated in step ‘c’ (equation 6) was converted to the population total value figure. According to Hanley and Spash (1993), there are three issues involved in the aggregation process. The first is the choice of the relevant population. The second is moving from the sample mean to the population mean. The third is the choice of the time period over which the values should be aggregated. The population in this study was defined as visitors to the Hon Mun Islands. The sample mean was multiplied by the number of visitors. Lastly, the total willingness to pay for coral protection in the Hon Mun Islands was aggregated over the time period of one year – the current year.

f. Evaluating the CVM Exercise

This step requires an assessment of how successful the application of CVM has been. It was not feasible to conduct a full assessment due to the limited scope of this study. Some methodological remarks, however, are given in the Conclusions section of this report.

Addressing Some Relevant Biases

- *Time Costs*: If time costs are ignored, demand will be biased. The effects of both time costs and transportation costs on the demand for recreation need to be estimated separately. However, since the two may be highly correlated and a separate estimation too difficult to carry out, time costs were given a monetary value and added to the transportation costs.
- *Truncation Bias*: This stems from a lack of survey data on people who did not visit the site. In this research, because the objective was to analyze

willingness to pay for funding the MPA (in other words, to find out the number of visitors who would be willing to pay for conserving the MPA), and not to get the total value of the site (which is more than just the recreational value), the WTP questions could reasonably exclude non-site visitors. So the bias from including only site visitors was avoided.

- *Multi-purpose Trip*: Visiting the site may be a detour from a journey with a different motive. To provide for this, a multi-purpose question was asked and some crude allocation of costs was used to estimate travel costs.
- *Multi-site Trip*: Visiting a site may be part of a round trip involving visits to other locations. Only a portion of the travel cost relates to the recreational site in question. This research project used a percentage of the day's total travel costs.
- *Statistical Problems*: The choice of functional form will have a great influence on the consumer surplus estimates. There are varied functional forms for the travel cost model. With any given set of data, the estimated consumer surplus values can differ significantly, depending on the functional form. This research project used the two most popular forms: linear and semi-log.

4.3 Data Collection Techniques

Collection of Secondary Data

- General information, such as population, income, etc., was obtained mainly from statistical literature.
- The Institute of Oceanography in Nha Trang, and the Department of Science, Technology and Environment in Khanh Hoa provided information on environmental aspects.
- The Department of Tourism in Khanh Hoa provided information on tourism activities.
- The feasibility study on the port expansion and other related information were obtained from the Nha Trang Port Authority.

Collection of Primary Data

The collection of primary data was geared towards visitors' experiences and socio-economic characteristics. The questionnaire was designed to collect information on:

- 1) On-site and off-site recreational behaviour
- 2) Travel experiences and trip costs

3) Socio-economic factors.

Sampling

In the survey, the systematic sampling was employed. Scheaffer et al. (1996) states that: “A systematic sample is generally spread more uniformly over the entire population and thus may provide more information about the population than an amount of data contained in a simple random sample.” Because survey data from non-residents of Nha Trang City could not be obtained, this survey only concentrated on the users' group. Individual visitors were chosen as respondents for the interviews. A ‘visitor’ was defined as one who used the Hon Mun Islands for recreation. Clearly, villagers who lived within the range of the islands were not included in the survey. Samples were taken using two approaches. The first approach was by directly interviewing visitors to the islands. The interviewer was required to speak to every given number of visitors encountered (for example, the interviewer would interview every fifth or sixth visitor.) The second approach was by handing the questionnaire to visitors on boat trips and getting them to complete the forms.

A pre-test survey was conducted to test the validity of the questions and their relevance to the planned analysis. Table 4 illustrates the samples taken of visitors to the site.

Table 4. Number of Samples Collected

	<i>TCM</i>	<i>CVM</i>
Domestic visitors	180	252
Foreign visitors	210	210
Total	390	462

Source: Calculated from survey

The number of samples was deemed sufficient to run the regression function and relevant to a limited survey period of six months. The research population covered the urban population of Vietnam because most Vietnamese tourists are people from urban areas. Vietnamese in rural areas are too poor to afford the luxury of touring.

Interview Location

The survey was conducted at the Hon Mun Islands by way of interviews and questionnaires.

5.0 CHARACTERISTICS OF THE STUDY AREA

5.1 Physical Conditions

The Hon Mun Islands, located at 12°10'N and 109°15'E in the south of Nha Trang Bay, lie about eight kilometres from the shore. The Hon Mun Islands are defined as a group of small islands, namely Hon Mot, Hon Tam, Hon Mieu, Hon Mun and a part of Hon Tre (See map in Appendix A).

There are normally two distinct seasons: the dry season from January to August and the rainy season from September to December with the peak in November and December. The rainfall in these two months accounts for more than 50% of that of the whole year. The average number of sunny hours every year is 2,600. The temperature is relatively constant. The yearly average temperature is around 26°C (28.5°C in summer and 24°C in winter). The frequency of storms afflicting the area is only 0.82 per year in comparison with 3.47 per year of that of the country's coast.

According to Pham and Vo (1998), physical conditions affecting Hon Mun's coral reefs are as follows:

- Salinity: In the dry season, salinity in the coral reefs is high, more than 34‰. In the rainy season, the salinity is lower, ranging from 25-30‰.
- Suspended matter concentration: The mean concentration is 25.9 mg/L ranging from 14 to 47 mg/L.
- Permanganate index: The mean value is 0.52 mg O₂/L with a large range from 0.21 to 1.52 mg O₂/L.
- Nutrient salts: Concentrations of nitrate-N and phosphate-P range respectively from 30 to 32,000 µg/L with mean value of 1,716 µg/L and 0.5 to 46 µg/L with mean value of 9.8 µg/L.

5.1.1 Flora and Fauna

The Hon Mun Islands support a very lucrative edible bird nest colony. According to the Vietnam Biodiversity Action Plan (Tran, 1998), the area has the highest level of marine biodiversity in Vietnam. The Institute of Oceanography (1998) in Nha Trang records the area as having the second highest rating for marine biodiversity in the region, with only slightly less diversity (65 genera) than the Indo-Pacific centre of diversity (70 genera).

Table 5. Parameters of the Benthic Community of Coral Reefs at Selected Plots in the Area of the Hon Mun Islands

<i>Parameters</i>	<i>Bai Tru</i>	<i>Mui Nam</i>	<i>Bai Tre</i>	<i>Hon Mun</i>	<i>Hon Mot</i>	<i>Hon Tam</i>
Hard corals (%)	0.0	8.1	0.0	26.7	11.3	0.0
Dead corals (%)	40.0	1.4	12.0	37.7	44.0	27.4
Algae (%)	8.0	28.4	0.0	6.0	5.1	3.8
<i>Sargassum</i> (%)	2.1	5.5	0.0	0.0	0.0	0.0
Sea urchin (ind./m ²)	5.0	0.0	8.6	3.2	2.7	0.5

Source: Pham and Vo (1998)

Table 6. Main Characteristics of the Proposed Hon Mun Marine Protected Area

<i>Characteristics</i>	<i>Number of islands/species/genera</i>
Coral islands	4
Hard coral species	155
Hard coral genera	44
Reef fish species	176
Living Coral Cover	
< 15 %	-
15 – 30 %	46 species
31 – 50 %	54 species
51 – 75 %	-

Source: Vo (1998)

5.2 Resources

Besides coral, the islands contain other rich resources in the form of fisheries and bird nests. Table 7 presents the estimated values of some resources of Hon Mun.

Table 7. Estimated Revenues from Hon Mun's Resources

<i>Resource</i>	<i>Revenue (in VND billion / year)</i>
Tourism	38.3
Fishery	84.0
Bird nests	28.0

Source: Tran (1998)

5.2.1 Fishery

Fishery is one of the main sources of livelihood for the villagers of Hon Mun Islands. Fishery here exists in four traditional ways:

- Using standing nets ('dam dang' in Vietnamese) to catch tuna and mackerel.
- Using net cages to culture groupers and lobsters.
- Angling for anchovy and cuttlefish.
- Diving to catch ornamental fishes.

There are four standing nets in the Hon Mun Islands of which one is off Hon Noc, one off Bich Dam and two to the south of Hon Mun. According to Tran (1998), each standing net, requiring the use of about 25 employees, can produce about one billion VND per year.

A few years ago, lobster and grouper cage culture, especially lobster, was very common on the islands. Its attraction stemmed from high market prices for nurse lobsters that were cheap to culture. According to the Khanh Hoa Fishery Agency, however, lobster production has decreased in recent years due to stagnation in the market price of mature lobsters, although the price of nurse lobsters has increased. Tran (1998) estimated that the average earnings from lobster culture were around VND 625,000 per month. This profit, although insignificant, compensates for labour costs. It is important for villagers because during off-farm seasons, their opportunity costs are nearly zero.

