

Recreational Value of the Coral Surrounding the Hon Mun Islands in Vietnam: A Travel Cost and Contingent Valuation Study¹

Pham Khanh Nam and Tran Vo Hung Son

Abstract²

Understanding the recreational value of natural resources is fundamental to effective conservation programs. When natural resources are damaged by human activities, their recreational value is greatly reduced along with their potential contribution to conservation programs.

The purpose of this research is to explore the recreational value of the coral surrounding the Hon Mun Islands. The islands contain the richest coral biodiversity in Vietnam, but are only about 6 km from a port that has been earmarked for expansion. This research employs the travel cost method and the contingent valuation method to measure and analyze impacts on the recreational value of the islands. The zonal travel cost model (ZTCM) estimates the annual recreational value of the islands at approximately US\$17.9 million, while the individual travel cost model estimates this value at about US\$8.7 million. A 20 per cent loss of the (ZTCM) recreational value that could be expected to result from the proposed port expansion is still larger than the expanded port's projected annual revenue of US\$3.1 million. Therefore, the port expansion proposal needs to be reconsidered.

Introduction

Coastal areas, which have high total economic value (TEV), including use and non-use values, play an important role in the economic development of Vietnam. The country's coast stretches over 3 000 km and contains diverse ecosystems and landscape. The recreational value of this coastal area holds significant potential economic benefits. However, a report by the Ministry of Science, Technology and Environment on the status of Vietnam's marine environment in 1994 (Tran 1998) indicates 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 because of 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, including coral reefs and birds' nests, is one of the most important tourism sites in Vietnam. In addition to boasting an airport and a seaport, Nha Trang is strategically located along both National Route 1 and the railway route linking the North and the South.

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

In recent years, with increasing economic development, the marine environment adjacent to Nha Trang City, especially around the Hon

¹ This research was funded by the Economy and Environment Program for Southeast Asia (EEPSEA).

² Since this research was completed, including this paper, the port expansion has been improved, but at a reduced scale.

Mun Islands, has faced increased exploitation. Coral reefs have been destroyed by many, mainly human-induced, factors. Shipping, dynamite-fishing, coral harvesting and marine tourism have led to a decrease in marine biodiversity and the loss of precious genetic resources, such as those of the Hawksbill turtle, false killer whales and leatherback turtles, from the South China Sea. Destructive 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 reality, the quality of water in the Hon Mun area will deteriorate with the increase in port traffic, affecting marine ecosystems and recreational activities. Policy-makers will have to choose between the port and marine biodiversity/recreational activities. 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).

The ability of local government authorities to effectively manage and protect the marine environment of the islands has been limited by inadequate knowledge of marine management and the need to consider local villagers. In early 1998, the Ministry of Fisheries and the World Conservation Union (IUCN) conducted an initial survey of the four most important environmental sites across Vietnam. The Vietnamese Government then selected the Hon Mun Islands as a pilot for a national system of marine protected areas (MPAs) (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 other suitable ports. For example, Cam Ranh Port, situated 60 km south of Nha Trang City, is considered to be one of the three best ports in the world in terms of its 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 help assess the economic impact of expansion of the port and devise future recreational development plans for the islands. Policy-makers will obviously need to know the benefit of tourism compared with that of other activities (for example, fishing and bird nest collection) at the islands 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 sustainability.³

Study method

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

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' socioeconomic 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 the Hon Mun Islands, which includes values gleaned from foreign visitors as well as from Vietnamese visitors?
- d) What is the visitors' willingness to pay (WTP) for funding the Marine Protected Area that will be set-up around the Hon Mun Islands, and what factors affect their willingness to pay?

³ The Hon Mun Islands were declared an MPA in January 2001. When this research project commenced, the proposal for the Hon Mun Islands to be declared an MPA was still being considered. Appendix A highlights the proposed map before the declaration of Hon Mun Islands as an MPA.

e) Is it reasonable to stop the port expansion project?

Valuation method

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 to value the site. Therefore, the travel cost method was used to estimate the recreational value of the islands.

The travel cost model (TCM)

Many TCM studies in Asia have valued the recreational benefits of natural resources based on surveys of only domestic tourists. For example, the estimated tourism value of Cuc Phuong National Park (Francisco and Glover 1999) did not include the value from international tourists, even though the authors had interviewed foreigners. The TCM application for Lumpinee Public Park in Thailand (Dixon and Hufschmidt 1986) also omitted this value. The reason for this omission in both cases was that the number of foreign tourists was too low to give a significant result – a problem that often arises in such studies. However, 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 to exclude responses of foreign tourists from the calculation. In this project, values for Vietnamese and foreign visitors are calculated separately and then added to derive the total recreational value of the Hon Mun Islands.

From the various travel cost models, the zonal travel cost model and individual travel cost model were selected.

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 the number of visits made by individual I in a year

TC_i is the 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 level of education.

The most popular functional forms are linear, quadratic, semi-log and log-log. There is no consensus in the literature reviewed on the preferred form. 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 ITCM is:

$$\ln V_i = a + bTC_i + cS_i + \varepsilon_i \quad (2)$$

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

where S_i is the socioeconomic variable representing income, gender, age, marital status, level of education, and group size.

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

The consumer surplus (CS) 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". (The "choke price" is the price at which demand is "choked off", or zero). In other words, the consumer surplus is the area below the demand curve and above the price paid line.

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

The consumer surplus (CS) per visit is calculated as follows:

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

Zonal travel cost model (ZTCM)

The area around Hon Mun is divided into zones 1 to 10, with each zone being increasingly distant from 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

Table 1. Description of variables

Variables	Description
LnV	Logarithm of number of visits
TC	Travel cost
Y	Income
Ps	Substitute price
GEN	Gender of visitors
AGE	Age
MAR	Marital status
EDU	Education
GR	Group

several administrative areas. Table 2 shows the zoning structure.

