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Essays on Economic Valuation of Cultural and Natural Resources in Vietnam

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ESSAYS ON ECONOMIC VALUATION OF CULTURAL AND NATURAL RESOURCES IN VIETNAM

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Abstract

The thesis consists of five self-contained papers. The first four papers are concerned with the economic valuation of cultural heritage sites, while the last one estimates direct use values of coastal wetlands in Vietnam.

In the first paper, contingent valuation is used to estimate the economic benefits of preserving the world cultural heritage site of My Son temples in Vietnam, and shows how these benefits can be captured and used to justify investments in preservation of this site.

The second paper compares and pools the estimates from contingent valuation and choice modeling of preservation of My Son. These two stated preference methods, independently and pooled, provide similar economic estimates. This convergent validity test shows that both methods can be used successfully to assess benefits to cultural heritage sites from measures to reduce air pollution, soil erosion, climate change and other causes of deterioration of cultural resources.

In the third paper, we compare the economic value of preserving historic temples in two countries in Southeast Asia, Thailand and Vietnam, and discuss the possibilities and difficulties in cross-country transfer of cultural heritage values.

The fourth paper estimates the errors due to yea-saying in dichotomous choice contingent valuation studies of cultural heritage, and investigates whether yea-saying is a bigger problem in developing countries than in developed countries where the majority of contingent valuation studies have been conducted.

As opposed to the application of stated preference methods applied in the previous four papers, the last paper shows how market prices can be used to estimate at least part of the total economic value of natural resources. Direct use values for competing uses of the Tam Giang-Cau Hai lagoon wetland in Vietnam, are estimated. The results suggests that the current activities of aquaculture, capture fisheries agricultural production and sea-grass collection provide higher economic benefits than extensive rice cultivation in all of the lagoon.

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Tran Huu Tuan

Ås, October 2007

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INTRODUCTION

1. Defining the economic benefit of cultural and natural resources

The economic benefits of a public good such as cultural or natural resource can be defined as the amount of welfare that these resources generate to society. The welfare produced by a resource includes both *use value* and *non-use value* derived from the resource. *Use value* reflects the direct benefits derived from the resource. For examples, fish, agriculture, fuel wood, recreation, transport, wildlife harvesting, energy, fruits, etc. can be directly derived from wetland products. Recreational value can be derived from visiting cultural heritage sites. *Non-use values* are the benefits that people derive from the knowledge that a resource (e.g. biodiversity, cultural heritage, religious site) is maintained. These include the benefit people get from knowing that the option to use the resource in the future exists (*option value)*, the benefit people place on knowing that the resource exists for themselves and others in the current generation (*existence value*), and the benefit of preserving the resource for future generations (*bequest value*).

Cultural and natural resources such as cultural heritage sites and wetlands are valuable assets because they provide economic benefits to people. Some of the benefits of natural resources accrue directly to people, e.g. fish, agriculture, wood products. These benefits are linked directly to markets and hence, can be properly regulated by market forces. Market valuation methods can be used to value these benefits. However, many benefits provided by cultural and natural resources possess characteristics of public goods in terms of non-excludability; non-rivalry; and thus, cannot be properly handled by markets. Non-market valuation techniques are needed to value these non-market benefits.

This thesis is concerned with estimating some of the economic benefits provided by cultural and natural resources, using market and non-market valuation methods applied to wetlands and cultural heritage site, respectively. The purpose of this introductory chapter is to present the motivations, hypotheses and methodology, and provide a brief summary of the thesis. The remainder of this chapter is structured as follows. Section 2 explains the motivation for economic valuation and its potential use in decision making. Section 3 presents the research questions and methodology. Section 4 presents the main content and findings of each paper. Section 5 discusses policy implications and contributions of the thesis.

2. Why economic valuation?

In Vietnam, there is a lack of economic information for cultural and natural resources. The economic benefits of cultural resources such as cultural heritage sites have never been determined. Very few valuation studies on economic benefits of natural resources such as wetlands have been conducted[1]. This leaves a gap in knowledge of economic benefits of these resources in Vietnam.

In Vietnam, like in many developing countries, even basic needs are sometimes hard to finance. This raises the question of why try to place a monetary value on cultural and natural resources, many of which can be considered to be non-essential goods. Do people in a developing country care about and benefit from these public goods, and are they willing to

[1] To our knowledge, there have been two valuation studies of wetlands in Vietnam to date. Both of these studies use secondary data to estimate some of the wetlands' use values. VEPA/IUCN (2000) estimates main direct and indirect use values (i.e. timber, fuelwood, non-timber forest products, fisheries, tourism, wildlife harvesting, water route protection, storm protection, carbon sequestration) of Can Gio mangrove forest in Ho Chi Minh City. Thang and Bennett (2005) assess direct use values of wetland in Camau province in Mekong River Delta.

use their limited budget for preserving cultural or natural resources? This becomes more relevant given that only the costs of preservation are usually accounted for, making it difficult to make an informed policy decision whether it is worth investing in a conservation program.

Information of the total economic value (both use and non-use values) of natural resources is needed in order to determine the social optimal level of exploitation of natural resources and efficient resource management. The economic values of natural resources are also important in determining the contribution of the natural resources to a country's gross domestic products (Torell *et al.* 2001), and can be used to adjust national accounts in green national accounting.

Estimating and expressing in monetary terms the economic benefits of the cultural and natural resources is important because these benefits could eventually be used in cost-benefit analysis (CBA) of preservation projects. This information could also help to manage these resources in a sustainable way, as it can help policy makers develop policies that reflect the value of the resources and solve issues associated with their management and conservation (Torell *et al*. 2001; Lambert 2003).

Since cultural and natural resources have public good characteristics, it is the task of government to protect them. However, as funds for protection are limited, we need to prioritize among competing needs to reach optimal allocation of limited resources. Economic valuation provides useful pieces of information on economic decisions that are the cause of resource loss (see e.g. Barbier *et al*. 1997; Georgiou *et al*. 1997; Torell *et al*. 2001; Navrud and Ready 2002; Ruijgrok 2006).

3. Research questions and methodology

3.1 *Research questions*

The thesis will seek to answer the following research questions:

1. What is the maximum amount that respondents are willing to pay for preserving the My Son cultural heritage site? Do different groups of visitors and non-visitors place the same value on preservation of the site? Could the charges levied on visitors be changed to raise more money? What levels of conservation investments at My Son are justified from a cost-benefit point of view?
2. Do Contingent Valuation (CV) and Choice Modeling (CM) methods provide the same benefit estimate? Does CM work well in cultural heritage valuation in a developing country context? Which preservation options for the My Son (i.e. using CM) would generate the highest benefit and be widely accepted by society?
3. How do cultural heritage values compare across countries? What are the possibilities and difficulties in transferring cultural heritage values between countries?
4. How large is the problem of yea-saying in dichotomous choice (DC) CV studies in a developing country context? What is the difference in terms of magnitude of yea-saying errors between developing and developed countries?
5. Do the wetlands of the Tam Giang-Cau Hai (TGCH) lagoon in Vietnam provide direct use values to the local people? What are the direct use values of competing uses of the TGCH lagoon wetland? What is the policy use of these economic estimates?

3.1 *Methodology*

This section presents the methods used in the thesis to address the research questions.

Non-market valuation methods such as CV and CM are applied to estimate the economic benefits of cultural heritage in the first four papers of the thesis. CV and CM are considered the best techniques to estimate the total economic value of cultural resources that are not

traded in the market, and which have a high intrinsic non-use value. However, the CM method has rarely been used to value cultural heritage. This thesis therefore aims at advancing our understanding of how this method can be applied, and to compares CM to the more familiar CV method.

CV and CM are to some extent complements. CV is used to estimate people's willingness to pay (WTP) for a certain scenario or project, while the CM method is used to estimate people's marginal WTP for certain attributes of that scenario or project. The CM method is believed to have some advantages. For example, the method encourages respondents to concentrate on the trade-offs between characteristics of a good or program, as opposed to taking simple position either 'for' or 'again' a program, and thus makes it difficult for respondents to behave strategically. CV is used in the first paper. In the second paper, both CV and CM are applied.

In the third paper, benefit transfer methods are used to test the validity and reliability of transferring the benefits derived from two CV studies of cultural heritage sites in Thailand and Vietnam.

Benefit transfer means transferring economic values from a primary valuation study (study site) to a site where we need to conduct policy analysis (policy site). Due to the high costs and time required to conduct primary valuation studies, there is potentially high policy interest in using benefit transfer to estimate values for sites not yet valued. While benefit transfer is increasingly applied to environmental goods, applications of benefit transfer in the field of cultural heritage resources are rare (Eftec 2005; Riganti and Nijkamp 2005). The unique nature of these public goods, differences in affected populations and population characteristics, and other cultural and social differences lead to a significant risk of benefit

transfer providing non-informative estimates for cultural heritage. The third paper will compare results of two CV studies of cultural heritage sites in Thailand and Vietnam, perform the benefit transfer tests between the two sites, and discuss possibilities and difficulties in such transfers of values.

In the fourth paper, we adapt a modified version of the Dissonance-Minimizing (DM) format proposed by Blamey et al. (1999) to estimate the error due to yea-saying. Comparing the results from the DM format with the traditional DC approach can then be interpreted as the error introduced by yea-saying. We expect that the institutional and cultural setting in a developing country like Vietnam may lead people to give socially desirable answer (see, e.g. Whittington 1998; Bell 2004; Zhongmin *et al*. 2006), which could lead to an even higher degree of yea-saying.

In the last paper, market prices are used to value direct use value of Tam Giang-Cau Hai (TGCH) lagoon wetland in Vietnam.

Market price is a straightforward method to estimate direct use values of natural resources (e.g. wetland products) that are sold and bought in markets. The market prices reflect individuals´ WTP to enjoy the benefits of private goods like fish, agriculture, and fuel wood. Thus, the values that people place on a resource are likely to be well-defined. However, this method involves a number of limitations; e.g. market data may be available for a limited number of goods and may not reflect all use values of a resource, market prices do not fully reflect the value of goods due to market imperfections and policy distortions, seasonal variations, and the method may overstate benefits since it usually does not subtract the value of other resources used to bring products to market.

4. Thesis contents

The following presents the main content and findings of each paper.

Paper 1: Capturing the benefits of preserving cultural heritage

This paper is co-authored with Ståle Navrud (Department of Economics and Resource Management, Norwegian University of Life Sciences). The aim is to estimate the economic benefits that would be produced by a restoration and preservation program for the world cultural heritage site of My Son temples in Vietnam. In particular the study looked at how much people would be willing to pay for preserving the site. The study focused on the following agents: (i) foreign visitors to My Son; (ii) Vietnamese visitors to My Son; (iii) Vietnamese visitors to the area surrounding My Son, who do not visit the My Son temples; and (iv) local residents.

Results show that foreign tourists visiting My Son have a significantly higher mean willingness-to-pay (WTP) for a preservation plan for this site than the overall Vietnamese population. Visitors to My Son stated a mean WTP of US$9 and US$2 for foreign and Vietnamese visitors, respectively, while for non-visiting Vietnamese mean WTP was about US$2. By estimating the benefits to all these groups, we are better able to construct policies that can capture all benefits to the site. In addition, we estimate optimal entrance fees for visitors that maximize revenues to the site. We also test whether the preservation project for My Son pass a benefit-cost test, by comparing the aggregated benefits with the social costs over the life time of the project.

The paper finds that if the optimal entrance fee regime is imposed, it would yield substantial annual revenue that could be used to finance the required preservation measures. This move would also reduce congestion at My Son, and thus achieve the twin goals of revenue

generation and heritage preservation. However, this pricing regime would not reduce the congestion problem due to Vietnamese visitors. The idea of imposing a pricing structure with seasonal differentiations to reduce the number of Vietnamese visitors in the high season is feasible. Results also show that if the justification of investments were only based on entrance fees, then this would lead to a level of preservation for My Son that would not be socially optimal. Only when the benefits derived from non-visitors are included, the preservation plan passes the benefit-cost test.

Paper 2: Comparing and pooling contingent valuation and choice modeling estimates

This paper, joint work with Ståle Navrud, is published in *Environmental and Resource Economics*, 2007, volume 38, issue 1.

The paper applies CV and CM to estimate the economic benefits of preserving the My Son temples; both to foreign visitors and the local residents (i.e. groups (i) and (iv) in the first paper). We then compare the estimates from the CV and CM methods, and pool the results from the two independent methods.

The results show that both CV and CM are suited to estimating the economic benefits of preserving the cultural heritage of My Son. Our comparison of CV and CM shows that these two independent SP methods produce very similar results, which can be interpreted as a test of convergent validity. The pooling results show that, for both foreign visitors and local residents, none of the scale parameters are significantly different from unity, implying that the parameters in the CV and CM models are not different, and the error variances are not different. The results of the pooled models are rather similar to the CM models. The inclusion of CV data to the CM models gives little gain, compared to the CM models alone.

Paper 3: Comparing cultural heritage values in Southeast Asia– Possibilities and difficulties in cross-country transfer of economic values

The paper, co-authored with Udomsak Seenprachawong (School of Development Economics, National Institute of Development Administration, Thailand) and Ståle Navrud, is forthcoming in Journal of Cultural Heritage.

The aim of this paper is to compare cultural heritage values from two CV surveys conducted in Thailand and Vietnam, respectively, in order to provide a discussion on possibilities and difficulties in benefit transfer of cultural heritage goods.

We use data from the two CV surveys conducted in Thailand and Vietnam for this paper. For the Vietnam survey, we use results of the CV survey of local residents, i.e. group (iv) in the first paper. The Thailand survey is designed to investigate the WTP of individuals in the Bangkok metropolitan area towards the preservation and restoration of historic temples in the central region of Thailand. These two CV surveys have many similar designed features aiming at isolating the effect on WTP from differences between the sites and the affected population. However, there are also features that are different in the two surveys. These similarities and differences have been taken into account in order to provide some hints on the elements that might affect WTP results, and therefore, benefit transfer exercise.

When making comparisons, we posit that the two cultural heritage sites in Thailand and Vietnam are similar. Since they are not, and since this is a rather relevant point for benefit transfer, we discuss the potential implications for benefit transfer of differences in the good being valued. We provide policy implications for benefit transfers that can be derived from the findings of benefit transfer tests.

We find that the error in transferring unadjusted mean WTP is from 46% to 129%. Unit value transfer with adjustments for differences in purchase power parity (PPP), income level and income elasticity between the sites in many cases substantially increase rather than decrease transfer errors. Function transfer does not perform better than unadjusted unit transfer. These results are contrary to both theoretical expectations and experiences from benefit transfer of environmental goods and environmentally related health impacts. The results suggest that there are other physical, cultural and institutional factors that can explain differences in WTP for cultural heritage than income and other socio-economic variables usually captured in CV surveys.