According to Vo (1998), fishing anchovy and cuttlefish as well as catching ornamental fishes are the main activities around the islands which provide many benefits to the villagers.

Tran (1998) estimated that the value of fishery in the Hon Mun Islands was around USD 6,123,200 in 1997.

5.2.2 Bird Nests

The Hon Mun Islands have a very valuable but scarce resource – bird nests (or 'yen sao'). In Hon Mun and Hon Noc, there are bird nests in the eight caves found on these islands. According to the Khanh Hoa Statistics Agency, the production of bird nests on these two islands is about 100 kg to 120 kg per year. With a market price of USD 2,000 per kg, the bird nests business of the Hon Mun Islands brings in approximately USD 200,000 to 240,000 per year. It is obvious that bird nests yield constant and important benefits to the islands. However, the right to harvest such a resource belongs to the local government.

5.2.3 Tourism

The number of tourists to Nha Trang City as well as the revenue from tourism has increased considerably over recent years. Table 8 presents revenue from and number of tourists from 1994 to 2000.

Table 8. Revenue from and Number of Tourists to Nha Trang City (1994-2000)

	<i>Unit</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>
<i>Revenue</i>	VND billion	60,661	85,110	115,000	115,200	147,700	150,500	197,200
<i>Total Tourists</i>	Person	260,000	317,000	390,000	315,500	331,400	370,000	397,000
<i>Foreign Tourists</i>	Person	73,500	91,500	109,000	105,000	99,600	130,000	118,700

Source: So Du Lich Khanh Hoa (1997, 1998, 1999, 2000)

The number of visits to Nha Trang City in 2000 was about 397,000 of which 70% visited the islands for recreation.

Tourists' Activities on the Islands

Recreational activities at the islands include snorkeling, scuba diving, boating, jet skiing, sun bathing, swimming and visiting fishing villages.

Coral reefs and ornamental fishes are features peculiar to the Hon Mun Islands compared to other recreational sites, but they only attract about ten per cent of the visitors (under scuba diving). Water sports like boating, sailing and jet skiing are also not very popular.

Table 9. Participation in Recreational Activities in the Hon Mun Islands

<i>Activities</i>	<i>Vietnamese</i>		<i>Foreigners</i>	
	<i>Headcount</i>	<i>Percentage (%)</i>	<i>Headcount</i>	<i>Percentage (%)</i>
Total sample	151	100	138	100
Sunbathing	56	37	64	46
Swimming	81	54	98	71
Snorkeling	58	38	83	60
Scuba-diving	10	7	8	6
Boating/Sailing/ Jet-skiing	14	9	37	27
Sightseeing	90	60	82	59
Eating seafood	77	51	74	54
Visiting fishing villages	29	19	68	49

Source: Survey data

The Place of Origin of Visitors

Table 10. The Place of Origin of Vietnamese Visitors

<i>Zone</i>	<i>Number of samples</i>	<i>Percentage (%)</i>
1	20	11.1
2	7	3.8
3	8	4.4
4	15	8.3
5	6	3.3
6	85	47.2
7	8	4.4
8	7	3.8
9	6	3.3
10	18	10.0
Total	180	100

Source: Survey data

Table 11. The Place of Origin of Foreign Visitors

<i>Region</i>	<i>Region</i>	<i>Number of samples</i>	<i>Percentage (%)</i>
Asia & Oceania	1	115	54.7
Europe	2	77	36.6
North America	2	18	8.7
Total		210	100

Source: Survey data

Means of transportation

Table 12. Means of Transportation of Vietnamese to Nha Trang City

<i>Means of transportation (%)</i>	<i>Zone of Origin</i>									
	1	2	3	4	5	6	7	8	9	10
Aeroplane	0	0	0	0	0	7	0	0	0	13
Train	0	0	37	0	60	69	28	100	17	77
Hired car	0	0	13	31	15	11	43	0	83	0
Tour bus	0	0	0	0	0	0	0	0	0	0
Motorbike	100	84	0	38	0	0	0	0	0	0
Private car	0	16	0	0	0	7	0	0	0	0
Coach	0	0	50	31	15	6	29	0	0	0
Total	100	100	100	100	100	100	100	100	100	100

Source: Survey data

5.2.4 Scientific Importance

The area is of considerable value to research and monitoring, containing high genetic diversity, a combination of various reef types and being close to the edge of the continental shelf and upwelling.

The National Institute of Oceanography of Nha Trang has conducted significant research programmes on the area in fields such as the biodiversity, biology and ecology of living coastal resources, aquaculture and restoration, biochemistry, hydrochemistry, and marine physics and geology. The Institute of Oceanography is on the Global Coral Reef Monitoring Network.

The area is also an important research field for the Nha Trang University of Fishery, which is located only about ten kilometres away from Nha Trang Port.

5.3 Management

The Hon Mun Islands may be considered a freely accessible public park managed by the local government. The right of supplying services on the islands is shared among many state-owned tourism companies. For example, the Ship Chandler Company manages Hon Tam and the Nha Trang Handicraft Import-Export Company services Hon Mun.

Shipping activities in Nha Trang Port, which is about three kilometers from the nearest point of the islands, could directly affect fishing operations and tourism in the Hon Mun Islands. Nha Trang Port receives 640,000 tonnes of goods and 18,000 turns of passengers annually. Nha Trang Port is at present the most important seaport of Khanh Hoa Province. Its activities definitely have a bearing on the management of the Hon Mun Islands.

5.4 Socio-economic Characteristics of Tourists

Table 13. Statistical Data on the Socio-economic Characteristics of Vietnamese Visitors to the Hon Mun Islands (180 respondents)

<i>Characteristics</i>	<i>Mean</i>	<i>Std Deviation</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>
Number of visits	1.7	1.19	1.00	1.00	5.00
Distance (km)	401	345	385	5	1,140
Travel time (days)	4.35	3.41	4.00	1.00	30.00
Group (persons)	15.00	25.14	8.00	1.00	160.00
Income (VND)	1,325,556	683,739	1,200,000	300,000	3,000,000
Age (years)	32.2	10.02	30.00	11.00	60.00
Education (Schooling years)	13.68	2.57	14.00	5.00	18.00
Sex (Male=1; Female=0)	0.69	0.46	1.00	0.00	1.00
Marital Status (Married=1; Not married=0)	0.51	0.50	0.00	0.00	1.00

Source: Survey data

The average visitor visited the Hon Mun Islands 1.7 times over one year. Over 50% of domestic visitors visited the Hon Mun Islands for the first time (Figure 1). This can have two implications: (1) making a holiday in Vietnam is not an annual habit and/or (2) the Hon Mun Islands are not that attractive to the Vietnamese.

Most visitors visited Hon Mun only once in the analysed year, even residents of Nha Trang.

Records of socio-economic characteristics of the sample revealed several interesting issues. The average income of visitors is around VND 1,300,000 per month, which is higher than the national average level. This is understandable since travel is a luxury good and only the middle and higher-income brackets can afford their recreational preferences. This reality, therefore, supports the early assumption that visitors to Hon Mun were from urban regions and confirms that choosing the urban population for this study was the right decision. The educational level of the visitors averaged 13.7 schooling years and was higher than the national average. The age structure showed that most visitors fell into the working age group, with the average age of 32.2 years. Seventy percent of the respondents were male.

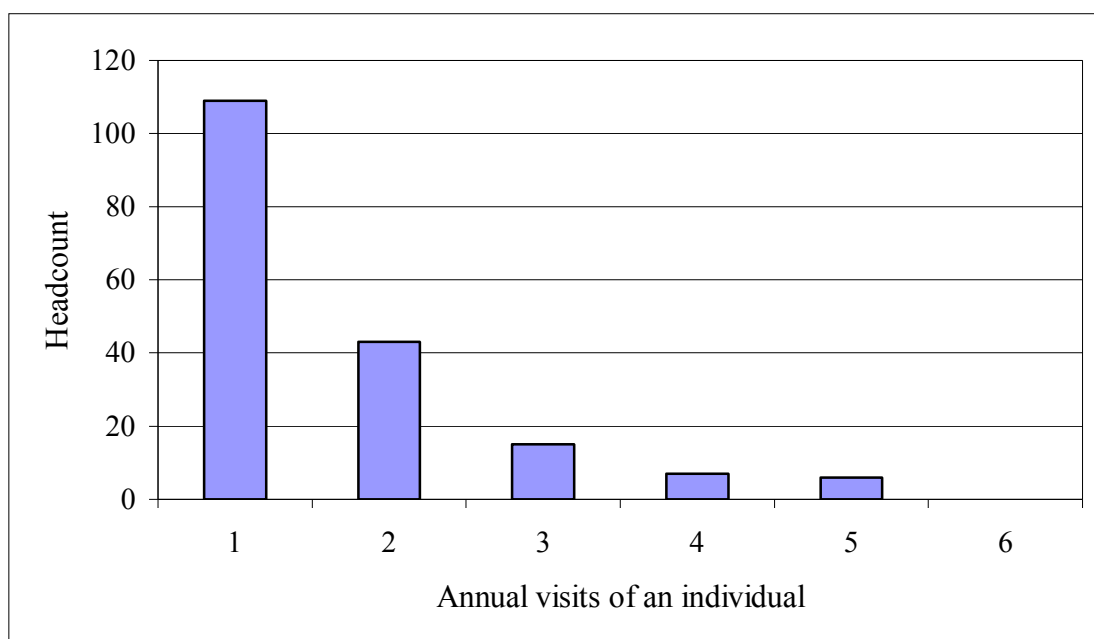


Figure 1. Graphical Distribution of Domestic Visits in the Year 2000

The average number of visits by foreigners was 1.17 over one year – lower than that of domestic visitors. Foreign tourists have to pay a large amount of money to visit Hon Mun, so it is reasonable to expect that the frequency of their visits in any given year would be less than that of domestic visitors.