As in the Khanh Hoa Tourism Report (So Du Lich Khanh Hoa 1998), foreign visitors are divided into two regions according to their country of origin, 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 from it will visit the site. But internationally, if zones are divided by country rather than region, this premise does not hold. For example, Cambodia, the Lao PDR and the Philippines are close neighbors of Vietnam, but the Hon Mun Islands have received no visitors from these countries. It is also very difficult to divide zones into individual countries because of

Table 2. Zones of origin

Zone	Distance (km)	Administrative district	Population
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	Ho Chi Minh City	5 155 700
7	497	Long An, Tay Ninh, Vung Tau, Dong Nai	925 600
8	516	Da Nang, Hue	1 112 600
9	677	Quang Nam, Quang Ngai An Giang, Can Tho, Ca Mau, Tien Giang	1 456 000
10	1140	HaNoi, 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 per cent.⁴

⁴ When this table was prepared, population data were only available for 1999. The data were updated for 2000 using the average growth rate of the population.

⁵ 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.

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 in the current study is:

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

where

V_i are visits from Zone i to the Hon Mun Islands

POP_i is the population of Zone i

S_i are socioeconomic 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 visitation rate per 1 000 population in each zone can be determined by using the following formula:

$$VR = \frac{\left(\frac{V_i}{n}\right)N \times 12 \times 1000}{P} \quad (6)$$

where

VR : visitation rate (visits/1 000/year)

V_i : visitors from zone i

n : sample size

N : total visitors per month

P : population in zone j

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

Zonal travel cost model versus individual travel cost model

There are two variants of the simple⁵ travel cost model. They are the "individual travel cost model" and the "zonal travel cost model". 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. An 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 zonal travel cost model 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 is a function of the travel cost.

Georgiou et al. (1997) 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 individual travel cost model would face difficulty when the variation is very small, or when individuals do not make several trips to the recreational site. For example, if every visitor were to visit the site only once a year, it would not be possible to run a regression function.

DeShazo (1997) used the individual travel cost model 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. 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 estimates 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, reflecting the fact that the variation of the dependent variable (number of visits) was too small to support the estimation. This result coincides with arguments (Georgiou et al. 1997) about the individual travel cost model above.

However, this drawback of the individual travel cost model is not a problem for the zonal travel cost model, which uses the number of trips per capita from each zone as a function of the travel cost. However, the zonal travel cost model has its own limitations. As Georgiou et al. (1997) 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 clearly this is often not the case."

The zonal model is, nevertheless, considered applicable for measuring the recreational value of the Hon Mun Islands, as is discussed below. First, according to the Department of Tourism, almost all tourists make between one and three visits to the Hon Mun Islands each year. As the Hon Mun Islands lie about 8 km offshore, 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 may visit the park several times a week for recreation. In such cases, it is possible to use the individual travel cost model to estimate the recreational value. Moreover, traveling far for a holiday is not yet a habit of the Vietnamese, possibly because of the relatively low income of most Vietnamese. With few visits per visitor per year, the individual travel cost model is not the most applicable model for this study.

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

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 neighboring areas. Although coral is the unique characteristic of the Hon Mun Islands, few tourists, unless they live in Nha Trang City, make a trip from their home to Hon Mun only for the purpose of admiring coral. 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 obtained 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 from within the total cost of the trip.

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

In the 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 considered two techniques to distribute the travel cost.

1. 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 the time spent visiting Hon Mun as a percentage of the total time spent for the whole trip to Vietnam.
2. 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 would equal one (site) over the total number of sites for the whole trip.

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

The questionnaire explored the satisfaction of visitors by asking respondents to rank the islands according to their level of satisfaction. Time criteria and the coefficient of satisfaction were jointly used to distribute the travel cost.

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. Hypothetical market

The Hon Mun Islands will be turned into an 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 should 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 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 referendum, (3) the payment card, and (4) the open-ended question. For this research project, the bidding game was not considered suitable. From the authors' experience in field surveys, Vietnamese respondents 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 from which they can choose. Because of this, the payment card method was used.

c. Estimating the mean WTP

Willingness to pay for funding the MPA was calculated using the following formula (equation 7).

The expected value of willingness to pay $E(y)$ is the sum of the components for uncensored and censored cases. (Censors are applied in cases where willingness to pay is considered to be zero in the data sheet but it is not a pure zero amount of money that the respondent is willing to pay.)

$$E(y) = [\text{Pr}(\text{Uncensored}) \times E(y | y > \tau)] + [\text{Pr}(\text{Censored}) \times E(y | y = \tau_c)] \quad (7)$$

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 many cases, 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 the response given in the questionnaire makes it impossible to determine how much a respondent 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:

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

where

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

e. Aggregating the data

The mean WTP estimated in step "c" 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 number of visitors was multiplied by the sample mean. 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 limitations on time and money. Nevertheless, some comments on the approach chosen are included in the conclusions to 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, because the two may be highly correlated and separate estimations 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 from 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 in order to put a value on travel cost related to the visit to the islands.
- 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.

Data collection techniques

Collection of primary data

The collection of primary data was geared towards visitors' experiences and socioeconomic characteristics. The questionnaire was designed to collect information on: (1) on-site and off-site recreational behavior; (2) travel experiences and trip costs; and (3) socioeconomic factors.

Sampling

In the survey, systematic sampling was employed. Scheaffer et al. (1996) stated 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 users. 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 specific visitors encountered (for example, every fifth or sixth visitor.) The second approach involved handing the questionnaire to visitors on boat trips and asking 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 3 illustrates the samples taken.