Paper 4: Estimating errors due to yea-saying in dichotomous choice CV studies

This paper, joint work with Ståle Navrud, applies a special type of Dissonance-Minimizing (DM) format proposed by Blamey *et al*. (1999) to estimate errors due to yea-saying arising in DC questions.

In this paper, we adapt the DM format that allows respondents to select one among many options of the preservation program for the My Son temples. The paper assesses the multiple response options (MRO) format used to estimate the economic benefits of preserving the My Son for Vietnamese respondents (i.e. groups (ii), (iii), and (iv) in the first paper). Results from the MRO format are coded following two data coding approaches. The first one is to code option 'yes' as yes, and all other options as 'no'. The underlying principle of this coding approach is to allow respondents to say 'no' to the CV question, but still support the program (i.e. the DM approach). The second approach is to code option 'no' as no, and all other options as 'yes'. This mimics the traditional DC approach, where respondents would say 'yes' to the CV question, despite that their true answers are 'no'. However, they say 'yes' to pay the

stated amount as this is the only way they can show that they support the program when their WTP is lower than the stated amount. A comparison of these two coding approaches can then be interpreted as the error introduced by yea-saying. We expect that the institutional and cultural setting in a developing country like Vietnam may lead people to give socially desirable answer, which could lead to an even higher degree of yea-saying.

Comparing the results from the DM format with the traditional DC approach we find that DC overestimates WTP for preservation of a cultural heritage site in Vietnam by 200 to 700%. However, this is the same magnitude of errors that have been found in other developing countries as well as in developed countries, and therefore we cannot say that yea-saying in DC questions is a bigger problem in developing countries than in developed countries. It seems to be a rather universal problem that leads to significant overestimation of WTP in traditional DC CV questions. Our results show that the DM approach can be used to avoid this problem also in a developing country context.

Paper 5: Valuing direct use values of wetlands: a case study of Tam Giang-Cau Hai lagoon wetland in Vietnam

This paper is co-authored with Mai Van Xuan (College of Economics, Hue University, Vietnam), Do Nam (Department of Science and Technology, Thua Thien Hue Province, Vietnam), and Ståle Navrud. The paper uses market prices to estimate direct use value of the Tam Giang-Cau Hai (TGCH) lagoon wetland in Vietnam.

Located in Thua Thien Hue Province, TGCH lagoon directly or indirectly provides the livelihoods for about 300,000 people living around and on the lagoon. Due to expansion of aquacultures, intensive fishing, and lack of an appropriate management scheme, the biological resources in the lagoon are degraded. Using a market price approach, we find that the direct

use values derived from aquaculture, capture fisheries, agricultural production, and sea grass collection in the lagoon was VND4.7 million (US$277) per hectare per year in 2005. Among these uses, capture fisheries provide the highest value in terms of net benefits, followed by agricultural production. Aquaculture yields the largest figure of total benefits, but has a negative net benefit (i.e. a loss). The direct use value of this current use exceed the direct use value of the alternative of converting the lagoon wetlands into rice fields; a results which would be further strengthened if indirect use and non-use values were estimated and added.

5. Policy implications and contributions of this thesis

A large number of cultural heritage sites can be found in developing countries. These sites attract an increasing number of tourists and income to these countries. Unfortunately, due to lack of money or resources to sufficiently protect these sites, many of them are in poor condition or deteriorating. Therefore, there is a need to put a price tag on these cultural heritage sites in order to justify the costs of preservation and conservation programs.

The idea of putting an economic value on the preservation of cultural heritages is not new (e.g. Navrud *et al*. 1992; Navrud and Ready 2002; Noonan 2002; Noonan 2003). However, very few valuation studies of cultural heritages exist in developing countries (Eftec 2005). The first four papers in this thesis adds to the scarce literature on economic benefits of cultural heritages in developing countries, and reduces the need to perform very uncertain benefit transfers from European or US valuation studies.

In the first paper we assess the benefits of the My Son cultural heritage in order to provide advice on the policy use of the results and the ways these benefits could be captured and used to improve the condition of the sites. More specifically, we use the estimated benefits for visitors to estimate optimal entrance fees that maximize revenues for the site. We also

perform a CBA of the preservation project, and show how the outcome can be used to justify investments in cultural heritage preservation.

The methodological comparison between CV and CM models applied to cultural heritage goods is the novelty of the second paper. Results from the paper suggest that these valuation models can be used in CBA to assess the benefits to cultural heritage of measures to reduce air pollution, soil erosion, climate change and other causes to deterioration of cultural heritage sites.

The CM results from this paper might help to inform policies in determining which preservation options that should be introduced in My Son in order to maximize social benefits. The results show that the preservation of My Son temples and upgrading the infrastructures are found to be quite important to respondents, while the provision of additional services is not as important.

Applying benefit transfer techniques to cultural heritage goods is the contribution of the third paper. Results show that benefit transfer of cultural heritage could be highly unreliable due to lack of knowledge about *which* variables that affect WTP for this heterogeneous group of public goods, and data on variables we know influence WTP (i.e. income elasticity of WTP at the policy site). This implies that benefit transfer may not provide accurate WTP estimates for cultural heritage goods to be used in CBA and other policy analyses until we have performed more primary valuation studies designed to gain more knowledge about variables that determine WTP for these goods and which we can find data for at the policy site.

The application of the DM format in order to get more unbiased estimates of the economic benefits of cultural heritage in a developing country context is the novelty of the fourth paper.

The last paper of the thesis is aimed to provide information on direct use values of wetlands, with a case of the TGCH lagoon wetland, using a market prices approach. This information may be important in the context of Vietnam, where there is currently lack of information on the economic values of wetlands. Specifically, no valuation study on the economic values of the lagoon wetlands has been conducted before in Vietnam. This leaves a gap in knowledge of economic values of the lagoon wetlands. This information gap, together with a lack of an appropriate policy for wetlands management, poses a big challenge to management of the lagoon wetlands. The economic values from this paper may be useful for designing new, efficient policies, and inform trade-offs among competing uses and management options for the lagoon wetland.

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Paper 1

Capturing the Benefits of Preserving Cultural Heritage

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Abstract. There is an increasing body of contingent valuation (CV) studies applied to cultural heritage sites. These CV studies assess the benefits of cultural resources, but few provide advice on the policy use of the results and the ways these benefits could be captured and used to improve the condition of the sites. This study attempts to do exactly this by conducting a CV survey of a preservation program for a World Heritage site (WHS), and using the estimated benefits for visitors to assess optimal entrance fees that maximize revenues for the site. We also perform a cost-benefit analysis of the preservation project, and show how the outcome can be used to justify investments in cultural heritage preservation.

Keywords: contingent valuation, cost-benefit analysis, cultural heritage, optimal entrance fee, revenue collection, willingness to pay.

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1. Introduction

Non-market valuation methods such as Contingent Valuation (CV), Choice Modeling (CM), Travel Cost Method (TCM), and Hedonic Pricing Method (HPM) have been used in valuation studies of cultural resources. Stated Preference (SP) methods such as CV and CM are considered the best techniques to estimate the total economic value of cultural resources that are not traded in the market, and which have high intrinsic non-use values. The most common method used for valuing cultural goods has been CV (see Navrud and Ready 2002; Noonan 2003; Eftec 2005). The number of CM studies applied to cultural resources has been increasingly (e.g. Morey *et al.* 2002; Edward and Kathleen Greer 2003; Mazzanti 2003; Apostolakis and Jaffry 2005; Tuan and Navrud 2007).

Compared to SP methods known as CV or CM, Revealed Preference (RP) methods like TCM and HPM have not been widely used in valuation of cultural resources. Some studies used TCM to value cultural goods can be found in the literature (e.g. David 1994; Forrest *et al.* 2000; Bedate *et al.* 2004; Poor and Jamie 2004; Alberini and Longo 2006). The only application of HPM to estimate economic benefits of cultural heritages is Ruijgrok (2006).

The economic benefits accruing from the preservation of a cultural heritage are primarily received by visitors and non-visitors. Visitors are willing to pay to access the site. They could hold both use and non-use values and the CV survey can take place on the site. Non-visitors do not visit the site (at the time of the survey) but presumably benefit from knowing that the cultural heritage is being preserved. Some of these non-visitors may have no intention or desire to visit the site, but others may have previously visited or plan to visit it in the future. This means that off-site respondents do not hold existence values alone (Bateman and Langford 1997).

A large number of CV studies in cultural heritage valuation can be found in the literature. There are some studies measuring benefits of cultural heritage derived from visitors, e.g. Navrud *et al*. (1992); Willis (1994); Willis (2003); Bravi *et al*. (2002); Michell and Carson (1989); Mourato *et al*. (2004); and Alberini and Longo (2006). Other studies value the benefits of cultural heritage derived from non-visitors, e.g. Trine Bille (1997); Santagata and Signorello (2000); Navrud et al. (1992); Mourato et al. (2002); Whitehead and Finney (2003); and Salazar and Marques (2005). These studies show that substantial benefits of cultural heritage accrued to visitors and non-visitors.

While there are some studies measuring the benefits held by visitors and other studies estimating the benefits held by non-visitors, very few attempts have been made to value cultural heritage benefits to both visitors and non-visitors of the same site. Beltran and Rojas (1996) used CV survey to estimate individuals WTP of Mexican citizens, both visitors and non-visitors, for use and preservation of the archaeological sites. The study found that the WTP of the visitors for preservation of the archeological sites was significantly higher than that of non-visitors. In their report to the World Bank on the Fes rehabilitation project, Carson *et al*. (1997) report a CV study of restoring the old city of Fes in order to measure economic benefits that accrue to foreigners visiting Morocco, both visitors and non-visitors to Fes. They found that visitors and non-visitors to Fes would be willing to pay US$70 and US$30, respectively, for preserving and improving conditions in Fes. Sanz *et al*. (2003) estimated the WTP of both visitors and Spanish residents for the national museum of Sculpture in Valladolid, Spain. They found that the mean WTP of both visitors and Spanish citizens was €27 under a conservative scenario with parametric estimation. Ruijgrok (2006) estimated recreational and bequest values of the heritage in the Tieler and Culemborgerwaard, the

Netherlands. He found that visitors would be willing to pay €1.22 per visit, and non-visitors would be willing to pay €11.88 per year per household.

This study is aimed to estimate the economic benefits of preservation of the My Son World Heritage site (WHS) in Vietnam, and to show how these benefits can be captured and used to justify further investments in preservation of this site.

Our study differs from Beltran and Rojas (1996), Carson *et al*. (1997), Sanz *et al*. (2003), and Ruijgrok (2006) in the way that Beltran and Rojas (1996), Sanz *et al*. (2003), and Ruijgrok (2006) measure benefits to national residents (Mexican, Spanish, and Dutch), Carson *et al*. (1997) value benefits to foreign visitors. Our study measures benefits to both national residents (Vietnamese) and foreign visitors. More specifically, this study focuses on measuring the economic benefits accruing to (i) foreign visitors to My Son; (ii) Vietnamese visitors to My Son; (iii) Vietnamese visitors that visit the area but do not visit My Son during their current trip; and (iv) local residents. By estimating the benefits to all these groups, we are better able to construct policies that can capture all benefits to cultural heritage sites. In addition, we assess optimal entrance fees for visitors that maximize revenues to the site. We also test whether the preservation project for My Son pass a benefit-cost test, by comparing the aggregated benefits with the social costs over time of the project.

The rest of this paper is structured as follows. Section 2 describes the theoretical framework, study site, survey and the design of the CV questionnaire. Section 3 presents socio-economic characteristics of respondents, respondents' knowledge and attitudes, WTP estimates, the WTP's determinants and aggregate WTP estimates of the benefits. Section 4 assesses optimal entrance fees that maximize revenues from visitors, and performs cost-benefit analysis (CBA)

of the preservation project. Section 5 concludes the study with a discussion of opportunities for future research in this area.

2. Methodology

2.1 Theoretical framework

The CV method Michell and Carson (1989) was used to elicit the economic benefits of the preservation and improvement of the My Son cultural heritage. The individual's compensating variation for the proposed improvement is given by:

$$U(Y, Q_0) = U(Y - WTP, Q_1) \qquad (1)$$

where U represents the indirect utility function of an individual, Y is the income level, Q_0 is the current condition of the site, Q_1 is the improved condition, and WTP is interpreted as the maximum amount that the individual would be willing to pay to secure the improvement.

For empirical estimation, it is common to specify the WTP welfare measure as:

$$WTP_i = X_i\beta' + \varepsilon_i \qquad (2)$$

where X_i represents a vector of explanatory variables, β is a vector of parameters, and ε_i is the error term reflecting unobserved taste components. The parameters of this equation can be estimated by the maximum likelihood method (Cameron 1988).

The total aggregate WTP estimates depend on both the benefits per person or household and the number of beneficiaries. The populations that accrue benefits from the preservation of My Son are (i) Foreign visitors to My Son, (ii) Vietnamese visitors to My Son, (iii) Vietnamese visitors visiting the area who do not visit My Son during their current trip, and (iv) Local resident households. The aggregate benefits can be estimated as:

$$B_{total} = \sum_{j=1}^{4} (n_j \times B_j) \qquad (3)$$

where $j = 1 \ldots 4$ are the four benefiting groups, n_j is the number of persons or households in group j, and B_j is the mean WTP of group j.

For foreign visitors and Vietnamese visitors to My Son, we aggregate using the sample mean WTP of each group multiplied by the corresponding number of visitors in each group. The sample of each group is randomly selected and is assumed to be representative of all visitors of that group to My Son in the year of study.

For Vietnamese visitors visiting the area but not My Son at the time of survey, we aggregate multiplying the sample mean WTP by the number of Vietnamese visitors to major tourist destinations in the vicinity of My Son. We assume that the study sample is representative of all Vietnamese visitors to the area in that year.

The population of local residents is defined as those households living in Quangnam province where My Son is located. We aggregate multiplying the sample mean WTP by the number of households in this province.

The total aggregate WTP is then the sum of the aggregate WTP of the four groups, see equation 3. Note, however, that since a WHS in theory is a global public good, non-visiting households in other parts of Vietnam and other countries worldwide could in theory have a positive WTP for My Son. However, since the number of substitute sites they could pay for increase with increased distance from My Son, we expect the mean WTP for My Son for this group to be very small or zero.