The foreign visitors’ socio-economic features showed that the average income was USD 3,642 per month. This suggests that most visitors come from developed countries. The average number of schooling years was 15.1, considerably higher than that of Vietnamese visitors. The average age was 32.5 years, similar to Vietnamese visitors. However, there was a difference in the gender figure. Fifty-two percent of foreign respondents were male compared to 70% for Vietnamese respondents.

Table 14. Statistical Data on the Socio-economic Characteristics of Foreign Visitors to the Hon Mun Islands (210 respondents)

<i>Characteristics</i>	<i>Mean</i>	<i>Std Deviation</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>
Number of visits	1.17	0.65	1.00	1.00	6.00
Travel time (days)	2.4	1.15	2.00	1.00	10.00
Group (persons)	5.29	4.03	3.00	1.00	18.00
Income (USD)	3,642	2,604	3,000	500	10,000
Age (years)	32.5	10.78	30.00	12.00	68.00
Education (Schooling years)	15.17	2.4	16.00	5.00	22.00
Sex (Male=1; Female=0)	0.52	0.50	1.00	0.00	1.00
Marital Status (Married=1; Not married=0)	0.34	0.47	0.00	0.00	1.00

Source: Survey data

5.5 The Hon Mun Pilot Marine Protected Area

The establishment of the Hon Mun Pilot Marine Protected Area was approved on 10 January, 2001 by the Government of Vietnam, the Global Environment Fund (GEF), the World Bank (WB), the Government of Denmark and the World Conservation Union (IUCN). The four-year project is funded by over USD 2 million.

The project has four main objectives:

1. To manage and plan the MPA with the participation of all involved parties.
2. To ameliorate unsustainable use of marine biodiversity with poverty alleviation through the development of sustainable fisheries and new aquaculture employment opportunities.
3. To raise the capacity for the successful development and implementation of the MPA through community empowerment by way of relevant training courses provided.
4. To monitor and assess the management of the project on a regular basis.

6.0 ANALYSIS OF THE RECREATIONAL VALUE OF THE HON MUN ISLANDS

6.1 Visitors' Travel Cost Structure

Table 15 presents the detailed expenditure of domestic and foreign tourists for visits to Hon Mun. A very small part of the recreational value contributes to the local economy; this consists of expenditure on food and accommodation in Nha Trang, tourist boat tickets, and services on the islands.

Table 15. Detailed Expenditure of Tourists to the Hon Mun Islands

(Unit: VND '000)

<i>Costs</i>	<i>Domestic tourists</i>		<i>Foreign tourists</i>	
	<i>All</i>	<i>Per head</i>	<i>All</i>	<i>Per head</i>
Transportation costs	19,936,849	127	150,832,903	1,587
Hotel costs in Nha Trang	14,026,320	72	6,841,728	72
Time costs	986,548	6.64	14,502,599	152
On-site costs	14,805,580	89	13,322,251	140
Total	35,728,977	219	178,657,753	1,880

Source: Calculated from the survey data

The on-site cost is Nha Trang's gross income from tourism in 2000 received through boat-trip tours, boat rental owners, diving services, villagers in the fishing village (Lang Chai⁵) and other tourism service suppliers. This gross income was estimated to be VND 48,994 million, of which the contribution of foreign tourists was less than domestic tourists'. However, the contribution of international tourists to the local economy is greater per head compared with domestic tourists because the number of foreigners to Hon Mun is only one-third of the total number of visitors to Hon Mun. It is worthwhile to make a comparison here. According to the report of the Khanh Hoa Tourism Department in December 2000, the total revenue of tourism in Khanh Hoa in 2000 was estimated at VND 197.2 billion. Roughly, if we use a weighting of one-third to estimate the tourism value of Hon Mun (based on the assumption that during an average of three days of recreation in Nha Trang, tourists use one day visiting Hon Mun, we could estimate the revenue gained from Hon Mun as VND 197.2 billion \times 1/3 = VND 65.7 billion.

⁵ There are some small fishing villages on the Hon Mun Islands. Lang Chai is the biggest and almost all tourists visit it.

The greatest part of visitors' expenditure lies in transportation costs. For domestic visitors, these costs made up over half of their total outlay. For foreign tourists, this figure was about 85% of their total expenditure. The major part of these costs are acquired by airline companies and complementary service suppliers.

6.2 The Individual Travel Cost Model

Table 16. The Travel Cost Regression Function for Two Functional Forms

<i>Variable</i>	<i>Linear</i> <i>(t-statistic)</i>	<i>Semi-Log</i> <i>(t-statistic)</i>
<i>Dependent Variable</i>	<i>Visits</i>	<i>Log of visits</i>
Constant	2.645732 (4.51)	0.907665 (3.64)
Travel costs	-0.003350*** (-3.08)	-0.001635*** (-3.54)
Income	2.94E-07** (1.97)	1.62E-07*** (2.56)
Substitute costs	8.12E-05 (0.14)	-8.84E-06 (-0.04)
Age	-0.008174 (-0.92)	-0.006350 (-1.69)
Male (dummy)	0.405930*** (2.08)	0.187193*** (2.26)
Education	-0.043680 (-1.15)	-0.021706 (-1.34)
Number of Observations	180	180
R-Squared	0.09	0.12
F-test	2.91	4.13

Source: Estimated from the survey data

** Statistically significant at 5% *** Statistically significant at 1%

In these models, most of the coefficients have the expected sign. Most importantly, the coefficient on travel costs is negative and significant. Similarly, the relationship between income and the total number of visits is positive and significant.

High travel costs incurred by individuals have a negative impact on visits to Hon Mun. The more respondents have to pay to get to the islands, the less the frequency of their visits. It is reasonable to infer that there is less demand for people who live far from Hon Mun to visit the islands compared with those who live near the islands.

The income variable also has significant impact on recreational demand and bears the expected positive sign. Respondents with higher wage rates are willing to take more trips to the islands. The implication here is important: in future, when the incomes of people increase, so will the recreational demand, especially in the case of the Hon Mun Islands, leading to an increase in the recreational value of the islands. This estimate is also important for rapidly growing per capita income countries like Vietnam to better plan for future recreational opportunities.

There is an insignificant relationship between the costs of substitute sites and the demand for the Hon Mun Islands. The prices of substitute sites have no impact on the demand for the islands. This regression result is not compatible with the theoretical hypothesis that the demand for a site will rise when prices of substitute sites increase. The sampling process encountered problems at this point. Respondents were usually ambiguous about an alternative recreational site if they did not choose Nha Trang for their holiday destination. Furthermore, it was very difficult to compare travel costs for substitute sites and travel costs to Hon Mun, because the former referred to the costs for visiting the whole substitute site instead of a particular site like Hon Mun. However, the results do not mean that the costs for substitute sites did not affect the demand for the Hon Mun Islands. It only reflects the fact that this aspect of the study could not be adequately controlled for purposes of this research.

The R-squared value measures how much the multiple regression fits the data. The R-squared values for both functions were low, indicating a less than satisfactory regression fit. These results reflect random responses between the number of visits and the explanatory variables. In this empirical study, the reason for low R-squared values may lie in the substitute site costs variable. Because the collection of reliable data on costs of substitute sites was very difficult, the regression hardly explains the variation in the demand for visits. In the semi-log function, the R-squared value tells us that the regression explains 12% of the total variation in the number of visits of each individual. Both the R-squared and t-statistical indices indicate that the semi-log (dependent) functional form is better than the linear form.

The semi-log form was used to estimate the consumer surplus per visit. The annual consumer surplus per visitor was computed to be VND 699,103. The consumer surplus per visit, therefore, is VND 422,277. The recreational benefit per visit, which is calculated by summing up the consumer surplus per visit and the average travel cost per visit, is VND 651,661. Based on the total number of visits to the islands of 194,810 in the year 2000, the total recreational benefit is estimated to be VND 126.948 billion per year. (See equations 1-5 under ITCM in section 4.2.1 for the relevant functions.)