Table 3. Number of samples collected

	TCM	CVM
Domestic visitor	180	252
Foreign visitor	210	210
Total	390	462

The number of samples was deemed both 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 traveling.

Characteristics of the Study Area

Scientific importance

The study area is of considerable value to research and monitoring as it contains high genetic diversity and a combination of various reef types, and is close to the edge of the continental shelf and up-welling.

The National Institute of Oceanography of Nha Trang has conducted significant research programmes in 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 part of 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 10 km away from Nha Trang Port.

Management

The Hon Mun Islands are considered as a freely accessible public park managed by the local government. The rights to supply services to the islands are 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 3 km 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 t of goods and 18 000 passengers annually. Nha Trang Port is, at present, the most important seaport of Khanh Hoa Province. Its activities undoubtedly affect the management of the Hon Mun Islands.

Social economic characteristics of tourists

Socioeconomic information

As can be seen from Table 4, the average visitor visited the Hon Mun Islands 1.7 times in a year.

Over 50 per cent of the domestic visitors visited the Hon Mun Islands for the first time (Figure 1). This can have two implications: (1) Vietnamese are not in the habit of taking annual holidays, and/or (2) the Hon Mun Islands are not that attractive to the Vietnamese.

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

Socioeconomic data from the survey revealed several interesting issues. The average income of visitors is around VND 1.3 million per month, which is higher than the national average level. This is understandable as travel is a luxury item and only people from the middle and higher-income brackets can afford their recreational preferences. This reality, therefore, supports the

previous assumption that visitors to Hon Mun were from urban (wealthier) regions and confirms that choosing the urban population for this study was the right decision. The educational level of the visitors averaged 13.7 years of schooling and was higher than the national average. Most visitors were of working age, with the average age being 32.2 years. Seventy per cent of the respondents were male.

Looking at Table 5, the average number of visits by foreigners was 1.17 – 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.

Table 4. Statistical data on the socioeconomic characteristics of Vietnamese visitors to the Hon Mun Islands (180 respondents)

Characteristics	Mean	Standard Deviation	Median	Minimum	Maximum
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

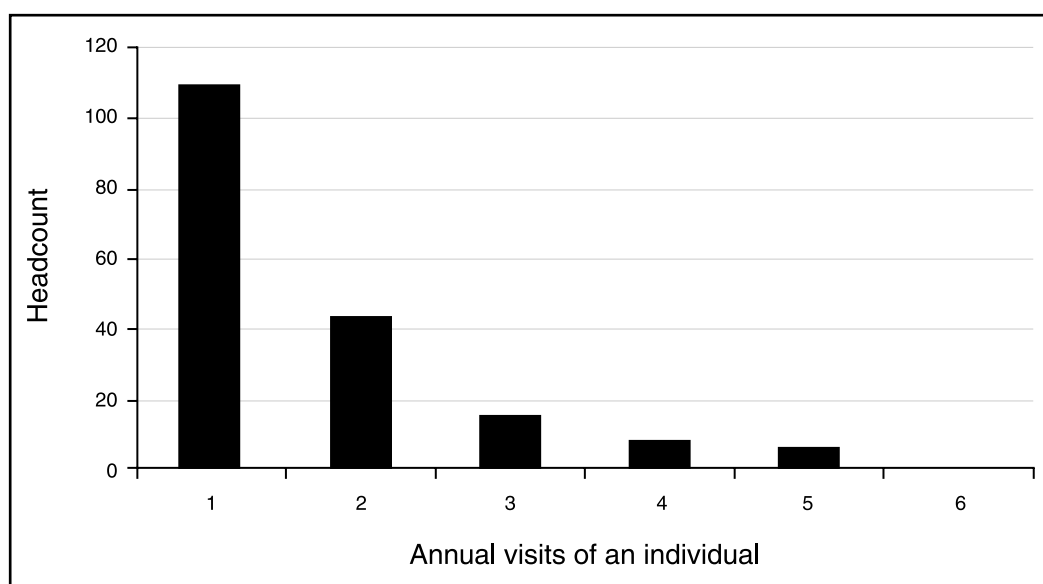


Figure 1. Graphical distribution of domestic visits, 2000

Table 5. Statistical data on the socioeconomic characteristics of foreign visitors to the Hon Mun Islands (210 respondents)

Characteristics	Mean	Standard Deviation	Median	Minimum	Maximum
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

The foreign visitors' socioeconomic features showed that the average income was US\$3 642 per month. This suggests that most visitors come from developed countries. The average number of years of schooling 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 per cent of the foreign respondents were male, compared to 70 per cent for Vietnamese respondents.

The Hon Mun pilot MPA

The establishment of the Hon Mun pilot MPA was approved on 10 January 2001 by the Government of Vietnam, the Global Environment Fund (GEF), the World Bank, the Government of Denmark and the World Conservation Union (IUCN). The four-year project is funded to the tune of over US\$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 likelihood of 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.

Analysis of the recreational value of the Hon Mun Islands

Visitors' travel cost structure

Table 6 presents the detailed expenditure of domestic and foreign tourists during visits to Hon Mun. A very small part of the recreational value contributes to the local economy; this consists of expenditures on food and accommodation in Nha Trang, tourist boat tickets, and services on the islands.