2.2 Study site and survey

My Son is located in the Quangnam province in the central Vietnam. This is a large complex of religious temples, which was originally comprised of more than 70 temples. The vestiges of 25 of these temples remain today. In December 1999, UNESCO recognized My Son as a World Cultural Heritage Site. In the period of 1997-2005, the average rate of growth of visitors to My Son is 24.3% per year for foreign visitors and 41.5% per year for Vietnamese visitors; and in 2005 about 117,000 visitors visited My Son (Tuan 2006). This cultural tourism is important to Vietnam as it helps to improve cultural exchanges and raise the living standards for the local people (Weitzel 2004). In spite of its benefits to society, this cultural heritage site is severely threatened by degradation and loss. There are some natural environmental causes that damage the site such as soil erosion, landslides, floods, and tropical climate. However, human activities including wars; plain neglect and tourism pressures are arguably the main causes of the degradation and destruction, see Kinh (2001); VNS (2004). This unique site is now in a state of significant disrepair, and urgently requires conservation efforts.

The surveys were conducted in the summer 2005 with a total of 967 face-to-face interviews. The sample size and location of interviewing for each group of respondents are presented in

Table 1. Sampling scheme

	Group of respondents	Location of interview	Number of respondents
Visitors	(i) Foreign visitors to My Son	My Son	243
	(ii) Vietnamese visitors to My Son	My Son	245
Non-visitors	(iii) Vietnamese visitors to the area	Hue and Hoian	238
	(iv) Local residents	Quangnam province	241
	Total number		967

For the Vietnamese tourists to the area, but non-visitors to My Son, interviews were performed in Hue (i.e. the city located 170 km north of My Son) and Hoian (i.e. the town located 35 km east of My Son) as they are two of the largest tourist destinations in the Central of Vietnam (Figure 1). Thus, we used a convenience sample, as it is very costly and difficult to conduct a survey representative of all Vietnamese visitors who do *not* visit My Son at the time of survey. For local residents, we used stratified sampling to get a representative sample of households in Quangnam province. In order to avoid double counting, the Vietnamese visitors sample omitted respondents who lived in Quangnam.

Figure 1. Map of the Central area of Vietnam

Source: Adopted from http://www.vnnavi.com/mientrung.html

2.3 The CV questionnaire

Four versions of the CV questionnaire were used in the surveys of the four groups of respondents. All versions of the questionnaire were identical apart from the valuation section. Each questionnaire began with a series of questions designed to obtain information about respondents' perception and attitudes towards My Son. Other questions examined how frequently respondents visited My Son, and how interesting they found the My Son visit to be. Respondents were also asked whether they want to visit My Son some time in the future.

All respondents were presented the My Son preservation scenario which consists of a clear description of My Son through text, maps, and photos. The purpose of this text is to provide each respondent with the same set of information about the characteristics and the current condition of My Son. First the *status quo* scenario is presented, in which the deterioration of the site continues due to insufficient resources for preservation. Then, the proposed preservation plan is presented. The plan will improve the condition of My Son from its current state, and preserve the site for the future. Thus, the impact of the preservation plan on My Son is "the good" the respondents are asked to value.

Two payment vehicles were used. For visitors to My Son (foreign and Vietnamese visitors to My Son), a special fee in terms of an increase in the entrance fee was used. For non-visitors (Vietnamese visitors to the area and local residents), a tax was used. Both these payment vehicles are mandatory, and give respondents the incentive to truthfully state their preferences for preserving My Son (as opposed to voluntary contributions). Since the standard referendum type question would not be a meaningful elicitation method to foreign visitors as they are non-residents, they were asked whether they would still visit My Son if the entrance fee would increase by the stated amount. This way of asking reminds foreign visitors that they have

substitute sites they might go to, and forces them to think whether My Son would still be worth visiting if the entrance fee was increased by such amount. The bid amounts were stated in US$ with four bid levels of $1, $5, $10, and $15. For the three Vietnamese groups, the bid amounts were stated in Vietnamese currency, and were VND5,000[1] (US$0.31); VND20,000 (US$1.25); VND50,000 (US$3.13); and VND100,000 (US$6.25).

After the valuation section, debriefing questions were asked in order to identify the motivation underlying respondents' positive WTP or refusal to pay. Socio-economic data such as sex; age; education; employment status; and income were also collected, and subsequently used in the econometric analysis.

3. Results and discussions

3.1 Socio-demographic characteristics, knowledge and attitudes of respondents

Table 2 describes some socio-demographic characteristics of respondents. It can be noted that fewer females were interviewed in the three visitor groups. This could be explained by the fact that during field interviews, there were some couples where the task of answering questions was delegated to their husbands. Further, the rate of non-participation and incomplete interviews for females is higher than for male respondents.

Table 2 shows that the respondents in the three visitor surveys are relatively young, mean annual household income of foreign visitors is much higher than for Vietnamese respondents and the lowest group is local residents. The education level of local residents is also much lower than that of visitors. Across three groups of visitors, about 40% of visitors traveled alone. Because trip costs can be influenced by the number of family members and the payment vehicle was per adult entrance fee, the variable *Alone* was introduced.

[1] US$1 = VND16,000.

Table 2. Socio-demographic characteristics

	Foreign visitors to My Son	**Vietnamese visitors to My Son**	**Vietnamese visitors to the area**	**Local residents**
	Mean (Std.)	*Mean (Std.)*	*Mean (Std.)*	*Mean (Std.)*
Sex[a]	0.46 (0.50)	0.37 (0.48)	0.38 (0.49)	0.51 (0.50)
Age	33.41 (10.91)	37.26 (12.13)	38.63 (12.39)	43.18 (11.09)
Income (US$)	57,075 (40,834)	-	-	-
Income (VND)	-	1.77 (0.70)	1.52 (0.65)	0.81 (0.65)
Education	3.63 (0.87)	3.64 (0.84)	3.41 (0.76)	2.07 (0.88)
Alone	0.44 (0.50)	0.42 (0.49)	0.40 (0.49)	-
Child	-	-	-	0.34 (0.48)
No. of respondents	243	245	238	241

Notes: [a] Sex = 1 for female, 0 for male. Age = age of respondents (years). Income (US$): household yearly income of foreigners. Income (VND million): household monthly income of Vietnamese respondents. Education: 1 = primary; 2 = secondary; 3 = high school; 4 = college; and 5 = graduate. Alone = 1 if the visitor is traveling alone, 0 otherwise. Child = 1 if the household has a child, 0 otherwise.

Table 3. Socio-demographic characteristics of local resident sample and Quangnam province

Variables	**Local residents**	**Quangnam average**
Gender (% female)	0.51	0.52
Age group (≥18 years, %)		
18-39	0.38	0.58
40-59	0.50	0.33
60 or over	0.11	0.10
Attending school (%)	0.08	0.07
Unemployment (%)	0.02	0.03
Household monthly income (VND million)	0.81	1.11
Urban (% of household living in urban areas)	0.17	0.16

Source: The Statistical Yearbook of Quangnam province 2004 and own calculations

Since there is no data on these socio-demographic variables in the visitor statistics, we cannot test the representativeness of the visitor samples. For the local residents we find that variables of the sample such as gender, attending school, unemployment and percentage of surveyed households living in urban areas are not significantly different from the Quangnam province, see Table 3. However, respondents' age is higher, and respondents' income is lower than the average population.

Table 4 shows the mean values and standard deviations of respondents' knowledge and attitudes.

Table 4. Respondents' knowledge and attitudes

Variable	**Foreign visitors to My Son**	**Vietnamese visitors to My Son**	**Vietnamese visitors to the area**	**Local residents**
	Mean (Std)	*Mean (Std)*	*Mean (Std)*	*Mean (Std)*
Know[a]	1.82 (0.65)	2.78 (1.04)	2.14 (1.12)	2.36 (0.97)
Importance	0.67 (0.47)	0.73 (0.45)	0.69 (0.46)	0.60 (0.49)
Hcity	0.41 (0.49)	-	-	-
Hue	0.60 (0.49)	0.79 (0.41)	0.90 (0.30)	0.27 (0.44)
Hoian	0.90 (0.30)	0.83 (0.38)	0.50 (0.50)	0.58 (0.50)
Visit	-	0.15 (0.36)	0.15 (0.36)	0.16 (0.37)
Satisfied	0.68 (0.47)	0.81 (0.39)	-	-
Ftrip	0.29 (0.45)	0.65 (0.49)	0.56 (0.50)	0.74 (0.44)
Before	0.36 (0.48)	0.26 (0.44)	-	-
No. of respondents	243	245	238	241

Note: [a] Know is respondent's knowledge of My Son before visited the site, scale from 1 to 5, where 1 = nothing and 5 = very much. Importance = 1 if respondents regard the importance for preserving WHSs in Vietnam, 0 otherwise. Hcity = 1 if respondents select historical cities as the first reason for the visit to Vietnam, 0 otherwise. Hue = 1 if respondents had visited Hue before, 0 otherwise. Hoian = 1 if respondents had visited Hoian before, 0 otherwise.

Visit = 1 if respondents had visited My Son before and 0 otherwise. Satisfied = 1 if respondents satisfied with their experience of visiting My Son, 0 otherwise. Ftrip = 1 if respondents consider visiting My Son again sometime in the future, 0 otherwise. Before = 1 if respondents were interviewed before visiting My Son and 0 otherwise.

Overall, previous knowledge of My Son was very low. For foreign visitors, most respondents knew 'nothing' or 'only a little' about My Son before they visited it. For Vietnamese respondents, most of them knew 'only a little' or 'fair amount' about My Son. Across the four groups, about 60-70% of respondents were aware of the existence of WHSs in Vietnam. For foreign visitors, 41% of respondents selected historical cities as the first reason to visit Vietnam. Percentages of respondents who had previously visited Hue vary a lot. Similarly, percentages of respondents who had previously visited Hoian are different among the four groups. Across the three Vietnamese groups, about 15% of respondents had visited My Son before, while most foreign visitors in the survey visited My Son for the first time. For visitors to My Son, 68% of the foreign visitors were satisfied with their visit, while 81% of Vietnamese visitors were so. Percentages of respondents who wish to visit My Son again differ greatly among groups. Referring to visitors to My Son, 36% and 26% were interviewed before they visited My Son for foreign and Vietnamese visitors, respectively.

3.2 Determinants of the WTP

To examine the construct validity of the CV results, valuation functions are estimated. The dependent variable is the discrete yes/no-response to the WTP question. The explanatory variables are the bid amount the respondent was asked, the respondent's socioeconomic characteristics, knowledge and attitude variables. Four binary logit models, one for each group of respondents, are estimated and reported in table 5.

The coefficients of *bids* in all valuation functions are statistically significant and negative implying that the probability of a yes-response decreases as the bid increases, which is consistent with economic theory.

Table 5. Estimated parameters of the logit models

Variables	Foreign visitors to My Son	Vietnamese visitors to My Son	Vietnamese visitors to the area	Local residents
Coefficient (p-value)				
Constant	-1.14 (.108)	-3.63 (.000)	0.292 (.384)	-11.25 (.000)
Bids	-1.77 (.000)	-0.02 (.000)	-0.031 (.000)	-0.06 (.000)
Sex	0.001 (.570)	0.0002 (.909)	0.002 (.158)	-0.005 (.751)
Age	-0.004 (.804)	-0.001 (.557)	-0.001 (.276)	-0.009 (.848)
Income	0.002 (.007)	0.001 (.554)	0.0004 (.721)	4.69 (.000)
Ugo	1.45 (.001)	0.57 (.094)	2.292 (.000)	2.40 (.040)
Know	-0.05 (.905)	0.61 (.185)	0.001 (.342)	0.56 (.420)
Hcity	1.19 (.005)	-	-	-
Visit	-	-0.42 (.353)	-0.002 (.829)	1.65 (.051)
Importance	0.75 (.079)	0.02 (.000)	-0.699 (.009)	1.32 (.043)
Ftrip	1.97 (.000)	2.30 (.000)	0.694 (.010)	0.18 (.809)
Satisfied	2.19 (.000)	2.24 (.001)	-	-
Before	-1.69 (.001)	0.65 (.130)	-	-
Summary statistics				
Log-likelihood	-87.88	-133.57	-101.25	-55.57
Pseudo-R^2	0.48	0.32	0.38	0.65
Chi squared	160.99	106.89	126.01	250.89
Number of obs.	243	245	237	233

For foreign visitors, many variables in the model have expected signs and are significant. The probability of a yes-response increases for a respondent that has higher income (*Income),* has attended college (*Ugo*), wants to visit historical cities (*Hcity*), is *satisfied* with his or her visit,

and wants to return to My Son (*Ftrip*). The probability of a yes-response decreases if the respondent is being asked about the preservation plan *before* visiting My Son. Thus, having experienced the site increases the probability of paying.

For Vietnamese visitors to My Son, the importance they attach to preserving WHSs in Vietnam (*Importance*); how satisfied they are with experience of visiting My Son (*Satisfied*); and if they consider returning to My Son in the future (*Ftrip*) all have an expected positive and significant effect on the probability of a yes-response. Having attended college (*Ugo*) has a positive and significant (at 10% level) effect on the probability of accepting a yes-response.

Among the Vietnamese visitors that did not visit My Son at the time of the survey, having attended college (*Ugo*), considering preserving the WHSs in Vietnam as important (*Importance*), and planning to visit My Son in the future (*Ftrip*) all have a significant, positive effect on the probability of a yes-response, as expected.

For local residents, having high income (*Income*); attended college (*Ugo*); visited My Son before (*Visit*); and regarded preserving the WHSs in Vietnam as important (*Importance*) all have expected signs and significantly increase the probability of accepting a yes-response.

3.3 WTP estimates

Overall, the percentages of yes-response to the WTP question are 51.0%; 42.4%; 49.2%; and 45.2% for foreign visitors; Vietnamese visitors to My Son; Vietnamese visitors to the area; and local residents, respectively. Respondents with no-response to the WTP question were also asked to state their reasons for doing so. Table 6 documents the motives for respondents' refusal to pay.

A no-response could be consistent with economic behavior, indicating that the respondent derived no benefits from preserving My Son or faced income constraints. Alternatively, a no-

response could be due to a respondent's rejection of some aspects of the CV scenario or engaging in free rider behavior. Motivations for not being willing to pay are classified as valid reasons and protest responses (or scenario rejecters, SR).