6.3 The Zonal Travel Cost Model

6.3.1 Domestic Visitors

Visitation rates for zones are calculated and presented in Table 17.

Table 17. Visitation Rate Per 1,000 of the Population Per Year for All Zones

<i>Zone</i>	<i>Population</i>	<i>Sample</i>		<i>Visitation rate/1,000</i>
		<i>Persons</i>	<i>%</i>	
1	341,000	20	11.1	63.48
2	647,700	7	3.8	11.70
3	350,200	8	4.4	24.70
4	786,200	15	8.3	20.65
5	545,900	6	3.3	13.88
6	5,155,700	85	47.2	17.48
7	925,600	8	4.4	9.35
8	1,112,600	7	3.8	6.81
9	1,456,000	6	3.3	4.46
10	5,050,500	18	10.0	3.86
Total	16,371,400	180	99.6*	

Source: Calculated from survey data

* Components are rounded numbers

The visitation rates decrease drastically with distance, from 63.48 per 1,000 of the population in the innermost zone, to 3.46 per 1,000 of the population in the outermost zone. Zone 1 (Nha Trang area) has the highest visitation rate.

This is understandable because this zone contains the second-largest number of samples and a small population. The visitation rate of Zone 6 (Ho Chi Minh City) highlights some specific and interesting elements. Samples from this zone make up approximately half of the total. There are reasons for this:

Firstly, the population of Ho Chi Minh is about five million (nearly one-third of the population sample size of this study), so its sample must be large.

Secondly, just like Vung Tau and Da Lat, Nha Trang⁶ has been a popular recreational site in the south of Vietnam.

Thirdly, Ho Chi Minh City is Vietnam's largest city; the economic centre of the country. Its residents can afford to take holidays and are used to doing so.

Fourthly, transportation facilities: air, train and coach, between Ho Chi Minh and Nha Trang are readily available. The most popular form of transportation for tourists is the train that takes about ten hours (overnight trip) to arrive at Nha Trang. Zone 2 (districts in Khanh Hoa Province) is near Hon Mun but the number of visitors from here is small due to it being a rural area.

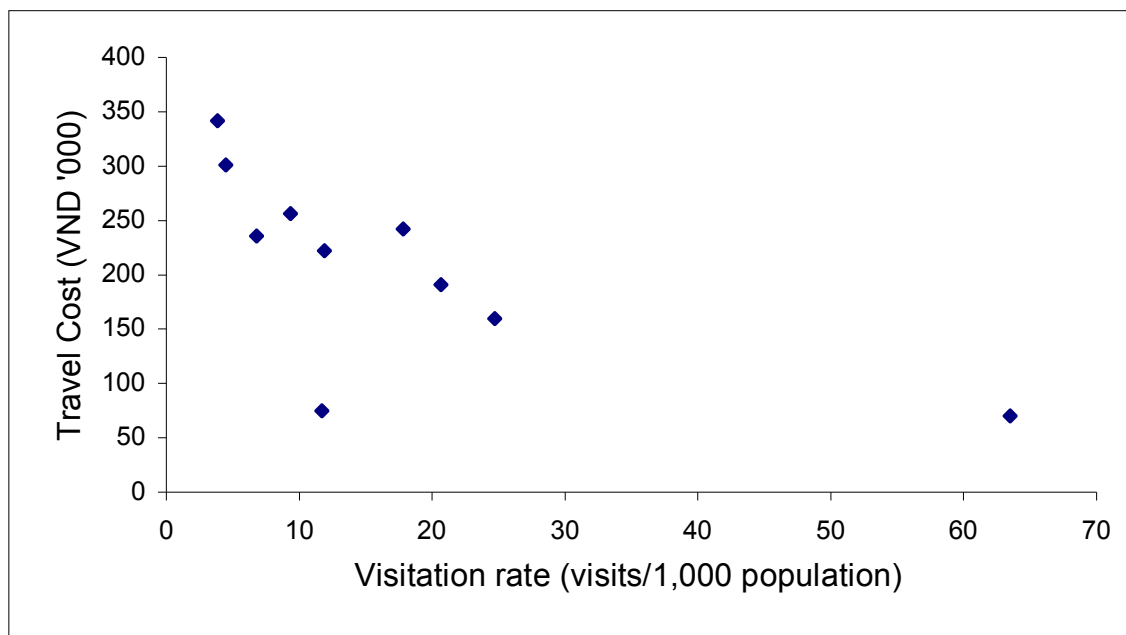


Figure 2. Graphical Relationship between the Visitation Rate and Travel Cost

Demand Curve

Since the visitation rate variable calculated violated the econometric assumption of normal distribution, the log of the visitation rate was used as a dependent variable in the demand function. Table 18 shows some results from the ordinary least square (OLS) regressions for zonal demand functions.

⁶ Ho Chi Minh City's residents often choose Da Lat, Vung Tau or Nha Trang to take holidays.

Table 18. The Domestic Demand for Visits to the Hon Mun Islands

$\text{LN}(\text{VISIT}) = 4.163 - 0.007 \text{ COST}$ <p style="text-align: center;">(8.54) (-3.55)</p> <p>R-squared = 0.61</p>	(equation 8)
$\text{LN}(\text{VISIT}) = 3.408 - 0.01 \text{ COST} + 0.001 \text{ INCOME} + 0.002 \text{ SUBSTITUTE PRICE}$ <p style="text-align: center;">(3.94) (-3.34) (0.99) (0.45)</p> <p>R-squared = 0.69</p>	(equation 9)

Note: The t-statistics are in parenthesis. The number of observations (zones) is 10.

In equation 9, both income variable and cost of substitute site variable have a relation to the cost variable because income was used to calculate time cost and travel cost was used to calculate substitute price. The coefficients of cost and income have the expected signs. Although function 9 results in a higher R-squared value, it has multicollinearity⁷ problems.

Figure 3 shows the user demand curve for Hon Mun visits in the year 2000. The curve was drawn based on function 8. The user demand or marginal willingness to pay curve for Hon Mun's recreational resources reflects a way of summarizing users' consumption attitudes and capabilities for such resources. This user demand curve is curvilinear and convex to the origin, that is, relatively flat at low prices and steep at higher prices. At low travel costs and high rates of visitation, relatively small increases in travel prices will lead to substantial reductions in the number of visits to Hon Mun. At high travel costs and low visitation rates, however, travel price increases have a much smaller effect and they produce much smaller reductions in the number of visits.

⁷ Multicollinearity refers to where two or more explanatory variables in the regression model are highly correlated, making it difficult or impossible to isolate their individual effects on the dependent variable.

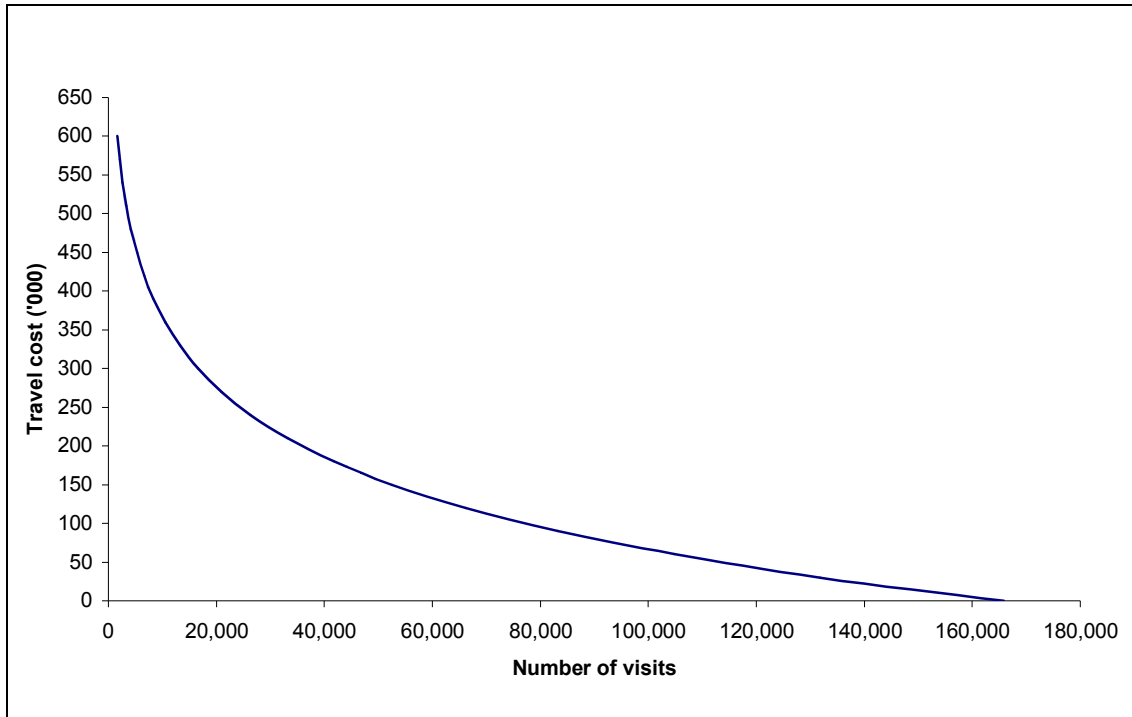


Figure 3. Demand Curve for Visits to Hon Mun

Consumer Surplus and Recreational Value

Table 19. Consumer Surplus and Price Paid for Hon Mun Visits in 2000

<i>Zone</i>	<i>Number of visits</i>	<i>Consumer surplus (VND '000)</i>	<i>Price paid (VND '000)</i>
1	12,811	1,672,058	897,503
2	23,414	3,055,923	1,757,994
3	6,612	863,008	1,056,982
4	11,707	1,527,937	2,234,320
5	6,385	833,395	1,419,963
6	51,865	6,769,170	12,553,297
7	8,359	1,090,989	2,140,915
8	11,739	1,532,049	2,768,215
9	9,320	1,216,453	2,805,743
10	23,695	3,092,591	8,094,045
Total	165,910	21,653,574	35,728,978