Table 6. Detailed expenditure of tourists to the Hon Mun Islands (VND million)

	Domestic Tourists		Foreign Tourists	
	All	Per head	All	Per head
Transportation costs	19.937	0.127	150.833	1.587
Hotel costs in Nha Trang	14.026	0.072	6.842	0.072
Time costs	0.987	0.067	14.503	0.152
On-site costs	14.806	0.089	13.322	0.140
Total	35.729	0.219	178.658	1.880

Source: Calculated from the survey data

The on-site cost is Nha Trang's gross income from tourism in 2000 earned by boat-trip tours, boat rental owners, diving services, villagers in the fishing village (Lang Chai⁶), and other tourism service suppliers. This gross income was estimated to be VND48 994 million; the contribution of foreign tourists being less than that of 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

⁶ There are some small fishing villages on the Hon Mun Islands. Lang Chai is the biggest and almost all tourists visit it.

here. According to the report of the Khanh Hoa Tourism Department in December 2000, the total revenue from tourism in Khanh Hoa in 2000 was estimated at VND197.2 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 VND197.2 billion \times 1/3 = VND 65.7 billion.

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 per cent of their total expenditure. The airline companies and complementary service suppliers acquire the major part of these costs.

The individual travel cost model

Results for the individual travel cost functions with two different models are presented in Table 7.

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

Table 7. The travel cost regression function for two functional forms

Variable	Linear (t-statistic)	Semi-Log (t-statistic)
Dependent variable	Visits	Log of visits
Constant	2.645 732 (4.51)	0.907 665 (3.64)
Travel costs	-0.003 350*** (-3.08)	-0.001 635*** (-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)	-0.006 350 (-1.69)
Male (dummy)	0.405930*** (2.08)	0.187 193*** (2.26)
Education	-0.043680 (-1.15)	-0.021 706 (-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 1% ** Statistically significant at 5%

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; as incomes increase over time, so too will recreational demand (especially in the case of the Hon Mun Islands). This will lead to an increase in the recreational value of the islands. This implication is significant for rapidly growing countries like Vietnam as they 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 for Hon Mun because the former referred to the costs for visiting the whole substitute site rather than 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 the purpose 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 per

cent 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 VND699 103. The consumer surplus per visit, therefore, is VND422 277. The recreational benefit per visit, which is calculated by adding the consumer surplus per visit and the average travel cost per visit, is VND651 661. Based on the total number of visits to the islands of 194 810 in 2000, the total recreational benefit is estimated to be VND126.948 billion per year. (See equations 1-5 above for the relevant functions.)

The zonal travel cost model

Domestic visitors

Visitation rates for zones are calculated using equation (6) and presented in Table 8.

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. 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,

Table 8. Visitation rate per 1 000 of the population per year for all zones

Zone	Population	Sample		Visitation rate /1 000
		Persons	%	
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 population of Ho Chi Minh City 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 Trang⁷ has traditionally been a popular recreational site in the south of Vietnam. Thirdly, Ho Chi Minh City is Vietnam's largest city; the economic center 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 City and Nha Trang are readily available. The most popular form of transportation for tourists is the train. 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.

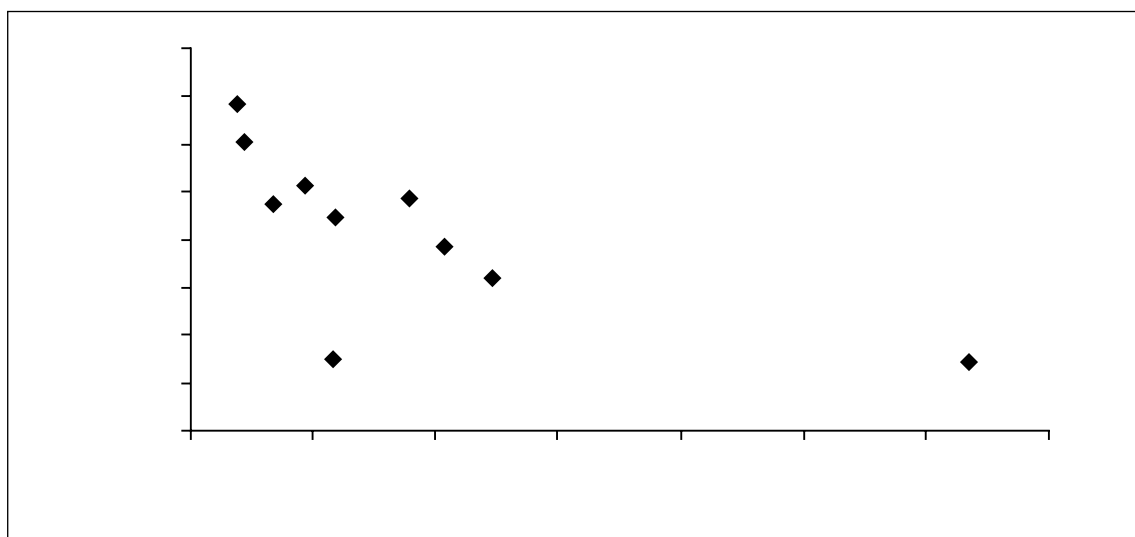


Figure 2. Graphical relationship between the visitation rate and travel cost

⁷ Ho Chi Minh City's residents often choose Da Lat, Vung Tau or Nha Trang to take holidays.

Demand curve

As the calculated visitation rate variable violated the econometric assumption of normal distribution, the log of the visitation rate was used as a dependent variable in the demand function. Table 9 shows some results from the ordinary least square (OLS) regressions for zonal demand functions.

In equation 9.2, both the income variable and the cost of the substitute site variable have a relation to the cost variable, because income was used to calculate the time cost and travel cost was used to calculate the substitute price. The coefficients of cost and income have the expected signs. Although function 9.2 results in a higher R-squared value, it has multicollinearity⁸ problems.