Table 6. Reason for not willing to pay

Respondent's reasons for non-willing to pay	Foreign visitors to My Son	Vietnamese visitors to My Son	Vietnamese visitors to the area	Local residents
1. I have no spare income*	8 (6.7)	34 (24.1)	25 (20.7)	41 (31.1)
2. I think the cost is too high*	67 (56.3)	34 (24.1)	41 (33.9)	20 (15.2)
3. If an acceptable method of paying is found	6 (5.0)	19 (13.5)	11 (9.1)	4 (3.0)
4. I would pay if other people agree to pay	2 (1.7)	13 (9.2)	4 (3.3)	25 (18.9)
5. I would pay if payment period is extended	0	3 (2.1)	2 (1.7)	8 (6.1)
6. There are other sites that I prefer to visit	2 (1.7)	3 (2.1)	1 (0.8)	0
7. The preservation of My Son is unimportant	0	2 (1.4)	1 (0.8)	1 (0.8)
8. Not believe paying will solve the problem	3 (2.5)	3 (2.1)	0	1 (0.8)
9. It is the government's responsibility	20 (16.8)	10 (7.1)	14 (11.6)	16 (12.1)
10. I do not trust the institutions	3 (2.5)	5 (3.5)	1 (0.8)	2 (1.5)
11. I oppose the plan regardless of costs	0	1 (0.7)	0	0
12. Other reasons	6 (5.0)	9 (6.4)	19 (15.7)	6 (4.5)
13. Don't know/ Not sure	2 (1.7)	5 (3.5)	2 (1.7)	8 (6.1)
Total respondents not WTP	119	141	121	132

*Note: Categories with * are classified as valid reasons; Numbers in brackets are percentage.*

The next section presents mean WTP estimates for both including SR and excluding SR for each group of respondents. Table 7 presents the parametric estimates of the mean WTP for each group of respondents. The mean WTPs are computed using the sample means of all variables in the logit models. The confidence intervals (C.I) for the parametric estimates are obtained by using the Delta method (Greene 2000).

Table 7. Mean WTP estimates (US$)

	Foreign visitors to My Son	**Vietnamese visitors to My Son**	**Vietnamese visitors to the area**	**Local residents**
SR included	8.78	2.27	2.70	2.17
	[7.53-10.02]	[1.47-3.08]	[2.00-3.39]	[0.74-3.59]
SR excluded	9.95	3.66	3.31	3.86
	[8.70-11.19]	[2.86-4.47]	[2.61-4.00]	[2.43-5.29]

Note: Numbers in [] are 95% C.I.

Mean WTP estimates vary among four groups of respondents. For visitors to My Son, foreign visitors would be willing to pay much more than Vietnamese visitors, i.e. $8.78 and $2.27 for foreign visitors and Vietnamese visitors with SR included, respectively. This result is consistent with a general pattern found in the literature, e.g. Mourato et al. (2004); Navrud et al. (2005) and economic theory as well (i.e. foreign visitors earn higher income and spend more for the visit to My Son than Vietnamese visitors do).

It is interesting to observe that Vietnamese visitors to My Son (visitors) are willing to pay less than Vietnamese visitors to the area (non-visitors), i.e. $2.27 and $2.70 for visitors and non-visitors with SR included, respectively. However, this difference is not significant at 95% C.I.

Including SR in the WTP analysis, which means treating no-response as zero instead of non-zero (and removed from the analysis as in the case of SR excluded), the WTP estimates are lower for all groups of respondents (table 7). On average, the WTP estimates with SR are 44% lower than without SR. In the following sections we will use the results from the sample where SRs are included. This will provide a conservative estimate of the benefits.

3.4 Aggregation of WTP estimates

Table 8 describes the aggregate WTP estimates for each group of respondents.

Table 8. Unadjusted aggregate WTP estimates

Groups of respondent	Foreign visitors to My Son	Vietnamese Visitors to My Son	Vietnamese visitors to the area	Local residents
Mean (US$)	8.78	2.27	2.70	2.17
	[7.53-10.02]	[1.47-3.08]	[2.00-3.39]	[0.74-3.59]
Number of visitors	86,461	30,527	1,283,200	-
Number of households	-	-	-	330,534
	759,128	69,329	3,458,991	715,949
Aggregate WTP (US$)	[651,051-866,339]	[44,754-93,923]	[2,568,821-4,348,353]	[244,055-1,187,363]
Total	5,003,396 [3,508,681-6,496,251]			

Note: Numbers in [] are 95% confidence intervals.

For foreign visitors to My Son, the CV question asked a one-time payment rather than annual payments. The issue is mainly to emphasize the idea that the preservation plan is a one-time project, i.e. the temples could not be restored repeatedly over time. Therefore, in order to calculate the annual benefits over a period of time, the issue of repeat visits should be noted. Nevertheless, results of the survey of foreign visitors show that most of foreigners visited My Son just once (241 out of 243 foreigners visited My Son for the first time). Thus, in this particular case, an aggregate estimate of the annual benefits can be obtained by multiplying the mean WTP by the number of foreign visitors to My Son (assuming that all foreigners visited My Son just once in their lifetime). According to the Management Board of My Son Relics, the number of adult foreign visitors to My Son in 2005 is 86,461. This yields an estimate of $759,128.

Vietnamese visitors to My Son were also asked for a one-time payment, and here also we need to take into consideration the issue of repeat visits when calculating annual benefits. Results of the survey with Vietnamese visitors to My Son show that 15% of them have visited

My Son before, thus we could assume that 85% of these visitors should be used in calculation of the annual benefits. This ad hoc adjustment provides a conservative estimate of the annual benefits for preserving My Son.

There are 30,527 adult Vietnamese visitors to My Son in 2005. With the above assumption, the adjusted number of Vietnamese visitors to My Son is 25,948, as seen in table 9. This gives an estimate of $58,930.

Table 9: Ad hoc adjustments of aggregate WTP estimates (adjustments in bold)

Groups of respondent	**Foreign visitors to My Son**	**Vietnamese Visitors to My Son**	**Vietnamese visitors to the area**	**Local residents**
Adjusted mean (US$)	8.78	2.27	**2.27**	2.17
Adjusted no. of visitors	86,461	**25,948**	1,283,200	-
Number of households	-	-	-	330,534
Aggregate WTP (US$)	759,128 [651,051-866,339]	58,930 [38,041-79,835]	2,914,236 [1,881,220-3,948,059]	715,949 [244,055-1,187,363]
Total	4,448,242 [2,814,366-6,081,869]			

Note: Numbers in [] are 95% C.I.

With Vietnamese visitors to the area, the study attempts to measure the potential benefits to Vietnamese visitors to the area that did not visit My Son during their current trips. Three major tourist destinations in the area close to My Son are Hue, Danang, and Hoian. According to departments of tourism in these provinces, the number of domestic visits to Hue; Danang; and Hoian in 2005 is 703,050; 510,702 and 649,567, respectively. There is currently no available data showing the percentage of Vietnamese visitors who make multiple visits among Hue; Danang and Hoian. As in the survey of 238 individuals taking place in Hue and Hoian (mostly in Hue), 50% of the visitors to Hue also visited Hoian. Assuming that 50% of the

visitors to Danang neither visited Hue nor Hoian and 50% of visitors to Hoian neither visited Hue nor Danang, this adds up a total of 1,283,200 visitors (i.e. 703,050 visitors to Hue, 255,351 visitors to Danang, and 324,799 visitors to Hoian) to the area in 2005.

In addition, because the WTP of Vietnamese visitors to the area but not My Son (i.e. non-visitors with mean WTP of $2.70) is higher than that of Vietnamese visitors to My Son (i.e. visitors with mean WTP of $2.27), but not significantly different, we conservatively assume that these non-visitors would pay the same as visitors (i.e. the mean WTP of Vietnamese visitors to the area is also $2.27). The aggregate WTP of Vietnamese visitors to the area is then $2,914,236.

For Vietnamese visitors to the area who did not visit My Son, there are two more possibilities to be considered. The first one is the total number of Vietnamese visitors to the Central of Vietnam, which is about 3 millions. The second possibility is the total number of Vietnamese visitors travel within Vietnam that not visit My Son during their current trip, which amounts to 16 millions in 2005. These visitors would likely hold some non-zero WTP for preserving My Son. Since the sample of Vietnamese visitors to the area did not include those visitors, our estimate provides a conservative estimate for non-visitors benefits.

For local residents, an aggregate estimate of the benefits can be obtained by multiplying the mean WTP by the number of households in Quangnam province. According to the Statistical Yearbook of Quangnam province, the number of households in Quangnam in 2005 is 330,534. This yields an estimate of $715,949.

Since the sample of local residents did not extend to households beyond the Quangnam province, we have omitted other households living in Vietnam (i.e. about 20 million households). In theory, the preservation benefits of My Son could accrue to any household in

Vietnam. The fact that My Son is a well-known attraction in Vietnam implies that other households in Vietnam would likely to have a positive WTP for preserving My Son. Excluding these households from the aggregation should give a lower estimate for non-visitors benefits.

For non-visitors, it is important to determine the number of years over which individual WTP should be aggregated. The aggregate WTP over more than one year would likely overestimate the benefits. Thus, this study uses only the first year's aggregate for these two groups. The conservative aggregate WTP for all groups in the first year (i.e. 2005), with ad hoc adjustments, is then about $4.5 million (see table 9). Note that if the rest of the Vietnamese households (20 million) were willing to pay only $0.22 per household as a one-time amount, we would double this estimate. We cannot exclude this possibility, but since we have no empirical evidence to support it we will conservatively assume they have zero WTP.

4. Policy implications

4.1 Revenues from visitors

With the current entrance fee of $4 for foreign visitors and $1.89 for Vietnamese visitors, the number of visitors to My Son in 2005 is 86,461 foreigners and 30,527 Vietnamese. This yields revenue of $403,540 ($345,844 for foreign visitors and $57,696 for Vietnamese visitors). This figure would increase if the numbers of visitors to My Son increased[2].

For foreign visitors, the expected visitation rate and revenues at different entrance fees are reported in table 10. With an existing entrance fee of $4, 86,461 foreigners visited My Son in 2005. As the entrance fee increases, the percentage of those willing to visit decreases, as

[2] The average rate of growth of visitors to My Son in the period of 1997-2005 is 24.32% per year for foreign visitors and 41.50% per year for Vietnamese visitors, see Tuan (2006).

expected. However, the percentage decrease in visitation is less than the percentage increase in the entrance fee, thus the expected revenue increases and maximizes at about $14. In other words, within this range, the demand for visiting My Son is inelastic. As the entrance fee exceeds $14, the demand is elastic and the expected revenue begins to decrease.

Table 10. Expected revenue at different entrance fees (optimal in bold)

Foreign visitors			**Vietnamese visitors**		
Entrance fee (US$)	% visitors	Expected revenue (US$)	Entrance fee (US$)	% visitors	Expected revenue (US$)
4	100	345,844	**1.89**	**100**	**57,598**
5	78	338,639	2.20	69	46,605
9	69	535,775	3.14	51	48,785
14	**46**	**555,618**	5.03	30	45,323
19	11	188,513	8.18	20	49,100

Note that this increase in entrance fees to maximize revenue would create side effects. This study shows that if entrance fees exceed $14, the number of visitors would drop 54% compared to current numbers (for those their WTP is less than the entrance charges). This would have an impact on the economy as the whole, dependent on whether these people would visit other sites instead.

Table 10 also shows the expected visitation rate and revenue at different entrance fees for Vietnamese visitors to My Son. As the entrance fee increases, both the visitation rate and revenue decrease. The expected revenue is maximized at the current entrance fee of $1.89. In other words, within the bid ranges, the demand of foreign visitors for visiting My Son is inelastic, while for domestic visitors the demand is elastic. This is consistent with results from similar type studies of national parks and eco-tourism, see e.g. Navrud and Mungatana (1994); Chase *et al*. (1998).

It is interesting to see that the expected revenue for foreign visitors is maximized at $14, which is 1.61 times higher than the current entrance fee, while the expected revenue of Vietnamese visitors is maximized at the current fee ($1.89). This suggests that in designing the pricing policy, more emphasis should be placed on foreign visitors rather than on Vietnamese visitors.

According to table 10, if optimal entrance fees that maximize revenues were imposed, substantial annual revenues could be captured to finance the required preservation investments. For example, if the optimal entrance fees of $14 for foreign visitors and $1.89 for Vietnamese visitors were imposed, the generated revenues would be $613,216 ($555,618 for foreign and $57,598 for Vietnamese visitors). This would be 52% higher than the current fee revenues. This policy recommendation would also reduce congestion[3] at My Son by reducing the number of foreign visitors by 54%. For Vietnamese visitors, however, there is no decline in the visitation rate at the optimal entrance fee. Thus, overall, imposing the optimal charge for the Vietnamese visitors would not reduce the problem of congestion.

In order to deal with the congestion problem at My Son due to Vietnamese visitors, we discuss some possible solutions in the following section. In the long term one solution might be to enhance infrastructures and services at the site. Another solution is to limit the number of visitors to the site. However, this might exclude individuals with high values for visiting the site while including those attaching low values to these public goods. Other option is to use price to limit access. As discussed above, the increase in price reduces both the visitation

[3] During the peak hour (from 11a.m to 1p.m), there is occasional congestion at My Son. Especially, in the summer - the high season of Vietnamese visitors, the congestion problem is occurred more often. With the current growth of visitors, this will be a big problem in the near future, unless there is a great improvement in infrastructure and services at the site.

rate and revenue. Thus, this is an inefficient solution to Vietnamese visitors. There is room for a pricing structure that has higher price at specific times in the high season and lower price during the low season to avoid all domestic tourism taking place e.g. in the summer, and spreading the visits more evenly across the year.

The current fee policies relating to cultural heritage sites in Vietnam is not properly based on the individual preferences of tourists (i.e. demand) or on supply in tourism market; nor is it properly designed to maximize revenues or restrict tourism demand to meet the environmental carrying capacity of endangered sites. There is also a tendency to apply a more uniform pricing policy for foreign and Vietnamese visitors to sites in Vietnam. For example, the entrance fee for visiting My Son before 2004 was VND50,000 and VND10,000 for foreign and Vietnamese visitors, respectively, which have now increased to VND60,000 (US$4) and VND30,000 (US$2). Thus, from entrance fees being 5 times higher for foreigners, this has now been reduced to twice as high. This pricing policy is generally imposed on an uninformed basis. Based on the calculated consumer surplus (and total WTP), our results suggest that an even larger price differentiation would increase both revenues and facilitate preservation, due to more money for preservation and reduced damage to the site from reduced congestion. This could possibly also secure social equity, see Laarman and Gregersen (1996) and Lindberg (1991) for details.

4.2 Cost-benefit analysis

For non-visitors, mean WTP estimates are $2.27 and $2.17 for Vietnamese visitors to the area and local residents, respectively. The payment vehicle used for these two groups is a one-time tax. Thus, the WTP aggregated over the number of Vietnamese visitors to the area and the local residents is also the present value of the benefits to these groups. The one-year aggregate

WTP estimate of non-visitors is $3,630,185 ($2,914,236 for Vietnamese visitors to the area and $715,949 for local residents). These benefits are 4.44 time higher than those received by visitors to My Son ($759,128 from foreign visitors and $58,930 from Vietnamese visitors).