Source: Estimated from survey data

6.3.2 Foreign Visitors

Table 20. Visitation Rates and Travel Costs of Foreign Tourists by Region

<i>Region</i>	<i>Number of samples</i>	<i>Travel cost (VND million)</i>	<i>Visitation rate (visits/1,000 pop.)</i>
1 (Asia & Oceania)	117	1.623	0.276
2 (Europe & North America)	93	2.203	0.065
Total	210		

Source: Calculated from survey data

The visitation rates are low because the populations chosen were too large. Unlike Vietnam, where tourists' populations were restricted to urban areas, statistical populations of foreigners were regional populations. Although Region 2 (Europe and North America) has a much larger population, it is represented by fewer samples than Region 1 (Asia and Oceania) leading to a smaller visitation rate.

Based on the minimum requirement of two observations to estimate a demand curve, the linear demand function is as follows (calculated from the data given in Table 20):

$$P = 2.381 - 2.737 \times Q \quad (10)$$

where

P is the travel costs (in VND million) and
Q is visits per 1,000 of the population.

Given a linear demand curve, the annual consumer surplus per visitor is the choke price minus the actual price paid, divided by two.

$$\begin{aligned} \text{Total CS} &= \frac{1}{2} \times (\text{number of visit}) \times (\text{choke price} - \text{price paid}) \\ \text{since per visitor CS} &= \text{Total CS} / \text{number of visit, then} \\ \text{per visitor CS} &= \frac{1}{2} \times (\text{choke price} - \text{price paid}) \end{aligned} \quad (11)$$

For Region 1 (Asia and Oceania), the consumer surplus (CS) is given by:

$$CS = \frac{1}{2} \times (2.381 - 1.623) = \text{VND } 379,000$$

* Choke price = 2.381 * Price paid = 1.623 (Table 20)

For Region 2 (Europe and North America) it is:

$$CS = \frac{1}{2} \times (2.381 - 2.203) = \text{VND } 89,000$$

* Choke price = 2.381 * Price paid = 2.203 (Table 20)

The weighted average consumer surplus is about VND 250,000. The average recreational value for foreigners is estimated to be VND 2.13 million, which is derived by summing up the average consumer surplus and average travel cost to the islands.

6.3.3 Total Recreational Value

The total recreational value equals the total consumer surplus plus the total price paid.

Table 21. Recreational Value of the Hon Mun Islands in the Year 2000

(Unit: VND million)

	<i>Consumer Surplus</i>		<i>Price Paid</i>		<i>Recreational Value</i>	
	<i>All Visitors</i>	<i>Per Visitor</i>	<i>All Visitors</i>	<i>Per Visitor</i>	<i>All Visitors</i>	<i>Per Visitor</i>
Domestic Visitors	21,654	0.13	35,728	0.22	57,382	0.33
Foreign Visitors	23,810	0.25	178,657	1.88	202,467	2.13
Total	45,464		214,385		259,849	

Source: Calculated from survey data

The annual monetary recreational value of the Hon Mun Islands is about VND 259.8 billion (approximately USD 17.9 million). This is the value that the islands yield every year for the economy. However, this is not the revenue of Hon Mun. This value is distributed firstly, in the form of the consumer surplus of visitors who have gained recreational benefit at Hon Mun and then, in terms of prices paid, to transportation companies and agents for service providers such as hotels, restaurants, tourist agencies, etcetera. A very small part of the estimated recreational value of Hon Mun is given to the local economy through expenditures on food and accommodation in Nha Trang, tourist boat tickets, and services on the islands.

The consumer surplus was estimated to be VND 45.4 billion (approximately USD 3.1 million), reflecting the annual recreational benefit of the Hon Mun Islands. This figure is the value of the benefit that visitors gained by visiting the Hon Mun Islands. It also reflects the amount that visitors are willing to pay to enjoy the islands' natural resources, such as the air, sea, scenic beauty, coral and fish. This figure, however, does not reflect the non-use value of Hon

Mun. With fewer visits, international tourists received more surplus than domestic tourists: VND 23.8 billion in comparison with VND 21.6 billion respectively. Their gained surplus per head was double that of domestic tourists, implying that foreign tourists gleaned greater enjoyment from the Hon Mun Islands than their local counterparts. International tourists value the natural resources of Hon Mun more than domestic tourists do. Survey results showed that foreign tourists were also more active than domestic ones. They participated in most of the recreational activities on the islands while the main activity of Vietnamese tourists was just enjoying the scenery.

6.4 The Contingent Valuation Method (CVM)

There were a total of 462 samples for the CVM, of which 252 are domestic respondents and 210 were foreigners. Table 22 and Table 23 summarize the main characteristics of domestic and foreign respondents to the CVM questionnaire.

Table 22. Statistical Data on Socio-economic Characteristics of Vietnamese Visitors to the Hon Mun Islands (252 respondents)

<i>Characteristics</i>	<i>Mean</i>	<i>Std Deviation</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>
WTP (VND)	17,966	31,042	5,000	0	180,000
Income (VND)	1,344,841	777,736	1,000,000	300,000	5,500,000
Age (years)	29.7	9.6	26.0	11.0	60.0
Education (Schooling years)	14.1	2.3	15.0	5.0	18.0
Gender (Male=1; Female=0)	0.67	0.47	1.00	0.00	1.00
Marital Status (Married=1; Not Married=0)	0.37	0.48	0.00	0.00	1.00

Source: Survey data

Of the 252 Vietnamese respondents, 112 respondents were not willing to pay towards the MPA's trust fund as they believed that the money would be wasted or that the people responsible for the pollution should pay. This implies that their true willingness to pay (WTP) or their true preferences is not really zero. In order to derive these values, the Tobit model is used.

Table 23. Statistical Data on the Socio-economic Characteristics of Foreign Visitors to the Hon Mun Islands (210 respondents)

<i>Characteristics</i>	<i>Mean</i>	<i>Std Deviation</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>
WTP (VND)	26,786	24,249	28,000	0	140,000
Income (USD)	3,642	2,604	3,000	500	10,000
Age (years)	32.5	10.78	30.00	12.00	68.00
Education (Schooling years)	15.17	2.4	16.00	5.00	22.00
Sex (Male=1; Female=0)	0.52	0.50	1.00	0.00	1.00
Marital Status (Married=1; Not married=0)	0.34	0.47	0.00	0.00	1.00

Source: Survey data

Table 24. Tobit Function for Vietnamese Visitors' WTP for the Hon Mun Islands MPA

<i>Dependent Variable: WTP</i>		
<i>Maximum Likelihood – Censored Normal (TOBIT)</i>		
<i>Explanatory Description</i>	<i>Coefficient</i>	<i>z-statistic</i>
Constant	-13342.64	-0.55
Monthly wage rate	0.0094***	2.38
Age	-2275.790***	-3.99
Education	4806.69***	3.05
Gender	395.69	0.05
Marital Status	-2809.27	-0.31
R-squared	0.15	
Left censored observation 112	Right censored observation 0	
Uncensored observation 140	Total observation 252	

Source: Estimated from survey data

*** Statistically significant at 1% level

From the Tobit function, the WTP per person was estimated using equation 6. The WTP per Vietnamese visitor was found to be VND 17,956.