Table 9. The domestic demand for visits to the Hon Mun Islands

(Equation 9.1)
 $\text{LN}(\text{VISIT}) =$
 $4.163 - 0.007 \text{ COST}$
 (8.54) (-3.55)
 R-squared = 0.61

(Equation 9.2)
 $\text{LN}(\text{VISIT}) =$
 $3.408 - 0.01 \text{ COST} + 0.001 \text{ INCOME} + 0.002 \text{ SUBSTITUTE PRICE}$
 (3.94) (-3.34) (0.99) (0.45)
 R-squared = 0.69

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

Figure 3 shows the user demand curve for Hon Mun visits in 2000. The curve was based on function 9.1. 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.

Consumer surplus and recreational value

In table 10, the consumer surplus was calculated zone by zone by estimating the area under the demand curve between the average travel cost of each zone and the choke price.

Foreign visitors

The visitation rates are low because the populations chosen were very large in comparison with the number of people from that region visiting the Hon Mun Islands. Unlike Vietnam, where tourist populations were restricted to urban areas, statistical populations of foreigners

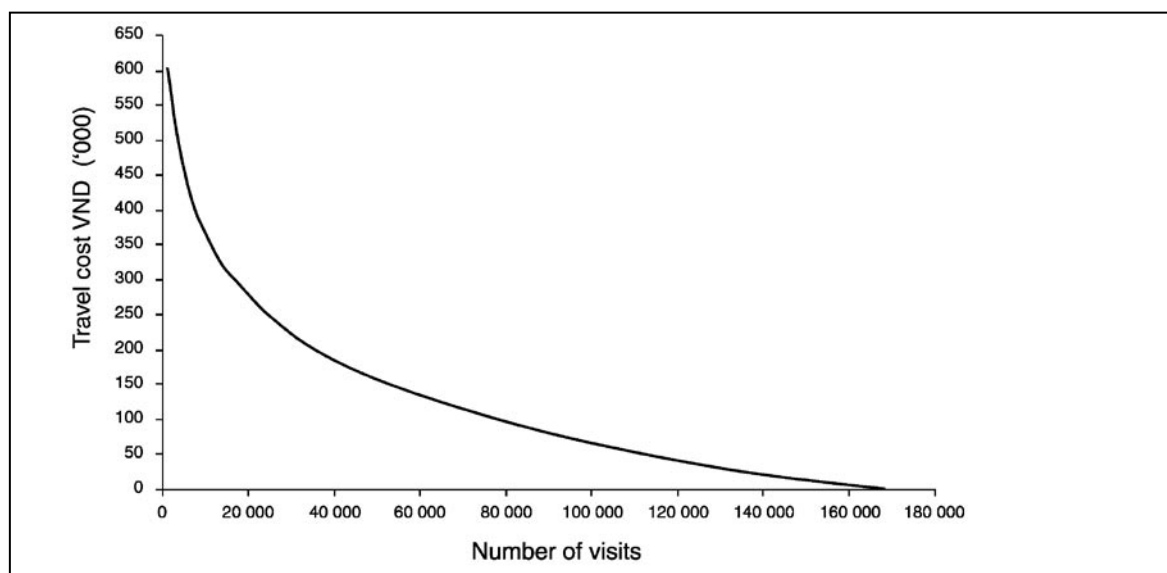


Figure 3. Demand curve for visits to the Hon Mun Islands

⁸ 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.

Table 10. Consumer surplus and price paid for Hon Mun visits in 2000

Zone	Number of visits	Consumer surplus (VND million)	Price paid (VND million)
1	12 811	1.672	0.898
2	23 414	3.056	1.758
3	6612	0.863	1.057
4	11 707	1.528	2.234
5	6385	0.833	1.420
6	51 865	6.769	12.553
7	8359	1.091	2.141
8	11 739	1.532	2.768
9	9320	1.216	2.806
10	23 695	3.093	8.094
Total	165 910	21.654	35.729

Source: Estimated from survey data

Table 11. Visitation rates and travel costs of foreign tourists by region

Region	Number of samples	Travel Cost (million VND)	Visitation rate (visits/1 000 pop.)
1 (Asia and Oceania)	117	1.623	0.276
2 (Europe and North America)	93	2.203	0.065
Total	210	3.826	

Source: Calculated from survey data using equation (6).

were regional populations. Although Region 2 (Europe and North America) has a much larger population than Region 1, 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 the Table 11):

$$P = 2.381 - 2.737 \times Q$$

where

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

Table 12. Recreational value of the Hon Mun Islands in 2000 (Unit: VND million)

	Consumer surplus		Price paid		Recreational value	
	All visitors	Per visitor	All visitors	Per visitor	All visitors	Per visitor
Domestic visitors	21 654	0.131	35 728	0.215	57 382	0.346
Foreign visitors	23 810	0.250	178 657	1.880	202 467	2.130
Total	45 464		214 385		259 849	

Source: Calculated from survey data

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

Individual annual CS = 0.5 x (choke price – price paid).

The total CS is equal to the sum of all the individual CSs, or CS x number of visits.

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

$$CS = 0.5 \times (2.381 - 1.623) = \text{VND}379\ 000$$

* Choke price = VND2.381 million

* Price paid = VND1.623 million (Table 11)

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

$$CS = 0.5 \times (2.381 - 2.203) = \text{VND}89\ 000$$

where the choke price = 2.381 and the price paid = 2.203 (Table 11)

The weighted average consumer surplus is about VND250 000. The average recreational value for foreigners is estimated to be VND2.130 million, which is derived by adding the average consumer surplus and average travel cost to the islands.

Total recreational value

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

The annual monetary recreational value of the Hon Mun Islands is about VND259.8 billion (approximately US\$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 from Hon Mun and then, in terms of the prices paid to transportation companies and agents for providers of services such as hotels, restaurants, tourist agencies, etc. A very small part of the estimated recreational value

of Hon Mun goes 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 VND45.4 billion (approximately US\$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 (VND23.8 billion in comparison with VND21.6 billion). 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. 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 to enjoy the scenery.