The total costs of the My Son preservation[4] amount to $12.89 million. The annual revenue from visitors to My Son under the current entrance fee regime is $403,442. According to the Management Board of My Son Relics, 50% of this revenue is spent on annual operating costs. If the remaining 50% of this revenue ($201,721) was used for preserving My Son, it would take 64 years[5] to collect revenues from visitors to cover the costs of preservation. If the optimal entrance fee regime was imposed, it would take 42 years to collect the preservation costs. The aggregate WTP of benefits for all groups of respondents in 2005 was $4,448,242. This constitutes 35% of the total preservation costs. If all of these benefits were collected in the first year, and then revenues collected annually from visitors to My Son, it would take 20 years[6] to cover the preservation costs. This suggests that if funding for My Son were to be based on benefits generated from entrance fees alone, this would lead to a level of preservation for My Son that would not be optimal for the site or best for society. Since non-visitors to My Son have shown that they place significant value on the preservation, the

[4] This is a conservation plan proposed by the Vietnamese government in collaboration with international agencies. The total cost of this preservation plan is VND196 billion over a period of time from 2004 to 2015. The exchange rate in 2004 was US$1=VND15,208, which is equivalent to US$12.89 million (DHM 2004).

[5] Assume that the increase in the annual operating costs over time is equal to revenue increase from the increase of visitors to My Son.

[6] In addition to the assumption that the increase of visitors (the growth rate) generates revenues to cover the increase in the annual operating costs; the growth rate of visitors also compensates for the rate of repeat visits to My Son.

results from this study can be used to justify current costs of the preservation and also to argue for increased preservation investment.

The calculations above are based on simply comparing the social costs of preservation to the potential social benefits for My Son over time with no discounting. In the next section, we conduct a CBA, and show how the outcome can be influenced by different time frames and social discount rates.

As we assume that the My Son heritage is preserved for future generations, we assume that the time horizon of the preservation project is infinity, ∞. The net present value (*NPV*) is calculated as

$$NPV = -C_0 + B_{locals} + B_{non-mysonvisitors} + \frac{B_{domesticvisitors}}{r} + \frac{B_{foreignvisitors}}{r} + \frac{NR}{r} \qquad (4),$$

where C_0 is the total costs of the conservation project which equals to $12.89 million. Since we have no details of how the costs would be spent, we assume that this is an initial investment cost[7] and occur immediately ($t = 0$).

B_{locals} refers to the one-time amount ($t = 0$) or the present value of the benefits accrued from local resident households in Quangnam province, is $715,949 as calculated above.

$B_{non\text{-}mysonvisitors}$ represents the one-time amount ($t = 0$) or the present value of the benefits derived from the Vietnamese visitors visiting the area who do not visit My Son during their current trip, which is equal to $2,914,236.

$\frac{B_{domesticvisitors}}{r}$ is interpreted as the present value over an infinite time horizon ($t \rightarrow \infty$) of the Vietnamese visitors to My Son. $B_{domesticvisitor}$ is an annual benefit that continues infinitely, r is

[7] This assumption will overestimate the costs.

the social discount rate. The annual benefit of the Vietnamese visitors to My Son, as calculated above, is $58,930.

$\frac{B_{foreignvisitors}}{r}$ is the present value of benefits to the foreign visitors to My Son over infinity (t -> ∞). $B_{foreignvisitors}$ is the annual benefit to the foreign visitors to My Son and equals to $759,128.

$\frac{NR}{r}$ refers to the present value of a perpetuity ($t = \infty$) of net revenue. Net revenue (NR) is an annual benefit, which is generated from the current entrance fees after 50% is spent on annual operating costs. As calculated earlier, NR is $201,721.

We use a 6%[8] social discount rate in the CBA of this project, but also carry out sensitivity analyses with 4% and 10%. The benefit-cost ratio (*BC* ratio) and internal rate of return (*IRR*) will also be calculated.

Table 11 presents *NPV*s, *BC* ratios and *IRR*s for the My Son preservation project. The *NPV*s under different discount rates range from $0.9 million to $16.2 million, the *BC* ratios from 1.07 to 2.26 and the *IRR* is 11%. This suggests that the preservation project is economically viable.

[8] The World Bank sometimes uses a 10% discount rate for their investments. Thus we will check for this option.

[9] This means that we are now assuming that the current preservation investment lasts only 20 years (before a new preservation investment project will be implemented).

[10] In calculating we apply the equation (4) with keeping $C_{0;}$ B_{locals}; $B_{non\text{-}mysonvisitors}$ the same as before, and modifying the last three components by the following formula $\sum_{t=0}^{19} \frac{B_t}{(1+r)^t}$.

Table 11. Results of the CBA with an infinite time horizon

Time horizon		Infinity	
Discount rates (*%*)	4	6	10
Net Present Value (*NPV, US$*)	16,236,687	7,738,535	940,014
Benefit Cost ratio (*BC ratio*)	2.26	1.60	1.07
IRR (%)		11	

Table 12. Results of the CBA with the time horizon of 20 years

Time horizon		20 years	
Discount rates (*%*)	4	6	10
Net Present Value (*NPV, US$*)	5,155,715	3,140,814	292,373
Benefit Cost ratio (*BC ratio*)	1.40	1.24	1.02
IRR (%)		10.5	

We then assume that the preservation project will last 20 years[9] ($t = 20$), the same social discount rates are used. Table 12 presents results of the CBA[10]. The CBA results show that the *NPV*s under different discount rates are always positive; the *BC* ratios range from 1.02 to 1.40 and the *IRR* is 10.5%. This analysis suggests that the preservation for My Son is also feasible even with a shorter time horizon of the preservation project.

5. Conclusions

This study estimates the economic benefits that would be created by a proposed preservation program to preserve and restore the My Son cultural heritage site in Vietnam. The study then discusses policy implications for revenue collection and CBA.

Results show that the adoption of the optimal price regime would both increase revenues and reduce congestion at the site. However, this pricing regime would not reduce the congestion

problem due to Vietnamese visitors. The idea of imposing a pricing structure with seasonal differentiations to reduce the number of Vietnamese visitors in the high season is feasible. Results also show that if the justification of investments were only based on entrance fees, then this would lead to a level of preservation for My Son that would not be optimal for the site nor for the society. The inclusion of benefits derived from non-visitors are needed to argue for increased preservation investment. The CBA results show that the preservation project for the My Son cultural heritage seems to be an economically viable proposition.

There is limited empirical evidence in Vietnam on the income elasticity of WTP in terms of increased fees and taxes. This indicates that additional studies need to be conducted to ensure an informed basis for the development of an optimal fee policy in pricing cultural heritages.

The lack of data on the tourist carrying capacity of My Son shows the need for future research to fill this information gap. More need to be known about the impact of additional visitors on this cultural resource if a truly sustainable pricing policy is to be developed.

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Paper 2

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ORIGINAL PAPER

Valuing cultural heritage in developing countries: comparing and pooling contingent valuation and choice modelling estimates

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Abstract A substantial part of the United Nation's World Heritage Sites (WHSs) can be found in developing countries, but many of them are in a bad state. Thus, there is a need to document the social benefits of these global goods in order to justify the costs of restoration and preservation programmes (RPPs). This study adds to the scarce literature on economic benefits of WHSs in developing countries, and reduces the need to perform very uncertain benefit transfers from European or US valuation studies. We apply Contingent Valuation (CV) and Choice Modelling (CM) to estimate the social benefits of RPPs for the My Son world cultural heritage site in Vietnam; both to foreign visitors and the local residents. We then compare the estimates from the CV and CM methods, and pool the results from the two methods. The results show that both CV and CM are suited to estimating the economic benefits of preserving cultural heritage of My Son. The two methods produce very similar results, which can be interpreted as a test of convergence validity. The pooling results give evidence to show that the CV and CM models have the same underlying preference structures. Thus, these valuation models can be successfully used in cost-benefit analyses to assess the benefits to cultural heritage of measures to reduce air pollution, soil erosion, climate change and other causes to deterioration of cultural heritage sites.

Keywords Choice modelling · Contingent valuation · Cultural heritage · Developing countries

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1 Introduction

A substantial part of the United Nation's World Heritage Sites (WHSs) can be found in developing countries. These sites attract an increasing number of tourists and income to these countries. Unfortunately, many of these WHSs are in bad state due to environmental and climatic impacts; war and tourism pressure, and there is an urgent need for restoration and preservation. Thus, there is also a need to document the social benefits of these WHSs—which are global public goods—in order to justify the costs of conserving them. However, very few valuation studies of WHSs in developing countries exist (Carson et al. 1997). This study adds to this scarce literature, and reduces the need to perform very uncertain benefit transfers of values from developed countries to value cultural heritage goods in developing countries. There are also very few valuation studies of cultural heritage goods worldwide; around 60 compared to many thousand environmental valuations studies (Navrud and Ready 2002; Noonan 2002, 2003; Pearce et al. 2002). The majority of valuation studies of cultural heritage are Contingent Valuation (CV) studies; and recently there have also been a few applications of the Choice Modelling (CM) approach.

The main aim of this study is to apply two different Stated Preference (SP) methods, CV and CM, to estimate the social benefits of restoration and preservation programmes (RPPs) for the WHS of My Son in Vietnam; both to foreign visitors and the local residents. We will compare the estimates from these two independent SP methods for the two groups of people, and pool the results from the two methods.

CV (Mitchell and Carson 1989; Bateman and Willis 1999) is a direct SP method where respondents are asked their willingness to pay (WTP) for the benefits received, or their willingness to accept compensation for their loss (WTA). Theoretically, the CV is based on welfare economics and assumes that stated WTP amounts are related to respondents' underlying preferences. The CV method has long been the target of criticism, focusing on issues such as insensitivity to scope of goods (Kahneman and Knetsch 1992; Diamond and Hausman 1994); while other authors and commentators have constructively provided a defence of the method (Hanemann 1994; Carson 1997). Especially, issues on anomalies or problems of the SP methods such as the WTA/WTP disparity; scale insensitivity; hypothetical market bias; information problems; preference uncertainty; preference reversals, which recently received much debate, see detailed discussions published in a special issue of *Environmental and Resource Economics* (Volume 32, Number 1, September 2005). The recent literature also provides coping strategies in dealing with such anomalies, e.g., discovered preference; preference-dependent preferences; market simulation; ex ante cheap talk; ex post calibration; institutional learning; repeated experience and choice heuristics (Sugden 2005; Hanley and Shogren 2005; Braga and Starmer 2005).

CM (Adamowicz et al. 1994, 1998, 1999; Boxall et al. 1996; Hanley et al. 1998b) is an indirect SP method that has its roots in conjoint analysis where individuals choose between multi-attribute goods. The CM method has emerged as an attractive approach as the multi-attribute framework proves to be particularly useful as a theoretical structure for economic valuation in the cultural heritage sector (Mazzanti

2003). However, a recent issue of *Environmental and Resource Economics* entitled ''Frontiers in Stated Preference Methods'' (Volume 34, No. 1, May 2006) addresses a number of issues related to the uncertainty of the CM method such as: constructing of contextual frame of the choice occasion (Harrison 2006; Shogren 2006); designing of choice sets and the structure of choice occasion (Hensher 2006); modelling of preference heterogeneity (Morey et al. 2006; Provencher and Moore 2006); and embracing model uncertainty (Layton and Lee 2006; Louviere 2006). Adamowicz and Deshazo (2006) argue, that the current literature also offers new tools for diagnosing and the remediation these problems.

Since both CV and CM share the common theoretical framework of a random utility model (RUM), comparing and pooling of CV and CM methods have received much attention. A number of comparative studies of CV and CM can be found in the literature (Boxall et al. 1996; Adamowicz et al. 1998; Hanley et al. 1998a; Stevens et al. 2000; Lehtonen et al. 2003; Bateman et al. 2006). Other studies have used data pooling to examine whether different elicitation methods reveal the same model of preferences (Adamowicz et al. 1994, 1998; Cameron et al. 2002; Hanley et al. 2003; Layton and Lee 2006). Those comparing and pooling studies have addressed a wide range of application in relation to environmental goods and services. However, to our knowledge, this is the first study that compares and pools CV and CM methods applied to cultural heritage goods. Thus, this study will shed light on whether CV and CM works equally well for other types of public goods than environmental goods.

My Son is located in Quang Nam province in the central Vietnam. This is a large complex of religious temples originally comprised of more than 70 temples, the vestiges of 25 of these temples remain today. In December 1999, My Son was recognized as a WHS by UNESCO. In the period of 1997–2005, the average annual growth rate of visitors to My Son was 24.3% and 41.5% for foreign and Vietnamese visitors, respectively. In 2005 My Son received a total of about 117,000 visitors (Tuan forthcoming). This cultural tourism is important to Vietnam as it helps to improve cultural exchanges and raise the living standards for the local people (Weitzel 2000). In spite of its benefits to society, this cultural heritage is severely threatened by degradation and loss (Kinh 2001; VNS 2003). There are some natural environmental causes that damage the site such as soil erosion, landslides, floods, and tropical climate. However, human activities are arguably the main causes of the degradation and destruction. These include wars, plain neglect, and tourism pressures. This unique site is now in a state of significant disrepair, and urgently requires conservation efforts (GHF 2002). This study measures the economic benefits that would be generated by a proposed preservation plan to restore and preserve My Son.

The study aims at measuring the economic benefits that accrue to the following agents: (i) adult foreign visitors to My Son, and (ii) local residents in Quang Nam province. My Son has long been known as a major tourist destination. Thus, a substantial fraction of the benefits of a conservation project accrues to foreign visitors (see also Carson et al. 1997). However, benefits also accrue to local residents from both use value,[1] option value (i.e. the value they get from knowing that the option to visit the site in the future exists), and non use values in terms of existence

[1] There is currently no data available showing the percentage of local residents that has visited the My Son cultural heritage. However, from a survey of 462 households, 17% of respondents had visited the site at least once in their lifetime (Tuan, forthcoming).

value (i.e. the value they place on knowing that the site exists for themselves and others in the current generation) and bequest value (i.e. the value of preserving the site for future generations) (Pagiola 1996; Navrud and Ready 2002).

The study is structured as follows. Section 2 presents the economic models for CV and CM. Section 3 describes the research design for CV and CM surveys of both foreign visitors and local residents; characteristics of the samples; and presents descriptive statistics. The results presented and discussed in Sect. 4, while Sect. 5 concludes.

2 Model specification

CV and CM can be analyzed using a common theoretical framework of the RUM (Boxall et al. 1996). Under the RUM framework, the overall utility of alternative i can be expressed as

$$Ui = V_i + \varepsilon_i, \tag{1}$$

where V_i is the deterministic component of utility and ε_i is a stochastic component that represents the unobservable influence on individual choice.