So the WTP of Vietnamese visitors in the year 2000 can be obtained by multiplying the average WTP by the number of visits in the year 2000 as follows:

$$WTP_{\text{domestic}} = \text{Average WTP} \times \text{Number of visits} \quad (12)$$

$$WTP_{\text{domestic}} = 17,956 \times 194,808 = \text{VND } 3,497,972,448 \text{ (about USD } 241,239)$$

Table 25. Tobit Function for Foreign Visitors' WTP for the Hon Mun Islands MPA

<i>Dependent Variable: WTP</i>		
<i>Maximum Likelihood – Censored Normal (TOBIT)</i>		
<i>Variable</i>	<i>Coefficient</i>	<i>z-statistic</i>
Intercept	10323.58	0.72
Monthly wage rate	2.007***	2.45
Age	115.06	0.46
Education	85.58	0.09
Gender	3185.05	0.77
Marriage	-2987.92	0.59
R-squared	0.036	
Left censored observation 44	Right censored observation 0	
Uncensored observation 166	Total observation 210	

Source: Estimated from survey data.

*** Statistically significant at 1% level

From the Tobit function, the WTP per person is estimated using equation 6. The WTP per foreign visitor is VND 26,786.

So the WTP of foreign visitors in 2000 obtained by multiplying the average WTP by the number of visits in 2000 is:

$$WTP_{\text{foreigner}} = 26,786 \times 94,960 = \text{VND } 2,543,598,560 \text{ (about USD } 175,420)$$

Thus, the total WTP for the Hon Mun Marine Protected Area is:

$$\text{VND } 3,497,972,448 + \text{VND } 2,543,598,560 = \text{VND } 6,041,571,008$$

7.0 CONCLUSIONS AND POLICY IMPLICATIONS

7.1 Conclusions

With the growing development of eco-tourism and the increasing attention given to conservation, non-market valuation techniques are required to provide estimates of the economic benefits of projects in these areas. This study has used the travel cost model and the contingent valuation method for analysing and measuring the recreational value of the Hon Mun Islands, a recreational and marine protected area.

Using the individual travel cost model (ITCM), the R-squared value was found to be too small (12% in the semi-log function) to explain the variation in the demand for visits. The consumer surplus per visit was estimated to be VND 422,277. The recreational benefit per visit was VND 651,661. Based on the total number of 194,810 visits to the islands in the year 2000, the total recreational benefit was estimated at VND 126.948 billion per year. However, the ITCM in this study applied only to domestic visitors. It was not practical to include foreign visitors because it was found that on the average, a foreign visitor made only one trip a year to Hon Mun. Therefore, the result would be underestimated by the ITCM.

The travel cost model is a relevant approach to evaluate the recreational value of the Hon Mun Islands. It may be used for other recreational sites in Vietnam. However, to establish a reliable demand curve for it, the site must be a developed recreational place, meaning that it must attract a large number of visitors in a year. Sampling becomes difficult when there are very few visits to the site.

Using the zonal travel cost model (ZTCM), the linear and semi-log demand curves for domestic visits to Hon Mun were plotted. The semi-log demand curve was chosen, as the linear form was skewed with autocorrelation and heteroscedasticity⁸ problems. The recreational value of the Hon Mun Islands from domestic visitors in the year 2000 was estimated at VND 57.3 billion, of which the recreational benefit or consumer surplus was VND 21.6 billion. Similarly, a demand curve for Hon Mun foreign visitors was plotted but in linear form. The recreational value from foreign visitors in the year 2000 was VND

⁸ If the ordinary least square (OLS) assumption that the variance of the error term is constant for all values of the independent variables does not hold, we face the problem of heteroscedasticity. This leads to unbiased but inefficient (i.e., larger than minimum variance) estimates of the standard errors (and, thus, incorrect statistical tests and confidence intervals). When the error term in one time period is positively correlated with the error term in the previous time period, we face the problem of autocorrelation. This leads to downward-biased standard errors (and, thus, incorrect statistical tests and confidence intervals).

202.4 billion, of which the consumer surplus was VND 23.8 billion. Therefore, the recreational value of the Hon Mun Islands is estimated to be VND 259.8 billion annually, of which Hon Mun's consumer surplus is estimated at VND 45.4 billion, based on the year 2000's statistics.

Using the Contingent Valuation Method, the willingness to pay (WTP) for funding a Marine Protected Area (MPA) project for the Hon Mun Islands was estimated to be VND 6 billion annually. The WTP per Vietnamese visitor is VND 17,956 and per foreign visitor, it is VND 26,786. These WTP values are relatively low compared to WTP values estimated for other recreational sites in the world. (See 3.0 Review of Related Literature for comparisons.)

Possible reasons for this include:

1. The use of 'exit surveys' instead of 'before surveys'. Interviews were done on boats on the way back to shore. About one-third of the questionnaire for Vietnamese visitors focused on the non-user. It is generally believed that people who have not yet availed themselves of the recreational benefits of a natural resort tend to be willing to pay more than people who have done so.
2. It may have been difficult for the interviewers to explain the importance of coral reefs in the area to foreign visitors due to language constraints.
3. The payment card format may have been biased to the low number of choices. The range of choices in the payment card were determined based on the price of a whole day's package tour around the islands. Visitors were deemed to be willing to pay an amount equivalent to this price for conservation activities. The price was relatively low: USD 7 for a day going around the islands and snorkeling, with lunch and pick-up services provided.

Clearly, the Hon Mun Islands represent a valuable environmental resource and even though people do not presently pay an admission fee, there is a large consumer surplus of welfare to be gained from the existence of the islands. In the future, as the number of visits to the islands increases, it is expected that the islands will become relatively more valuable. Although the estimated recreational value is only one aspect of the total value of the islands, it shows that, with proper conservation and management, tourism can be a significant source of benefit.

Specific Problems

One problem that the study had to overcome was that of multi-site trips. The Hon Mun Islands form part of the recreational attraction of Nha Trang. Tourists to Nha Trang, visit not only Hon Mun but other sites as well, such as Chong Rock, Ponaga Tower or Nha Trang beach. Information collected in the

questionnaire covered their travel expenditure for the whole trip to Nha Trang and not exclusively to the Hon Mun Islands. Therefore, a way to elicit the travel costs for Hon Mun only had to be found. Two special factors were taken into account:

1. The respondent's satisfaction with the Hon Mun Islands in comparison with other recreational sites in Nha Trang
2. The time the respondent spent on the Hon Mun Islands out of the total time spent in Nha Trang.

The problem was accentuated with respect to international tourists. Foreigners do not visit just Nha Trang but also travel to various other sites in Vietnam such as Da Lat, Hoi An, Hue, Ha Long Bay, Ha Noi, Sa Pa, and Mai Chau. Hon Mun is just a small stopover for them. In sites that attract an insignificant number of international tourists, the tourism value derived from them may be omitted. However, for sites like Hon Mun where foreign visitors make up about a third of the total, inclusion of their behavior is compulsory. In this study, travel costs of both domestic visitors and foreign visitors to the Hon Mun Islands were extracted and included in the estimation calculations. It should be noted, however, that it was not possible to accurately isolate the travel costs for Hon Mun. Only rough estimates that were sufficient for purposes of this study were extracted.

7.2 Policy Implications

Sustainable Tourism

The number of visitors going to the Hon Mun Islands averages 290,000 per year yielding a total recreational value of VND 259.8 billion (USD 17.9 million). However, only a small part of this amount (VND 48.9 billion as tourism service revenue) is earned by the local community. Hence, it is fair to create funds for the proper management and conservation of the islands.

Establishment of a fund based on donations from visitors would be feasible because estimations from the ITCM and ZTCM show that consumer surpluses derived from the site for both models are quite large (64%⁹ and 18% of the total recreational value, respectively). The magnitude of this fund is already estimated in this study using the CVM (See section 6.4). However, although the TCM-derived estimates of consumer surplus show that there is considerable potential revenue to support a fund, nearly half of respondents to the CVM survey reported unwillingness to contribute, due to scepticism that a fund would be well-managed. This scepticism is consistent with findings from similar studies elsewhere.

⁹ Note that the ITCM was applied only for domestic visitors who paid less than foreign visitors for transportation.

This suggests that, while the revenue potential exists, it can only be realized if tourists feel that their payment will translate into improved management. This suggests that the fund should:

- a) Be available to local resource managers
- b) Be managed by an accountable entity with transparent transactions
- c) Yield meaningful visible results within a short time period.

The visible benefits need not be direct conservation benefits (for example, healthier corals). They could be things like more support infrastructure (for example, mooring buoys to prevent boats from dragging anchors, thus avoiding damage to coral) or improvements that enhance tourists' appreciation of the sites (for example, signboards). If tourists notice visible improvements to infrastructure, it will signal to them that funds are indeed being used for local benefit.

Financial and technical support from international organizations can also be another source of funds. A four-year fund valued at over USD 2 million was initiated in early 2001 supported by the Government of Vietnam, the Global Environment Fund (GEF), the World Bank (WB), the Government of Denmark and the World Conservation Union (IUCN). Such funds need to be expanded and extended.

A sustainable tourism development plan is essential. It should include not only conservation activities but the expansion and marketing of tourist facilities including protection of tourists from harassment and other dangers. Sustainable tourism must support local economic activities besides taking into account the environmental costs and values. The local economy as well as the environment must be protected through tourism activities.