The contingent valuation method (CVM)

There were 462 samples for the contingent valuation method, of which 252 were domestic respondents and 210 were foreigners. Table 13 and Table 14 summarize the main characteristics of domestic and foreign respondents to the CVM questionnaire.

Of the 252 Vietnamese respondents, 112 respondents were not willing to contribute to 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 was used.

Table 15 and Table 16 presents results of the Tobit functions for Vietnamese and foreign visitors, respectively.

From the Tobit function, the willingness to pay (WTP) per person was estimated using equation (7). The WTP per Vietnamese visitor was found to be VND17 956.

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

Table 13. Statistical data on socioeconomic characteristics of Vietnamese visitors to the Hon Mun Islands (252 respondents)

Characteristics	Mean	Standard Deviation	Median	Minimum	Maximum
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

Table 14. Statistical data on the socioeconomic characteristics of foreign visitors to the Hon Mun Islands (210 respondents)

Characteristics	Mean	Standard Deviation	Median	Minimum	Maximum
WTP (VND)	26 786	24 249	28 000	0	140 000
Income (US\$)	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 15. Tobit function for WTP of Vietnamese visitors for the Hon Mun MPA

Dependent variable: WTP Maximum likelihood – Censored normal (TOBIT)		
Explanatory description	Coefficient	z-statistic
Constant	-13 342.64	-0.55
Monthly wage rate	0.0094***	2.38
Age	-2 275.790***	-3.99
Education	4 806.69***	3.05
Gender	395.69	0.05
Marital status	-2 809.27	-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

Table 16. Tobit function for WTP of foreign visitors for the Hon Mun Islands MPA

Dependent Variable: WTP Maximum Likelihood – Censored Normal (TOBIT)		
Variable	Coefficient	z-statistic
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

$WTP_{domestic} = \text{Average WTP} \times \text{Number of visits}$

$$WTP_{domestic} = 17\,956 \times 194\,808 \\ = \text{VND}3\,498 \text{ million (about US\$}241\,239)$$

From the Tobit function, the willingness to pay (WTP) per person is estimated using equation (7). 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:

$$WTP_{foreigner} = 26,786 \times 94,960 = \text{VND } 2,544 \\ \text{million (about US\$}175\,420)$$

Thus, the total willingness to pay for the Hon Mun Marine Park Area is:

$$\text{VND}3\,498 \text{ million} + \text{VND}2\,544 \text{ million} \\ = \text{VND}6\,042 \text{ million}$$

Conclusions and Policy Implications

Conclusions

With the growing development of ecotourism and the increasing attention given to conservation, it is necessary to use non-market valuation techniques 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 analyzing 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 per cent in the semi-log function) to explain the variation in the demand for visits. The consumer surplus per visit was estimated to be VND422 277. The recreational benefit per visit was VND651 661. Based on the total number of 194 810 visits to the islands in 2000, the total recreational benefit was estimated at VND126.948

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 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 evaluating the recreational value of the Hon Mun Islands. It may also 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 a 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 heteroscedasticity⁹ problems. The recreational value of the Hon Mun Islands to domestic visitors in 2000 was estimated at VND57.3 billion, of which the recreational benefit or consumer surplus was VND21.6 billion. Similarly, a demand curve for Hon Mun foreign visitors was plotted, but in linear form. The recreational value from foreign visitors in 2000 was VND202.4 billion, of which the consumer surplus was VND23.8 billion. Therefore, the recreational value of the Hon Mun Islands is estimated to be VND259.8 billion annually, of which Hon Mun's consumer surplus is estimated at VND45.4 billion, based on 2000 statistics.

Using the contingent valuation method, the WTP for funding an MPA project for the Hon Mun Islands was estimated to be VND6.0 billion annually. The WTP per Vietnamese visitor is VND17 956 and per foreign visitor VND26 786. These WTP values are relatively low compared with WTP values estimated for other recreational sites in the world. 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 questionnaires 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 by the limited number of choices. The range of choices on the payment card was based on the price of a full day 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 – US\$7 for a day traveling around the islands with snorkeling, lunch and pick-up services included.

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 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 also other sites, such as Chong Rock, Ponaga Tower or Nha Trang beach. Information collected in the questionnaire included travel expenditure for the whole trip to Nha Trang, and not exclusively to the Hon Mun Islands. A means of eliciting the travel costs for only Hon Mun had to be found. Two special factors were taken into account. These were (1) the respondent's satisfaction with the Hon Mun Islands in comparison with other recreational sites in Nha Trang; and (2) the time the respondent spent on the Hon Mun Islands out of the total time spent

⁹ 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).

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 (i.e. Da Lat, Hoi An, Hue, Ha Long Bay, Ha Noi, Sa Pa, and Mai Chau). Hon Mun is just a small stopover for them. The tourism value of sites that attract an insignificant number of international tourists 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 and foreign visitors to the Hon Mun Islands were calculated and included in the estimates. It should be noted, however, that it was not possible to accurately isolate the travel costs for Hon Mun; only rough estimates sufficient for purposes of this study were derived.

Policy implications

Sustainable tourism

On average, 290 000 people visit the Hon Mun Islands each year, resulting in a total annual recreational value of VND259.8 billion (US\$17.9 million). However, the local community earns only a small part of this amount (VND48.9 billion). So, although the local community is the direct stakeholder of the islands and is responsible for managing and protecting the islands, it receives a very small share of the benefits. This existing distribution mechanism may result in weak incentives to manage the islands sustainably. Hence, it may be appropriate 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 estimates from both the ITCM and ZTCM show that consumer surpluses derived from the site are

quite large (64 per cent¹⁰ and 18 per cent of the total recreational value, respectively). The magnitude of this fund is already estimated in this study using the CVM (section 4.4). However, although the TCM-derived estimates of consumer surplus show that there is considerable potential revenue to support a fund, nearly half of the respondents to the CVM survey reported unwillingness to contribute, due to skepticism that a fund would be well-managed. This skepticism is consistent with findings from similar studies elsewhere.