In the referendum CV method, a respondent is asked to choose between an improved state, i, and the status quo, j. Using the utility function for two alternatives from (1), the probabilities of an individual choosing alternative i or j are:

$$\begin{aligned} \Pr_i &= \Pr(\varepsilon_i - \varepsilon_j \leq V_j - V_i), \\ \Pr_j &= \Pr(\varepsilon_j - \varepsilon_i \leq V_i - V_j). \end{aligned} \tag{2}$$

Assuming that each error term is Type I Extreme Value distributed and the difference between random terms is logistically distributed, the probability that an individual choose alternative i is given by:

$$\Pr i = \frac{\exp(V_i - V_j)}{1 + \exp(V_i - V_j)} \tag{3}$$

This formulation can be estimated using the binary logit model (Hanemann 1984).

In the CM case, the choice of one option over another implies that the utility of that option (U_i) is greater than the utility of the other (U_j). The probability of choosing alternative i is:

$$\Pr(i) = \Pr\{V_i + \varepsilon_i \geq V_j + \varepsilon_j; \in C\}, \tag{4}$$

where C is the set of all possible alternatives. Assuming that the error terms are Gumbel-distributed with scale parameter μ, the probability of choosing alternative i is:

$$\Pr(i) = \frac{\exp^{\mu V_i}}{\sum_{j \in C} \exp^{\mu V_j}} \tag{5}$$

This formulation can be estimated using the conditional logit model (McFadden 1974) where the scale parameter, μ, is typically assumed to be one.

Since CV and CM models all share the common RUM, we can combine the two data sets and examine the relative scale factors, which accounts for the difference in the variation of the unobserved effects or error variance heterogeneity (Adamowicz et al. 1998). The joint data concatenates the two data sets. Grid search procedures (Swait and Louviere 1993) are used to estimate the relative scale factors. Swait and Louviere (1993) developed an approach that facilitates the testing of the hypothesis of equal parameters, and if this hypothesis cannot be rejected the hypothesis of equal scale parameters is tested. If the null hypothesis of equal scale parameters cannot be rejected, the two data sets can be considered to represent similar preference structures.

3 The research design

3.1 Design of CV questionnaires

This section presents the questionnaire used for the foreign visitors, and comment, where appropriate, on the differences between this and the questionnaire for local residents.

The CV questionnaire used for foreign visitors consisted of six sections. Section 1 contained information about general attitudes of foreign visitor's to Vietnam and My Son, such as reasons for visiting Vietnam and My Son, their knowledge of My Son before visiting, their travel experience in Vietnam, and their attitudes to My Son.

Section 2 contained the valuation scenario with a clear description of My Son in text, maps, and photos. The purpose of this text is to provide each respondent with the same set of information about the characteristics and current condition of My Son. Then, the proposed restoration and preservation plan is presented. The plan will improve the condition of My Son and preserve the site for the future, while in the *status quo* scenario the site will deteriorate. The respondents are told that if the plan is implemented, it will accomplish two things: (i) Stop any further degradation of the remaining temples, and avoid any further irreversible loss; and (ii) Ensure that these temples will continue to be cultural heritage for future generations. Appendix 1 reproduces the valuation scenario used in the survey.

Section 3 describes the payment vehicle, elicitation method, and bid amount. The questionnaire for foreign visitors asks for WTP for the specified plan in terms of a one-time special fee, as an increase in the entrance fee to My Son. For the local residents, a tax is used. Both these payment vehicles are mandatory (and not voluntary) to give respondents the incentive to truthfully state their preferences for preservation of My Son.

Since the referendum type question would not be meaningful for non-residents, we posed the WTP question to foreign visitors as:

1. Still visit My Son even though the entrance fee would add US$—per adult to the cost of your visit
   Or
2. Not to include My Son in your itinerary for this trip and use the money for other purposes.

It is worth noting that the WTP question posed to foreign visitors once they have already being in Vietnam. Thus, if we ask them how much they would be willing to pay to visit My Son, the question would put them in a 'fait accompli' situation that now they are at My Son they have no other substitute sites to visit but to pay whatever requested amounts. Instead, we attribute this to the fact that foreigners were asked to think back to the time they were planning their trip, rather than the point at which they had already arrived in Vietnam. We remind them that they have substitute sites that are already in their itinerary or could be in their itinerary. This forces them to think whether My Son would still be worth visiting if the entrance fee was increased by the stated amount. The bid amounts were stated in US$ with four price-points: $1, $5, $10, and $15. For the local residents, bid amounts were 5,000; 20,000; 50,000; and 100,000 VND.[2]

Section 4 included debriefing questions to identify the occurrence of embedding or strategic behaviour when answering the WTP questions. Section 5 collected socioeconomic data such as sex, age, education, employment status and income level. Section 6 contained evaluation questions to be filled in by the interviewer. They were designed to provide us with feedback from all interviewers about the interview situation, how attentive the respondent was during the interview and the difficulties the respondent may have had.

3.2 Design of CM questionnaires

Two different CM questionnaire formats were used for foreign visitors and local residents. The CM questionnaires also consisted of six sections. Section 1 contained information about general attitudes of the foreign visitors to Vietnam and My Son; Sect. 2 contained My Son's scenario; Sect. 3 contained the CM scenario and choices; Sect. 4 included debriefing questions; Sect. 5 contained questions on socioeconomic variables; and Sect. 6 contained evaluation questions to be answered by the interviewer. Thus, Sects. 1, 2, 5, and 6 of the CM are identical to those of the CV.

In the CM framework, the study focuses on identifying attributes of preservation for My Son that respondents think are important. More precisely, we try to estimate respondents' marginal WTP for different attributes of My Son's preservation. Four attributes are designed: Price (entrance fee is used for foreign visitors, and preservation fee via an increase in tax is used for local residents), proposed preservation plan, infrastructure upgrading, and additional services.

The attributes and attribute levels are developed using results from focus groups and pre-tests of the questionnaires. The description of the attributes and their levels are shown in Table 1.

Given the set of attributes and levels in Table 1, an experimental design is used to design paired choice sets. The full combinations of 32 (4×2^3) choice sets are produced. Four choice sets are removed from the design because each of them has a dominated alternative (that is, all conditions in the two choices were the same except for one 'better' condition in the alternative situation). The remaining 28 choice sets in turn are grouped into 4 versions of 7 choice sets each. This means that 4 different questionnaires for CM are used, and each respondent was repeatedly asked 7 choice questions.

[2] With the exchange rates of US$1 = 15,900 VND, the bid amounts equal to $0.31; $1.26; $3.14; and $6.29.

Table 1 Attributes and attribute levels in Choice Modelling (CM) questionnaires

Attributes	Description	Levels
Price	Entrance fee for the foreign visitor if the alternative is selected. The current entrance fee is US$4 (the status quo—SQ) and four alternative levels.	$4 (the SQ) $5, $9, $14, $19*
Preservation plan	From the current condition of preservation (the SQ) to the proposed preservation plan for My Son.	The SQ, The proposed plan
Upgrading of infrastructures	From the current condition of infrastructures (the SQ) to the proposed level of upgrading infrastructures: upgrading 30 km road to link My Son with the highway, building a new bridge and upgrading the drainage system at My Son.	The SQ, Upgrading infrastructures
Additional services	The existing basic services (the SQ), and multimedia audio-visual interactive services plus temporary exhibition in addition to the existing exhibition.	The SQ, Additional services

Notes: * For the local resident survey, preservation fee is used with the bid ranges of 5,000; 50,000; 100,000; and 200,000 VND. 1 US$ = 15.900 VND.

To obtain a fair comparison between CM and CV, the CM question is posed in the same framework as the CV question. An example of a choice set used for interviewing foreign visitors shown in Fig. 1.

3.3 The sample

Questionnaire versions went through several rounds of modifications and reviews by SP-practitioners, cultural researchers, and other concerned parties. The questionnaires were pre-tested by personal interviews of 180 individuals, i.e. 60 and 120 individuals for CV and CM, respectively. The final survey with a total of 930 in-person interviews took place during the summer of 2005.

Attributes	Current situation	Alternative situation
Entrance fee	$4	$5
Proposed Preservation plan	No	Yes
Upgrading infrastructures	Current condition	Current condition
Additional services	Existing services	Multimedia audio-visual services, temporary exhibition
Would you have made this trip to My Son if you had known that the alternative situation had been applied?	□	□
	Please select the option you prefer	

Fig. 1 Example of a choice set used for interviewing foreign visitors

For foreign visitors to My Son, the surveys were conducted both on-site, and on tourist buses to and from My Son from Hue and Hoi An.[3] The sample consists of 243 interviews for the CV survey and 225 interviews for the CM survey.

For local residents, the household surveys were administered in the Quang Nam province. The sample consists of 241 and 221 interviews for the CV and CM survey, respectively. To gather a provincially representative sample, the survey respondents were selected proportionally throughout 16 administration units (i.e. 14 districts and 2 towns) in the Quang Nam province. In each unit, 2 villages were selected, i.e. a total of 32 villages. For each selected village, 16 households were selected for interviewing using a designated-walk procedure.

Few of the respondents who were approached for an interview refused to participate. Among foreign visitors, however, there was a relatively high rate of refusals and incomplete questionnaires (about 20%) due to lack of time.

Table 2 shows the basic socio-demographic variables of the respondents, and lists the variables used in the econometric analyses.

4 Results and discussions

4.1 Contingent valuation results

Table 3 shows bid amounts and proportion of yes-answers for foreign visitors and local residents.

As expected, the proportions of yes-answers decrease as the bid amount increases.

To examine the construct validity of the CV results, valuation functions are estimated (Carson et al. 1997). The dependent variable takes the value 1 if a respondent's answer to the CV question is yes and 0 otherwise. The independent variables are listed in Table 2, and include the bid amount the respondent was asked, the respondent's income, socioeconomic and attitudinal (taste) variables. Two CV models are estimated using binary logit models with log of bid amounts (*logbids*). Results are reported in Table 4.

Both valuation functions achieve relatively good fits (Pseudo-R^2 is 0.46 for foreign visitors and 0.63 for local residents). The coefficients of *logbids* are l significant and negative implying that the probability of a 'yes' response decreases as the bid increases, which is consistent with economic theory.

For the foreign visitors, most of the variables in the models (*Income, Ugo, Hcity, Satisfied, Ftrip, Before*) have expected signs and are significant. The probability of a 'yes' increases for a respondent with higher income, having attended college. If respondents want to visit historical cities, or want to return to My Son they are more likely to answer ''yes''. The probability of saying ''yes'' to pay decreases if the respondent is being asked about the preservation plan *before* visiting My Son. Thus, having experienced the sites increases the probability of paying.

For the local residents, high income (*Income*) and having visited My Son before (*Visit*) have expected signs and significantly increase the probability of paying.

[3] Hue (i.e. the city located 170 km north of My Son) and Hoi An (i.e. the town located 60 km east of My Son). Hue and Hoi An are selected for this survey as they are two of the largest tourist destinations in Vietnam, and where most visitors stay during their trips to My Son.

Table 2 Socio-demographic characteristics and other variables used in the analyses

Variable	Description	Visitors Mean (Std.)	Residents Mean (Std.)
Sex	Sex (1 = female, 0 = male)	0.50 (0.50)	0 .51 (0.50)
Age	Age of respondents (years)	34.40 (12.04)	43.75 (11.14)
Income	Household yearly income of foreigners (US$)	60,115 (3,923)	–
	Household monthly income of local residents (VND million)	–	0.94 (0.79)
Education	1 = primary; 2 = secondary; 3 = high school; 4 = college; 5 = postgraduate	3.71 (0.66)	2.21 (0.60)
Ugo	Education—if respondent had attended college (1 = yes, 0 = no)	0.47 (0.49)	0.09 (0.26)
Htype	Type of house (1 = concrete materials, 0 = temporary materials)	–	0.82 (0.27)
Visit	If respondents had visited My Son before (1 = yes, 0 = no)	–	0.17 (0.29)
Hcity	If respondents wanted to visit historical cities (1 = yes, 0 = no)	0.34 (0.35)	–
Know	Previous knowledge about My Son (scale from 1 to 5, where 1 = nothing nd 5 = very much)	1.78 (0.43)	2.47 (0.69)
Satisfied	If the respondent was very satisfied with his visit to My Son (1 = yes, 0 = no)	0.40 (0.49)	–
Ftrip	Considering visiting My Son again in the future (1 = yes, 0 = no)	0.28 (0.32)	0.79 (0.41)
Before	If respondent is interviewed before visiting My Son (1 = yes, 0 = no)	0.36 (0.48)	–

Table 3 Bids and proportion of yes-answers in the Contingent Valuation (CV) survey

Visitors			Residents		
Bids (USD)	*N*	% yes	Bids ('000VND)	*N*	% yes
1	60	78.3	5	60	71.7
5	61	69.9	20	60	50.0
10	61	45.9	50	61	45.9
15	61	11.5	100	60	13.3
	243			241	

4.2 Choice modelling results

Three multinomial logit (ML) models are estimated using data from both foreign visitors and local residents. In the ML model, the utility function V_i represents the utility of the different options. The basic utility function takes the form:

$$V_i = \alpha + \sum \beta_k X_k \tag{11}$$

where α is an alternative specific constant (ASC), β_k is a coefficient, and X_k is a variable representing an attribute from a choice set. The complex utility function includes socioeconomic and attitudinal (taste) variables. It is impossible to include these variables directly into utility functions, as they are invariant across the alternatives in a choice set. Instead they have to be estimated interactively with the ASC

Table 4 Estimated parameters of the Contingent Valuation (CV) logit model

Variables	Visitors (*P*-value)	Residents (*P*-value)
Constant	–0.61 (0.337)	–7.42 (0.000)
Logbids	–1.74 (0.000)	–1.36 (0.000)
Sex	0.001 (0.568)	–0.002 (0.861)
Age	–0.004 (0.797)	–0.006 (0.720)
Income	0.002 (0.004)	4.37 (0.000)
Ugo	1.29 (0.002)	1.38 (0.132)
Htype	–	0.26 (0.928)
Visit	–	1.85 (0.019)
Hcity	1.05 (0.010)	–
Know	0.05 (0.906)	–0.002 (0.337)
Satisfied	2.14 (0.000)	–
Ftrip	2.14 (0.000)	0.18 (0.789)
Before	–1.70 (0.001)	–
Summary statistics		
Log-likelihood	–89.45	–61.82
Pseudo-R^2	0.47	0.63
χ^2	157.87	248.26
Number of obs.	243	241

or with other attributes (Swallow et al. 1994; Morrison et al. 1998). In this study, socioeconomic and taste variables are included as interactions with the ASC for alternative situation (non-status quo option). These interactions show the effect of a variety of socioeconomic and taste variables on the probability that a respondent will choose the alternative option.

$$V_i = \alpha + \sum \alpha S_h + \sum \beta_k X_k \tag{12}$$

where S_k represents socioeconomic or taste variables. The marginal WTP (implicit price) for a change in each attribute is calculated by $-\beta_k/\beta_M$, where β_k is the coefficient of the non-monetary attribute and β_M represents the monetary attribute coefficient.