Adjustment of the Port Expansion Plan

Although the recreational value is only one part of the total value of the islands, the results show that tourism can generate significant revenue; some VND 259.8 billion in a year. According to the Nha Trang Port Upgrading Feasibility Study (Ministry of Transportation, 1997), the estimated revenue of the new port is about VND 45.8 billion per year. Since the new port would not cause a total loss of the recreational benefit of the Hon Mun Islands¹⁰, a direct comparison of the revenue of the new port and the recreational value of the Hon Mun Islands is not appropriate. A full cost-benefit analysis (CBA) of the port expansion versus recreational development would be the best basis for comparison but is, however, not feasible within the scope of this study. This project only measures the maximum recreational value that would be lost (in other words, the value at risk) and compares it with the benefits projected from

¹⁰ Except for accidents like oil spills.

the port expansion. The large estimated recreational value of the islands is a strong indicator of the potential of the islands' tourism business. The new port is expected to take on 1.8 times an increase in goods and three times an increase in passengers, which poses the risk of increased air, water and noise pollution in the surrounding areas, including the coral islands. If the islands' tourism activities were to be reduced by 20% due to increased pollution created by the new port, the resulting decrease in the recreational value of the islands would be more than the annual revenue of the port. There is no national substitute for the Hon Mun Islands in terms of coral-related tourism and research. Hence, the proposed port expansion plan needs to be seriously reconsidered.

Coral Reef Management

Coral reefs are the most important and unique characteristic of the Hon Mun Islands among all marine recreational sites in Vietnam but they have not been marketed appropriately to attract tourists. In 2000, about 4,000 tourists scuba-dived to look at the coral reefs of Hon Mun. Compared to the 290,000 odd visitors to the islands, this figure is small. There are three reasons for this.

First of all, the coral around the islands has been seriously destroyed. The opportunity to view good coral reefs decreases day by day. It is obvious that consumers always choose the best goods; as the quality of the coral around the islands deteriorates, fewer tourists would want to pay for a diving trip to look at it.

The second problem lies in pricing. The price of a scuba diving tour is considered expensive, even for foreigners. The average price is USD 30 per hour whereas the price for a day's tour around the islands, complete with lunch and tourist guide, is only USD 7.

The third reason centres on marketing and advertising. Tourists are not provided with enough interesting information about the natural properties of the islands. Many visitors to the Hon Mun Islands are not even aware of the existence of coral reefs there. So they are content just to look at the scenery and swim. The survey data confirms that about 80% of the tourists to the islands participated in these two activities. The demand for the Hon Mun Islands will increase and their tourism value will rise if their coral reefs are conserved and their inherent beauty and worth are marketed appropriately.

The Management of the Marine Protected Area (MPA)

The challenge of managing a marine protected area is to allow multiple uses while conserving nature at the same time (Cesar 2000). Therefore, it calls for knowledge of the compatibility of the various functions as well as the impacts of threats on the ecosystem. Drawing up an efficient MPA management scheme requires further research.

REFERENCES

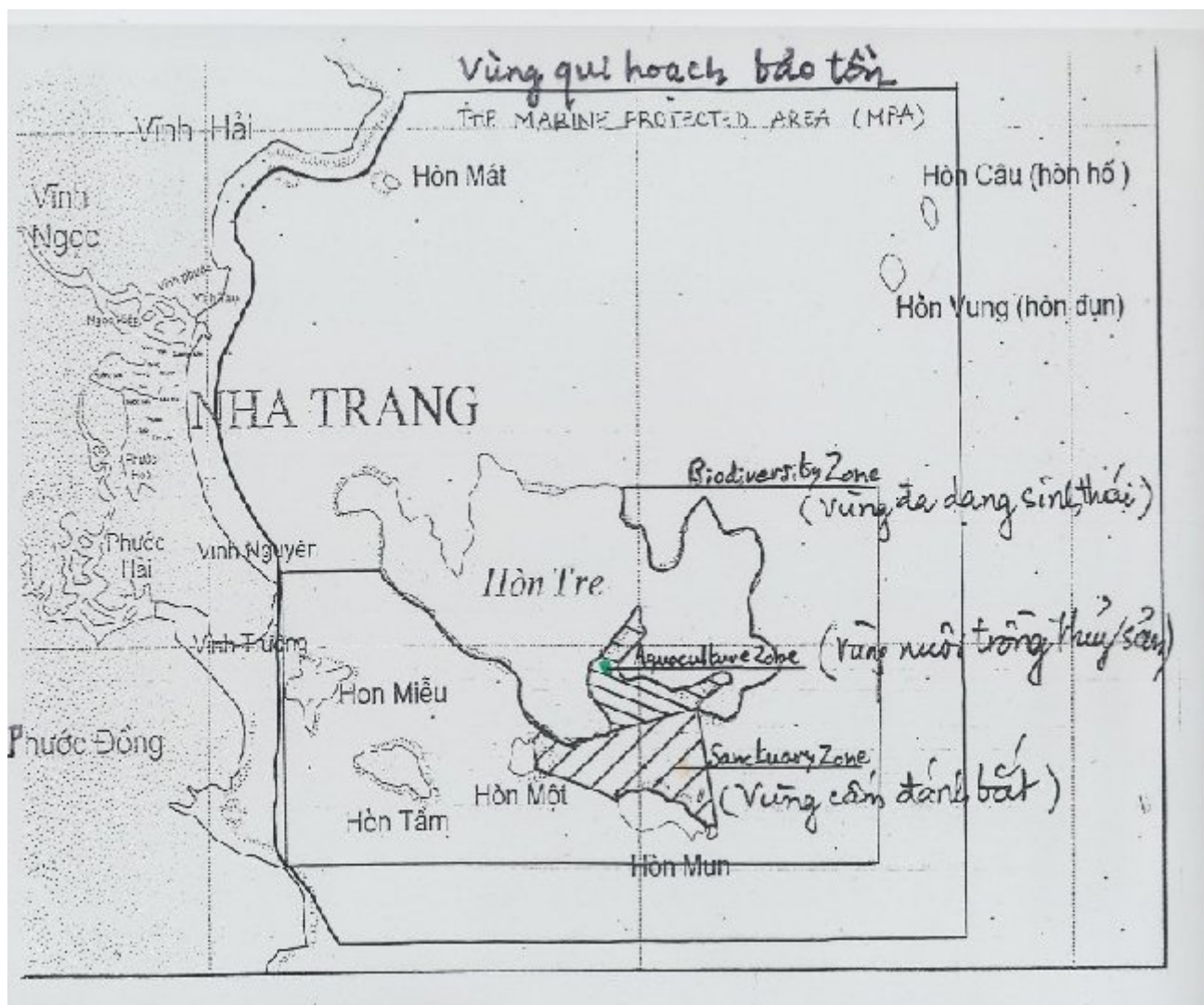
- Bann, C. 1998. The Economic Valuation of Tropical Forest Land Use Options: A Manual for Researchers. EEPSEA Research Report, Singapore.
- Bateman, I.J. and K.G. Willis. 1999. Valuing Environmental Preferences. Oxford University Press, UK.
- Bockstael, N.E. 1995. Travel Cost Model, *In* Bromley, ed. The Handbook of Environmental Economics. Blackwell Publishers Ltd, UK. 655-71.
- Brown, G. and W. Hendry. 1990. The Economic Value of Elephants. London Environment Economics Centre Paper #89-12. International Institute for Environment and Development, London, UK.
- Cesar, H.S.J. ed. 2000. Collected Essays on the Economics of Coral Reefs. CORDIO (Coral Degradation in the Indian Ocean), Sweden.
- DeShazo, J.R. 1997. Using The Single-site Travel Cost Model to Value Recreation: An Application to Khao Yai National Park. EEPSEA Research Report. EEPSEA, Singapore.
- DOSTE (Department of Science, Technology and Environment). 1996. Investment Project – Establishment of Hon Mun Marine Protected Area. Unpublished paper, Nha Trang, Khanh Hoa, Vietnam.
- Dixon, J.A. and M. Hufschmidt ed. 1986. Economic Valuation Techniques for the Environment. The Johns Hopkins University Press, London, UK.
- Dixon, J.A.; L.F. Scura; R.E. Carpenter and P.B. Sherman. 1993. Economic Analysis of Environmental Impacts. Earthscan Publications Ltd, London, UK.
- Driml, S.M. 1997. Bringing Ecological Economics out of the Wilderness. *Ecological Economics* 23: 145-153.
- _____ 1999. Dollar Values and Trends of Major Direct Uses of the Great Barrier Reef Marine Park. Research Publication 56. Great Barrier Reef Marine Park Authority, Townsville, Australia. 12pp.
- Du, Y. 1998. The Value of Improved Water Quality for Recreation in East Lake, Wuhan, China: Application of Contingent Valuation and Travel Cost Methods. EEPSEA Research Report, Singapore.
- Francisco, H.A. and D. Glover, ed. 1999. Economy and Environment: Case Studies in Vietnam. IDRC (International Development Research Centre), Singapore.