This suggests that, while 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; and (c) yield meaningful visible results within a short time period.

The visible benefits need not be direct conservation benefits (e.g. healthier corals). They could be things like more support infrastructure (i.e. mooring buoys to prevent boats from dragging anchors and damaging coral) or improvements that enhance tourists' appreciation of the sites (e.g. 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 to create and manage a pilot MPA including the Hon Mun Islands, valued at over US\$2 million, was initiated in early 2001 with the support of the Government of Vietnam, the Global Environment Fund, the World Bank, 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 address not only conservation activities, but also the expansion and marketing of tourist facilities, including protection of tourists from harassment and other dangers. Sustainable tourism must support local economic activities as well as take into account environmental costs and values. The local economy and the environment must be protected.

Adjustment of the Port Expansion Plan

Although recreational value is only a part of the total value of the islands, the results from this study show that tourism can generate significant revenue; in fact, some VND259.8 billion annually. According to the Nha Trang Port Upgrading Feasibility Study (Ministry of Transportation 1997), the estimated revenue of the new port is about VND45.8 billion per year. Since the new port would not cause a total loss of the

¹⁰ Note that the ITCM was applied only for domestic visitors who paid less than foreign visitors for transportation.

recreational benefit of the Hon Mun Islands,¹¹ a direct comparison of the revenue of the new port with 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 the port expansion. The large estimated recreational value of the islands is a strong indicator of the potential of the islands' tourism business. It is estimated that the new port would handle 1.8 times the volume currently handled and carry three times as many passengers. Such increases would pose 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 per cent 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. While there are substitutes for the port expansion, 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

The coral reefs of the Hon Mun Islands are the most important and unique of all marine recreational sites in Vietnam, but they have not been marketed appropriately to attract tourists. In 2000, only about 4 000 tourists of the 290 000 visitors to the islands took the opportunity to scuba-dive to look at the coral. There are three reasons for this. First of all, the coral around the islands has been seriously damaged. The opportunity to view good coral reefs decreases day by day. It is obvious that 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 US\$30 per hour, whereas the price for a day's tour around the islands, complete with lunch and a tourist guide, is only US\$7. The third reason centers on marketing and advertising. Tourists are not provided with enough interesting information about the natural properties of the islands. Many

¹¹ Except for accidents like oil spills.

visitors to the Hon Mun Islands are not even aware of the existence of coral reefs there. So they just look at the scenery and swim. The survey data confirms that about 80 per cent of the tourists to the islands participated in these two activities. The demand for the Hon Mun Islands will increase and their tourism value rise if their coral reefs are conserved and their inherent beauty and worth are marketed appropriately.

The management of the marine park area (MPA)

The challenge of managing a marine protected area is to allow multiple uses while conserving nature (Cesar 2000). This calls for knowledge of the compatibility of the various functions as well as the impacts of threats to the ecosystem. One of the biggest challenges that the pilot MPA in the Hon Mun Islands will face is achieving financial sustainability. A possible solution could be to impose a "conservation fee" on users of the islands. The large consumer surplus accruing to tourists (see Table 12) and their willingness to pay suggest there are grounds for such a fee. Estimating tourist response to a fee, deciding the fee, and drawing up an efficient MPA management scheme would require further research.

References

- Brown, G. and W. Hendry. 1990. The economic value of elephants. 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, 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 the Hon Mun Marine Protected Area Nha Trang. Khanh Hoa. Unpublished paper.
- Dixon, J. A. and M. Hufschmidt (eds). 1986. Economic valuation techniques for the environment. Johns Hopkins University Press, USA.
- Driml, S.M. 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, 12 p.
- Francisco, H. A. and D. Glover (eds). 1999. Economy and environment: Case studies in Vietnam. International Development Research Centre (IDRC), 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. Socioeconomic statistical data of 61 provinces and cities in Vietnam. Statistical Publishing House, Hanoi, Vietnam.

Hanley, N. and C. L. Spash. 1993. Cost-benefit analysis and the environment. Edward Elgar Publishing Ltd., UK.

Ministry of Transportation. 1997. Feasibility of Nha Trang port upgrading. Hanoi.

Scheaffer, R. L., W. Mendenhall III and R. L. Ott. 1996. Elementary survey sampling (5th edition). Duxbury Press, USA.

Tran, V. H. S. 1998. Environmental economic assessment activities aimed at developing a proposal for establishing and managing marine protected areas.