Table 5 shows ML models[4] and marginal WTP of the foreign visitors.

Model 1 consists of the attributes only. The entrance fee (*Price*); the proposed preservation plan (*Preservation*); and the upgrading infrastructures (*Infrastructure*) attributes have expected sign and are significantly affected the utility of respondents. The negative coefficient of *Price*, means that the respondent's utility is lower for an option having a higher price. The positive coefficients of the *Preservation* and *Infrastructure* attributes suggest that the conservation of My Son and the improvement of its infrastructure increase the respondent's utility. The *Service* attribute is not significant in all models. This implies that improving the services does not seem to increase the utility of the respondents.

[4] Table 1a in the Appendix 2 reports results of random parameter logit (RPL) models for foreign visitors. RPL models account for parameters that vary in population, as opposed to being the same for each person in ML models. The advantage of the RPL model is that the heterogeneity in the sample can be captured by estimating the mean and variance of the random parameter distribution (Holmes and Adamowicz 2003). Results show that mean effect terms (i.e. the magnitude; the sign; and the significance) for each variable in the three RPL models are not much different from those in the ML models. S.D. terms for each attribute are insignificant in most cases.

Table 5 Results of the Choice Modelling (CM) multinomial logit (ML) models for foreign visitors

Variables	Model 1 (Attributes only)		Model 2 (Attributes and socioeconomic variables)		Model 3 (Attributes, socioeconomic and taste variables)	
	Coeff. (*P*-value)	MWTP (US$)	Coeff. (*P*-value)	MWTP (US$)	Coeff. (*P*-value)	MWTP (US$)
Constant	–0.91 (0.000)		–0.65 (0.100)		–0.95 (0.019)	
Price	–0.20 (0.000)		–0.21 (0.000)		–0.21 (0.000)	
Preservation	1.22 (0.000)	6.18	1.23 (0.000)	6.00	1.28 (0.000)	6.12
Infrastructure	0.30 (0.014)	1.53	0.33 (0.011)	1.59	0.33 (0.011)	1.59
Service	–0.07 (0.591)		–0.02 (0.897)		–0.05 (0.718)	
Sex	–		–0.20 (0.114)		–0.11 (0.395)	
Age	–		–0.24 (0.017)		–0.14 (0.023)	
Ugo	–		–0.17 (0.181)		–0.24 (0.074)	
Income	–		0.23 (0.002)		0.21 (0.004)	
Hcity	–		–		0.08 (0.549)	
Know	–		–		0.33 (0.011)	
Satisfied	–		–		0.94 (0.000)	
Ftrip	–		–		0.11 (0.452)	
Summary statistics						
Log-likelihood	–875.57		–794.75		–781.81	
χ^2	419.98		408.73		434.67	
Adjusted R^2	0.20		0.20		0.21	
Number of obs.	1,575 (0 skipped)		1,449 (0 skipped)		1,449 (0 skipped)	

Model 2 includes the socioeconomic variables. Among the covariates, Income is significant and positive. This means that respondents are more likely to support the preservation of My Son if they have higher income. *Age* is negative and significant, implying that younger respondents are more likely to support the preservation plan.

Model 3 includes the socioeconomic and taste variables. The four variables (*Hcity, Know, Satisfied*, and *Ftrip*) are all positive. The *Know* and *Satisfied* variables are significant. Consistent with expectations, these interactions show that respondents are more likely to support the preservation of My Son if they have more knowledge about it and are satisfied with their visit.

The overall models are significant at the 1% level and the explanatory powers are relatively high, with adjusted R^2 of about 0.20 across three models.

Estimates of implicit prices for each of the non-monetary attributes are reported. These estimates show that an adult foreign visitor is willing to pay an additional fee of about US$6 for a change from the status quo to the preservation plan, and about US$1.5 for upgrading infrastructures.

Table 6 describes ML models[5] and marginal WTP of the local residents.

In Model 1, all attributes have expected sign and are statistically significant, except the *Service* attribute. In Model 2, the *Income* and *Ugo* variables are all significant and have *a priori* expected signs. In Model 3, the *Know* and *Ftrip* variables significantly influence the utility of household.

[5] Table 1b in the Appendix 2 shows results of RPL models for local residents. It is worth noting that price is the only attribute that has SD terms strongly significant in all models. This can be interpreted as the preference of price is heterogeneous, while the preference of other attributes is homogenous in the population of local residents.

Table 6 Results of the Choice Modelling (CM) multinomial logit (ML) models for local residents

Variables	Model 1 (Attributes only)		Model 2 (Attributes and socioeconomic variables)		Model 3 (Attributes, socioeconomic and taste variables)	
	Coeff. (*P*-value)	MWTP ('000 VND)	Coeff. (*P*-value)	MWTP ('000 VND)	Coeff. (*P*-value)	MWTP ('000 VND)
Constant	–0.05 (0.797)		–1.91 (0.001)		–2.15 (0.000)	
Price	–0.02 (0.000)		–0.02 (0.000)		–0.02 (0.000)	
Preservation	0.71 (0.000)	34.09	0.71 (0.000)	31.93	0.73 (0.000)	32.33
Infrastructure	0.43 (0.001)	20.49	0.47 (0.001)	21.28	0.51 (0.000)	22.52
Service	0.09 (0.560)		0.09 (0.509)		0.07 (0.621)	
Sex	–		0.11 (0.373)		–0.03 (0.819)	
Age	–		0.01 (0.917)		–0.01 (0.847)	
Income	–		0.43 (0.001)		0.34 (0.010)	
Ugo	–		0.44 (0.032)		0.39 (0.061)	
Htype	–		0.39 (0.147)		0.56 (0.045)	
Visit	–		–		0.21 (0.214)	
Know	–		–		0.43 (0.000)	
Ftrip	–		–		0.52 (0.000)	
Summary statistics						
Log-likelihood	–753.78		–708.66		–693.16	
χ^2	455.28		484.03		516.02	
Adjusted R^2	0.30		0.31		0.33	
Number of obs.	1,547 (0 skipped)		1,498 (0 skipped)		1,489 (0 skipped)	

The explanatory power of these models is about 0.30 across three models. The implicit prices for each of the non-monetary attributes are reported. Households are willing to pay 32 thousand VND (US$2) for the preservation plan and about 22 thousand VND (US$1.4) for upgrading infrastructures.

4.3 Combining CV and CM data

The CV question asks the respondent if she would still visit My Son (with a stated increase in entrance fee and the improved situation) or not (i.e. prefers the current situation). This is identical to the CM framework, since both the CV and CM questions are considered as a choice between two alternatives. The two data sets can be pooled as the CV data has two attributes (*Price* and *Preservation*) while the CM data has four attributes in a choice set (*Price, Preservation, Infrastructure*, and *Service*). Tables 7 and 8 provide results of the foreign visitors and local residents, respectively.

Likelihood ratio (LR) tests are used to accept/reject the pooling hypothesis. Test statistics follow χ^2 distribution with degree of freedom equal to difference in number of estimated parameters between pooled and un-pooled models. If the LR-test statistic is smaller than the critical value, pooling data cannot be rejected.

Results of the pooled model include an estimate for the scale parameter (μ_{CM}) of the CM data. The estimation of a scale factor as part of the model allows for direct comparisons of parameter estimates. If there is no difference in variance between the CV and CM data, the estimate of μ_{CM} is not significantly different from unity. Since the scale factor is inversely related to the variance of the RUM's random component, $\mu_{CM} < 1$ suggests that CM data are noisier than the CV data (and the other way around if $\mu_{CM} > 1$).

Table 7 Joint estimates of Contingent Valuation (CV) and Choice Modelling (CM) for the foreign visitors

Variables	CV (*P*-value)	CM (*P*-value)	Joint model (*P*-value)
Constant	–1.84 (0.000)	–0.91 (0.000)	–0.81 (0.000)
Price/Bids	–0.23 (0.000)	–0.20 (0.000)	–0.19 (0.000)
Preservation	–	1.22 (0.000)	1.13 (0.000)
Infrastructure	–	0.30 (0.014)	0.37 (0.001)
Service	–	–0.07 (0.592)	0.01 (0.914)
Summary statistics			
Scale parameter (μ_{CM})	–	–	1.34
Adjusted R^2	0.20	0.20	0.20
Log-likehood	–134.88	–875.57	–1012.71
χ^2	68.38	419.98	483.45
Number of obs.	243 (0 skipped)	1,575 (0 skipped)	1,818 (0 skipped)

Notes: The LR-test of difference between parameters, gives a χ^2 value of 4.52. The respective critical value at 5% significance level and 2 df is 5.99. The LR-test of equal scale parameters yields a χ^2 of 3.62; the respective critical value at 5% significant level and 1 df is 3.84.

Table 8 Joint estimates of Contingent Valuation (CV) and Choice Modelling (CM) for the local residents

Variables	CV (*P*-value)	CM (*P*-value)	Joint model (*P*-value)
Constant	–0.87 (0.000)	–0.05 (0.797)	–0.02 (0.891)
Price/Bids	–0.03 (0.000)	–0.02 (0.000)	–0.02 (0.000)
Preservation	–	0.71 (0.000)	0.70 (0.000)
Infrastructure	–	0.43 (0.001)	0.44 (0.001)
Service	–	0.07 (0.600)	0.08 (0.524)
Summary statistics			
Scale parameter (μ_{CM})	–	–	1.26
Adjusted R^2	0.13	0.30	0.27
Log-likehood	–144.73	–753.78	–898.73
χ^2	42.45	455.28	510.55
Number of obs.	241 (0 skipped)	1,547 (0 skipped)	1,788 (0 skipped)

Notes: The LR-test statistic is 0.44; the respective critical value at 5% significance level and 2 df is 5.99. The LR-test statistic of equal scale parameters gives χ^2 of 1.06; the critical value at 5% significant level and 1 df is 3.84.

LR-test statistics for the hypothesis of equal parameter is calculated by $-2*(LL_{JOINT}-(LL_{CV} + LL_{CM}))$, where LL_{JOINT} is the log likelihood value corresponding to the estimation of μ_{CM}, LL_{CV} and LL_{CM} are the log likelihood values corresponding to the CV and CM model, respectively. The test statistics for the hypothesis of equal scale parameter is $-2*(LL-LL_{JOINT})$, where LL is the log likelihood value for the joint model in which the scale factors of the two data sets are assumed to be equal, LL_{JOINT} is as previously defined (Swait and Louviere 1993).

The LR-test results from Table 7 imply that we can not reject the null hypothesis of equal parameters and equal scale parameters. The joint model is quite similar to the CM model. All the parameters have the same sign as the parameters in the CM model, except the *Service* parameter (which is, however, insignificant in all models). The scale parameter is 1.34, indicating that the CM model has a lower error variance. However, the μ value is not significantly different from unity (the *P*-value for the

likelihood ratio test is 0.057). Thus, the CV and CM models appear to have error variances that are not significantly different. Adjusted R^2 for the three models are almost identical (about 0.20).

Table 8 presents the results of the local residents.

The LR-test results show that we cannot reject the hypothesis of equal parameters and equal scale parameters. The scale parameter is 1.26, indicating that the CM model has a lower error variance. However, this value is not significantly different from unity (the p-value for the likelihood ratio test is 0.302). Thus, the CV and CM models appear to have variances that are not significantly different.

The adjusted R^2 are 0.13, 0.30, and 0.27 for the CV, CM, and joint model, respectively. All parameters in the joint model have the same sign as in the CM model. The results of the joint model are closer to the CM model than the CV model.

4.4 Comparing WTP estimates

Although two different methods are used, comparison is still feasible due to the common basis of the utility theory. In this study, CV is used to estimate WTP for the proposed preservation plan for My Son. CM is used to estimate marginal WTP for attributes related to My Son's preservation in general. The proposed restoration and preservation plan attribute in the CM survey is designed in the same way as in the CV survey. This allows for a comparison between WTP from the CV study, and marginal WTP of the same good in the CM exercise.

Further, to allow a reasonable comparison between CV and CM, the CV model contains the bids and an intercept while the CM model contains attributes and ASC (Boxall et al. 1996; Adamowicz et al. 1998). In the CV model, the mean WTP is calculated by *-Intercept/Bidcoeff*, where *Bidcoeff* is the coefficient of the bids. In the CM model, the marginal WTP for a change in each attribute is repeated by the ratio $-\beta_k/\beta_M$, where β_k is the regression coefficient of the non-monetary attribute and β_M represents the monetary attribute coefficient. The confidence intervals for the parametric estimates are obtained by using the Krinsky and Robb (1986) bootstrapping procedure with 1,000 draws.

Table 9 reports non-parametric and parametric estimates. The difference between non-parametric and parametric estimation is that the former reduces the restrictions imposed on the underlying WTP distribution. In the non-parametric approach, a lower bound estimate for mean WTP is calculated by $\Sigma t_j(F_{j+1} - F_j)$,

Table 9 Comparison of willingness to pay (WTP) estimates

	Visitors (US$)		Residents ('000 VND)	
	Contingent Valuation (CV)	Choice Modelling (CM)	CV	CM
Non-parametric estimates[a]	6.41 [5.5–7.3][b]	6.94 [6.6–7.3]	31.52 [25.5–37.6]	35.06 [31.3–38.8]
Parametric estimates	7.97 [7.3–9.2]	6.21 [5.0–7.2]	33.55 [22.8–44.3]	34.09 [21.4–46.8]

[a] Lower bound estimate for WTP.

[b] Numbers in [ ] are 95% confidence intervals.

Table 10 Tests for equivalence between methods

	CM	Contingent Valuation (CV)	*P*-value
Visitors			
Non-parametric estimates	6.94	6.41	0.480
Parametric estimates	6.21	7.97	0.174
Residents			
Non-parametric estimates	35.06	31.52	0.000
Parametric estimates	34.09	33.55	0.179

where t_j is the bid amounts; F_j is proportion of no-responses. The confidence interval for a lower bound WTP can be constructed because of the asymptotic normality (Haab and McConnell 2002).

The results show that there is no large variation of estimates from CV, CM model for both visitors and residents. The WTP estimates are higher in the CM than in the CV for all the cases, except for the visitors with parametric estimates.