- Georgiou, S.; D. Whittington; D. Pearce and D. Moran. 1997. *Economic Value and the Environment in the Developing World*. Edward Elgar Publishing Ltd, UK.
- General Statistical Office. 1998. *Socio-economic Statistical Data of 61 Provinces and Cities in Vietnam*. Statistical Publishing House, Hanoi, Vietnam.
- Gustavson, K.; R.M. Huber and H.J. Ruitenbeek. 2000. *Integrated Coastal Zone Management of Coral Reefs: Decision Support Modeling*. The World Bank Group, USA.
- Hanley, N. and C.L. Spash. 1993. *Cost-benefit Analysis and the Environment*. Edward Elgar Publishing Ltd, UK.
- Hundloe, T. 1990. Measuring the Value of the Great Barrier Reef. *Journal of the Royal Australian Institute of Parks and Recreation* 26 (3): 11-15.
- Institute of Oceanography. 1998. *Preliminary Assessment of Suitability of Hon Mun as a Site for Establishment and Management of a Marine Protected Area*. Unpublished Paper. Nha Trang, Vietnam.
- Kramer, R.A.; N. Sharma and M. Munashinghe. 1995. *Valuing Tropical Forest – Methodology and Case Study of Madagascar*. World Bank Environmental Paper Number 13, Washington DC, USA.
- Leeworthy, V.R. and P.C. Wiley. 1991. *Recreational Use Value for Island Beach State Park*. National Oceanic and Atmospheric Administration, USA.
- Ministry of Transportation. 1997. *Feasibility of Nha Trang Port Upgrading*, Hanoi, Vietnam.
- OECD (Organization for Economic Cooperation and Development). 1994. *Project and Policy Appraisal: Integrating Economics and Environment*. Technical Paper Series, Paris, France.
- Pham, V.T. and S.T. Vo. 1998. *Environmental Parameters Suggested for Monitoring of Marine Life in the Waters of South Vietnam*. Institute of Oceanography's Report, Nha Trang, Vietnam.
- Ruitenbeek, H.J. 1999. *Blue Pricing of Undersea Treasures – Needs and Opportunities for Environmental Economics Research on Coral Reef Management in South East Asia*. Presented at the 12th Biannual Workshop of the Environmental Economics Program for South East Asia, Singapore. 11-14 May, IDRC, Singapore.
- Scheaffer, R.L.; W. Mendenhall III and R.L. Ott. 1996. *Elementary Survey Sampling – Fifth Edition*, Duxbury Press, USA.

- Spurgeon, J. 1992. The Economic Valuation of Coral Reefs. *Marine Pollution Bulletin* 24(11):529-536.
- Tobias, D. and R. Mendelsohn. 1991. Valuing Ecotourism in a Tropical Rain-forest Reserve. *Ambio* Vol. 20 No. 2, 91-3.
- Tran, V.H.S. 1998. Environmental Economic Assessment Activities Aimed at Developing a Proposal for Establishing and Managing a Marine Protected Area. Unpublished Paper. Nha Trang, Vietnam.
- So Du Lich Khanh Hoa. 1997. Bao Cao Tong Ket 5 Nam Ve Du Lich 1993-1997. [Khanh Hoa Tourism Department. 1997: Report of the 5-Year Period on Tourism 1993-1997] Nha Trang, Vietnam.
- _____ 1998, 1999. Bao Cao Tinh Hinh Thuc Hien Thang 12. [Khanh Hoa Tourism Department, 1998, 1999: Report of December] Unpublished Paper. Nha Trang, Vietnam.
- Vo, S.T. 1998. The Establishment of Marine Protected Areas Based on Coral Reefs in Vietnam. Institute of Oceanography. Unpublished Paper. Nha Trang, Vietnam.

APPENDIX A

Map of the Hon Mun Islands



APPENDIX B

Questionnaire

A Marine Protected Area (MPA) in Nha Trang Bay around The Hon Mun Islands and the other islands now is in plan. The Bay now is being damaged by over-exploitation, including too much fishing, harmful fishing methods, careless use by tourists, and pollution. The purposes of the MPA are to maintain biodiversity, protect coral reefs, improve fisheries, control pollution, manage tourism, and create new jobs for local people who will be hired to manage the MPA. This survey is about your use of the area. Please tick the appropriate boxes to indicate your choice. Your answers to these questions will be used to help plan and manage the MPA. Keep in mind there are no right or wrong answers to these questions. Your best opinions are fine. Thank you for your cooperation.

Name of interviewer: _____

Date: _____

Reviewed by: _____

1. What country and city are you from?

Country _____

City _____

2. How many times have you visited these islands, including this trip? _____ times

3. How many people are in the group you are traveling with in Nha Trang? _____

4. How many nights is your visit to Nha Trang? _____ nights

5. Why are you visiting Nha Trang? (Please tick)

Vacation or holiday

Work

Study and research

Other reason _____

6. How did you get to Nha Trang from your home? (Please tick one or more)

Airplane

Train

Tour bus

Hired car

7. In Vietnam, which places did you visit or are you going to visit, apart from Nha Trang?

(Please specify the name of the places) _____

8. What activities have you participated in at the islands? (Please tick all that apply)

- | | |
|---|--|
| <input type="checkbox"/> Using beaches/Sunbathing | <input type="checkbox"/> Boating/Sailing/Jet-skiing |
| <input type="checkbox"/> Swimming | <input type="checkbox"/> Just visiting/Relaxing/Looking at scenery |
| <input type="checkbox"/> Snorkeling | <input type="checkbox"/> Eating seafood |
| <input type="checkbox"/> Scuba-diving | <input type="checkbox"/> Visiting fishing villages |

9. Please indicate your expenditure (estimate thereof) in the islands

Return trip ticket	_____	USD/person
Food & drinks	_____	USD/person
Souvenirs	_____	USD/person
Scuba-diving	_____	USD/person
Others	_____	USD/person

10. Please rank the places you have visited in Nha Trang in the order of their satisfaction to you

<u>Place</u>	<u>Rank</u>
The islands	_____
Nha Trang beach	_____
Ponaga tower	_____
Hon Chong rocks	_____
Long Son pagoda	_____

Willingness to Pay for the Marine Protected Area

Experts and people on the islands believe that creating the Marine Protected Area is the best approach to preserving the environment around the islands, but they are not sure if the MPA will be successful. New source of funds will be needed to pay programs and for jobs for people who no longer will be able to earn their living from fishing.

The next questions concern your willingness to pay new fees to visit the islands and use the Marine Protected Area.

11. Would you be willing to pay more fee each time you visit and use the islands to help fund new programs to manage the Marine Protected Area?

- Yes → go to question 12
 No → go to question 13

12. If you answered Yes to question 11, what is the **highest user fee** that you would be willing to **pay more** (not including paying the return trip ticket to travel agency) for new programs to manage the Marine Protected Area?

- 0.5 USD / 7,000 VND
- 1.0 USD / 14,000 VND
- 1.5 USD / 21,000 VND
- 2.0 USD / 28,000 VND
- 2.5 USD / 35,000 VND
- 3.0 USD / 42,000 VND
- 3.5 USD / 49,000 VND
- 4.0 USD / 56,000 VND
- 4.5 USD / 63,000 VND
- 5.0 USD / 70,000 VND
- 6.0 USD / 84,000 VND
- 7.0 USD / 98,000 VND

13. If you answered No to question 11, what is the main reason that you said no:

- I do not care about the Marine Protected Area
- The Marine Protected Area is not needed
- It costs too much already to visit the islands
- The money would be wasted
- Other people and business that pollute should pay
- Not enough information

Questions About You

14. Are you male or female?

- Male
- Female

15. How old are you? _____ years

16. What is the highest grade you completed in school?

- Primary school
- Secondary school
- High school
- College/University
- Masters or other graduate degree

17. Are you married?

- Yes
- No

18. What is your approximate net MONTHLY income?

For foreigners:

- 0 - 1,000 USD
- 1,001 - 2,000 USD
- 2,001 - 3,000 USD
- 3,001 - 4,000 USD
- 4,001 - 5,000 USD
- 5,001 - 6,000 USD
- 6,001 - 7,000 USD
- 7,001 - 8,000 USD
- 8,001 - 9,000 USD
- 9,001 - 10,000 USD
- More than 10,000 USD

For Vietnamese:

- 0 - 400.000 VND
- 400.000 - 600.000 VND
- 600.000 - 800.000 VND
- 800.000 - 1.000.000 VND
- 1.000.000 - 1.200.000 VND
- 1.200.000 - 1.500.000 VND
- 1.500.000 - 2.000.000 VND
- 2.000.000 - 3.000.000 VND
- More than 3.000.000 VND

Thank you very much!