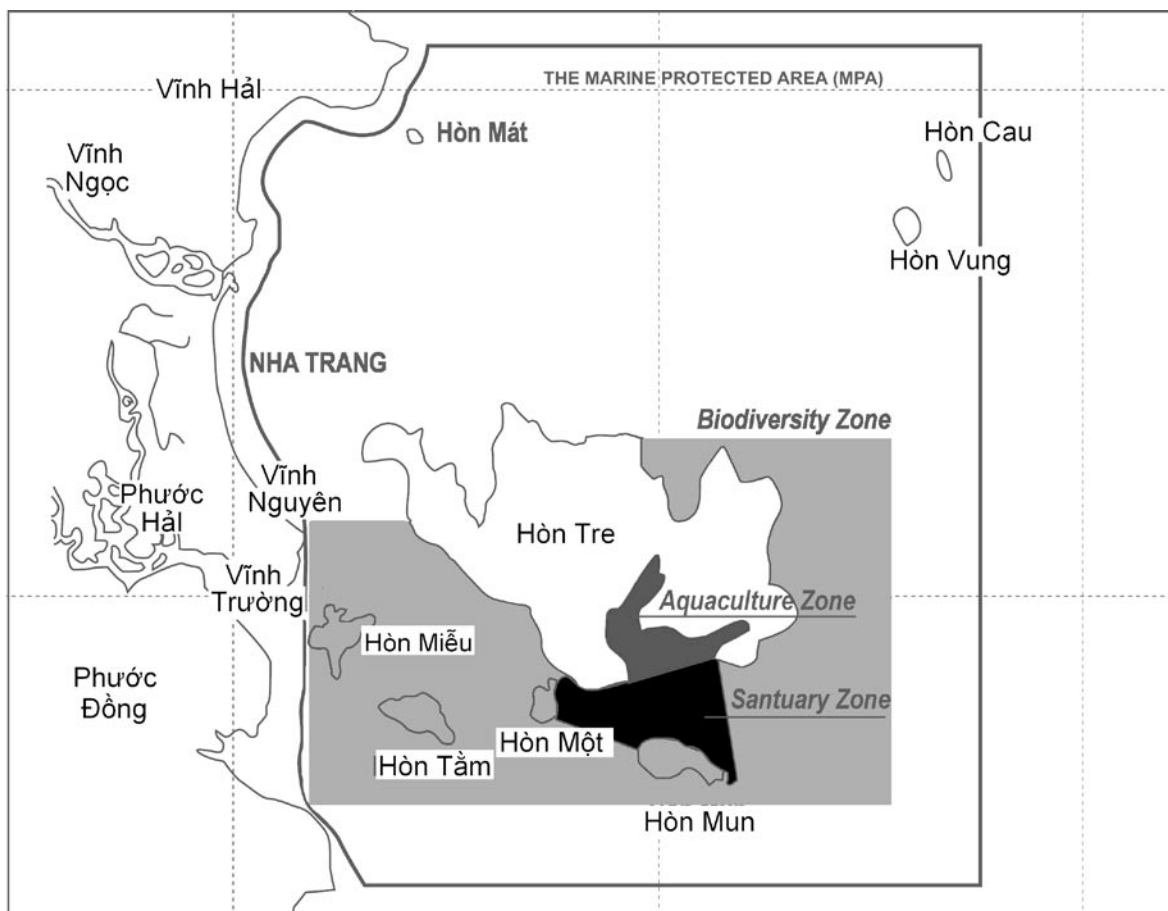
Nha Trang. Unpublished paper. So Du Lich Khanh Hoa. 1997. Bao Cao Tong Ket 5 Nam Ve Du Lich 1993 – 1997. [Khanh Hoa Tourism Department (1997): Report of the 5-year period on tourism 1993 – 1997] Nha Trang.

So Du Lich Khanh Hoa 1998, 1999, 2000. Bao Cao Tinh Hinh Thuc Hien Thang 12. [Khanh Hoa Tourism Department, 1998, 1999, 2000: Report of December] Nha Trang. Unpublished papers.

Vo, S.T. 1998. The establishment of marine protected areas based on coral reefs in Vietnam. Institute of Oceanography, Nha Trang. Unpublished paper.

APPENDIX A

Map of the Hon Mun Islands



Note: The Hon Mun Islands were declared an MPA in January 2001. When this research project commenced, the proposal for the Hon Mun Islands to be declared an MPA was still being considered. The map above highlights the proposed map before the declaration of Hon Mun Islands as an MPA.

APPENDIX B

Questionnaire

A Marine Protected Area (MPA) is being planned in Nha Trang Bay around the Hon Mun islands and other islands. The Bay is now being damaged by over-exploitation, including too much fishing, harmful fishing methods, pollution and careless use by tourists. The purposes of the MPA are to maintain biodiversity, protect the 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 are you staying in 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, besides Nha Trang?

(Please specify the name of the places) _____

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

Use beaches / Sun bathe	Boating / Sailing / Jet skis
Swim	Just visit and relax / look at scenery
Snorkeling	Eat seafood
Scuba diving	Visit fishing village

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

Return trip ticket	USD/person
Food and 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 for programs and offer jobs to people who will no longer 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 an additional 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 answer Yes to question 11, what is the **highest user fee** that you would be willing to **pay** (not including the return trip ticket paid to the tourist agency) for new programs to manage the Marine Protected Area?

0.5 U.S. / 7,000 VND

1.0 U.S. / 14,000 VND

1.5 U.S. / 21,000 VND

2.0 U.S. / 28,000 VND

2.5 U.S. / 35,000 VND

3.0 U.S. / 42,000 VND

3.5 U.S. / 49,000 VND

4.0 U.S. / 56,000 VND

4.5 U.S. / 63,000 VND

5.0 U.S. / 70,000 VND

6.0 U.S. / 84,000 VND

7.0 U.S. / 98,000 VND

13. If you answer 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 businesses 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 foreigner:	For Vietnamese:
0 - 1,000 USD	0 - 400.000 VND
1,001 - 2,000 USD	400.000 - 600.000 VND
2,001 - 3,000 USD	600.000 - 800.000 VND
3,001 - 4,000 USD	800.000 - 1.000.000 VND
4,001 - 5,000 USD	1.000.000 - 1.200.000 VND
5,001 - 6,000 USD	1.200.000 - 1.500.000 VND
6,001 - 7,000 USD	1.500.000 - 2.000.000 VND
7,001 - 8,000 USD	2.000.000 - 3.000.000 VND
8,001 - 9,000 USD	More than 3.000.000 VND
9,001 - 10,000 USD	
More than 10,000 USD	

Thank you very much!