To see the difference between CV and CM estimates, the convolution test proposed by Poe et al. (1994) is applied. The test is constructed following the Krinsky and Robb (1986) bootstrap procedure with 1000 draws. The null hypothesis of equality between $\mathrm{WTP_{CM}}$ and $\mathrm{WTP_{CV}}$ is reformulated as the difference being equal to zero $(\mathrm{H_0} : \mathrm{WTP_{CM}} - \mathrm{WTP_{CV}} = 0)$. The probability value of non-parametric test is reported in Table 10.

The results show that, except for the residents with non-parametric estimate, the null hypothesis of equality between CM and CV cannot be rejected in the other cases. This suggests that CM and CV produce very similar results.

It is interesting to observe that, for the local residents, even though the bid ranges are very large (i.e. 5; 20; 50; and 100 thousand VND for the CV, and 5; 50; 100; and 200 thousand VND for the CM), the estimates from CV and CM are not always significantly different.

There are few studies that compare CV and CM. The results obtained in this study are opposed to Boxall et al. (1996), where the CV estimates were higher than the CM estimates in measuring recreational moose hunting values arising from changed forest management practices. However, the selection of the CM model resulted in welfare estimates similar to the CV model. Our results are consistent with those found in other studies. Hanley et al. (1998b) compare CV and CM applying to forest landscapes, and find that the welfare estimates are very similar. Adamowicz et al. (1998) compare CV and CM methods in measuring passive use values and show that 'once the variance is taken into account, the preferences over incomes between the two approaches are not significantly different'.

Although non-parametric estimates are not directly comparable with parametric estimates, the results show that they are very close.

5 Conclusion

This study applies CV and CM, to both foreign visitors and local residents, to estimate the social benefits of a restoration and preservation plan for the My Son cultural heritage in Vietnam. We then compare the estimates from the CV and CM methods, and pool the results from the two methods.

The results show that both CV and CM are suited to estimating the economic benefits of preserving cultural heritage of My Son temples. Our comparison of CV and CM shows that these two independent SP methods produce very similar results, which is a test of convergent validity. The pooling results show that, for both foreign visitors and local residents, none of the scale parameters are significantly different from unity, implying that the parameters in the CV and CM models are not different, and the error variances are not different. The results of pooled models are rather similar to the CM models. The inclusion of CV data to the CM models gives little gain in comparison with the CM models alone.

The CM results might help to inform policies in determining which preservation options that should be introduced in My Son in order to maximize social benefits. The results show that the preservation of My Son temples and upgrading the infrastructures are found to be quite important to respondents, while the provision of additional services is not as important.

Our results show that CV, CM and the pooled model works equally well for cultural heritage goods as for environmental goods. Thus, these valuation models can also be used in cost-benefit analyses to assess the benefits to cultural heritage of measures to reduce air pollution, soil erosion, climate change and other causes to deterioration of cultural heritage sites.

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Appendix

Table 11 Valuation scenario

As you may know, My Son is the most important Cham temple complex in Vietnam. Because of its uniqueness, it was listed by UNESCO as a World Heritage Site in 1999.

Description of the My Son. This card is about the features of the My Son *(show card 1)*. It was inhabited from the 4th until the 15th century AD, far longer than any of the other Indian-influenced sites in the South-East Asia. This complex of religious temples originally comprised of more than 70 temples. The vestiges of 25 of these temples remain today.

Current condition of the My Son. Many temples in the My Son were destroyed by the ravage of time, war, and a lack of awareness. *[Show card A]*

Unfortunately, the government resources are too limited to keep up with the need for preservation and restoration. As a result, many temples continue to deteriorate year-by-year, many others collapse before they can be restored.

Despite the efforts of government and other agencies that result in maintaining some of the temples as seen in photo card B *[Show card B]*, many of the important temples have become rundown such as temples in photo card C *[show card C]*.

There is a concern that if a major effort is not undertaken, the My Son temples will rapidly degrade, and many will soon collapse, losing their historical characters, perhaps forever.

A proposed preservation plan. The Vietnamese Government, in collaboration with experts from international agencies, has developed a *plan* to preserve the My Son sanctuary. If it is implemented, the plan will:

– Stop any further degrading of the remaining temples, avoid any further irreversible loss.
– Ensure that these temples will continue to be cultural heritage for future generations.

Table 12a Results of random parameter logit (RPL) models for foreign visitors

Variables	Model 1 (Attributes only)		Model 2 (Attributes and socioeconomic variables)		Model 3 (Attributes, socioeconomic and taste variables)	
	Mean effect (*P*-value)	SD (*P*-value)	Mean effect (*P*-value)	SD (*P*-value)	Mean effect (*P*-value)	SD (*P*-value)
Constant	–0.95 (0.000)		–0.68 (0.092)		–1.03 (0.020)	
Price	–0.22 (0.000)	0.01 (0.487)	–0.21 (0.000)	0.002 (0.921)	–0.23 (0.000)	0.01 (0.760)
Preservation	1.40 (0.000)	0.15 (0.565)	1.26 (0.000)	0.003 (0.990)	1.38 (0.009)	0.01 (0.971)
Infrastructure	0.39 (0.007)	0.45 (0.049)	0.33 (0.011)	0.001 (0.998)	0.35 (0.011)	0.01 (0.957)
Service	–0.06 (0.681)	0.83 (0.013)	–0.01 (0.961)	0.35 (0.369)	–0.04 (0.779)	0.85 (0.040)
Sex	–		–0.21 (0.101)		–0.08 (0.548)	
Age	–		–0.24 (0.021)		–0.25 (0.030)	
Ugo	–		–0.17 (0.185)		–0.25 (0.077)	
Income	–		0.24 (0.002)		0.23 (0.004)	
Hcity	–		–		0.06 (0.676)	
Know	–		–		0.36 (0.011)	
Satisfied	–		–		1.02 (0.000)	
Ftrip	–		–		0.11 (0.455)	
Summary statistics						
Log-likelihood	–870.27		–794.30		–779.93	
χ^2	442.87		420.14		448.88	
Adjusted R^2	0.20		0.20		0.21	
Number of obs.	1,575 (0 skipped)		1,449 (0 skipped)		1,449 (0 skipped)	

Table 12b Results of random parameter logit (RPL) models for local residents

Variables	Model 1 (Attributes only)		Model 2 (Attributes and socioeconomic variables)		Model 3 (Attributes, socioeconomic and taste variables)	
	Mean effect (*P*-value)	SD (*P*-value)	Mean effect (*P*-value)	SD (*P*-value)	Mean effect (*P*-value)	SD (*P*-value)
Constant	–0.18 (0.347)		–2.84 (0.000)		–2.77 (0.000)	
Price	–0.03 (0.000)	0.01 (0.000)	–0.04 (0.000)	0.02 (0.000)	–0.03 (0.000)	0.01 (0.000)
Preservation	0.76 (0.000)	0.15 (0.519)	0.95 (0.000)	0.80 (0.169)	0.82 (0.000)	0.75 (0.079)
Infrastructure	0.43 (0.003)	0.09 (0.712)	0.63 (0.001)	0.84 (0.034)	0.60 (0.001)	0.003 (0.994)
Service	–0.06 (0.663)	0.03 (0.905)	0.05 (0.789)	0.47 (0.144)	0.09 (0.631)	0.36 (0.338)
Sex	–		0.17 (0.323)		–0.03 (0.859)	
Age	–		0.02 (0.758)		–0.02 (0.834)	
Income	–		0.61 (0.001)		0.43 (0.005)	
Ugo	–		0.50 (0.064)		0.43 (0.076)	
Htype	–		0.40 (0.256)		0.61 (0.062)	
Visit	–		–		0.27 (0.091)	
Know	–		–		0.48 (0.001)	
Ftrip	–		–		0.57 (0.001)	
Summary statistics						
Log-likelihood	–748.80		–695.81		–683.12	
χ^2	647.00		685.05		710.43	
Adjusted R^2	0.30		0.32		0.33	
Number of obs.	1,547 (0 skipped)		1,498 (0 skipped)		1,498 (0 skipped)	

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Paper 3

Comparing cultural heritage values in South East Asia – Possibilities and difficulties in cross-country transfer of economic values

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Abstract

Benefit transfer means transferring economic values from a primary valuation study (study site) to a site where we need to conduct policy analysis (policy site). Due to the high costs and time required to conduct primary valuation studies, there is potentially high policy interest in using benefit transfer to estimate values for sites not yet valued. While benefit transfer is increasingly applied to environmental goods, applications of benefit transfer in the field of cultural heritage resources are rare. The unique nature of these public goods, differences in affected populations and population characteristics, and other cultural and social differences lead to a significant risk of benefit transfer providing non-informative estimates for cultural heritage. We compare results from two contingent valuation (CV) studies of historic temples in Thailand and Vietnam, test the validity and reliability of benefit transfer between the two sites, and discuss possibilities and difficulties in such transfers. We find that the error in transferring unadjusted mean willingness-to-pay (WTP) is from 46% to 129%. Adjustments for differences in purchase power parity (PPP), income level and income elasticity between the sites in many cases substantially increase rather than decrease transfer errors. Function transfer does not perform better than unadjusted unit transfer. These results are contrary to both theoretical expectations and experiences from benefit transfer of environmental goods and environmentally related health impacts. The results suggest that there are other physical, cultural and institutional factors which can explain differences in WTP for cultural heritage than income and other socio-economic variables usually captured in CV studies. Until we are able to identify and measure the impacts of these factors, the potential policy use of benefit transfer for cultural heritage goods is rather limited.

Keywords: benefit transfer, contingent valuation, cultural heritage, willingness to pay

1. Introduction

Benefit transfer means transferring economic values from a primary valuation study (study site) to a site where we need to conduct policy analysis (policy site). Due to the lack of time and resources needed to conduct primary valuation studies, benefit transfer is increasingly used to assess environmental and health impacts in cost-benefit analyses of development projects and environmental programs and policies (Navrud and Ready 2007). This has lead to the need to assess the validity and reliability of benefit transfer by conducting similar valuation studies (most often CV studies) at different sites, both within and across countries. These benefit transfer validity studies have addressed a wide variety of environmental goods and health impacts: Bergland *et al*. (1995) and Muthke and Holm-mueller (2004) tested benefit transfer for water quality improvements, within and across countries, respectively. Alberini and Krupnick (1997) conducted a benefit transfer tests across two countries for acute respiratory illnesses from air pollution. Brouwer and Spaninks (1999) estimated and compared the benefits of agricultural wildlife management on peat meadow land. Barton and Mourato (2003) conducted a benefit transfer validity test of avoiding health effects from water pollution. In a CV study conducted in 5 European countries Ready et al. (2004) measured and compared the benefits of avoiding respiratory illnesses related to air and water quality. Brouwer and Bateman (2005) transferred the WTP for health-risk reductions. Krupnick *et al*. (2006) tested benefit transfer of mortality risk valuation. Abou-Ali and Belhaj (2006) transferred WTP for air pollution reduction caused by road traffic.

Benefit transfer studies in the field of cultural resources, however, are rare (Riganti and Nijkamp 2005; Eftec 2005). Errors in benefit transfer of these public goods could be potentially large due to differences between the study site and policy site (including the

definition of the good itself, the extent to which it will change, and whether the good is of local, regional, national or global significance), differences in market characteristics (e.g. the size of the affected populations and population characteristics, socio-economic and attitudinal characteristics), differences in methodological variables (e.g. elicitation format and payment vehicle in CV surveys, survey mode, response rate, and sample size), and other differences in cultural and political contexts; see Eftec (2005); Ready and Navrud (2006).

Due to the unique nature of cultural heritage goods, possibilities for benefit transfers seem to be limited. Eftec (2005) argued that economic values associated with cultural heritage assets are likely to be highly site and good-specific. They pointed out that geographical location is an important consideration in assessing the appropriateness of a study for transfer purposes. For instance, similar assets may be distinctly different between different countries due to different cultural and historical associations. Another feature which is important for benefit transfer is whether the cultural heritage site is of national or international importance (which determines both the level of WTP per households and the number of households affected by a change in quality/quantity of the good), see Eftec(2005); Ready and Navrud (2006).

Market characteristics between two cultural heritage goods are normally different. It is unlikely that the populations affected by the goods at the study site and the policy site have identical characteristics. This is related to the size of affected population as well as demographic characteristics of the population (Loomis and Rosenberger 2006). Socio-economic characteristics are often different between countries, particularly when comparing a developing country to a more developed country (Eftec 2005; Ready and Navrud 2006). Other issues associated with population and population characteristics that may have an impact on benefits transfer are the validity of transferring per household or per person values, the distinction between users and non-users values, and distance from the good. For example, unit

WTP estimates for users of cultural heritage assets are higher than those for non-users (Pearce *et al.* 2002). Bateman *et al*. (2006) argued that where some resource site generates use value, the density of such users will be higher near to that site. Furthermore, as users typically hold higher values than nonusers, then we would expect average values to decay with increasing distance from that site.

From economic theory, one would expect that individuals with higher income have higher WTP than individuals with low income. When using a Dichotomous Choice (DC) elicitation format in a CV study, we also expect the share of respondents' willing to pay (and probability of a respondent saying yes to pay) a particular price to decrease (increase) as the price they are asked to pay increases (decreases). From an economic viewpoint, we would also expect that respondents would be willing to pay more for a larger amount of a desired good. This is referred to as a scope test, as we observe how WTP changes when the size or scope of good changes (Carson *et al.* 2001).

It might be expected that respondents with positive attitude towards the goods would be willing to pay more for it. However, respondents with positive attitudes may still refuse to pay due to strategic reasons, budget constraints, etc. (Jorgensen and Syme 2000).

CV studies employ different methodologies in terms of e.g. elicitation format, payment vehicle, survey mode, response rate, per individual or per household WTP, which can lead to different WTP results. Meta-analytical reviews of the valuation literature reveal some methodological patterns such as DC elicitation format produce higher WTP values than Open-Ended (OE) or Payment Card (PC) formats, since the DC format may incur a 'yea-saying'[1]

[1] The tendency of some respondents to agree with an interviewer's request regardless of their true views (Mitchell and Carson 1989).

problem (Blamey *et al*. 1999; Cameron *et al*. 2002). One would expect that voluntary payment yields higher WTP estimate than compulsory payments like taxes, since the voluntary payment could lead to free riding behavior (Murphy *et al.* 2005). Survey modes could also influence WTP estimates (Boyle 2003), but results from empirical comparisons of mail and in-person surveys are mixed. With regard to choice of payment vehicle, one would expect that one-time payment provides lower WTP estimates than (the present value of) annual or monthly payments, due to human discounting errors (Rabin 1998). It is generally assumed that the higher response rates, the lower the mean WTP estimates, since the survey then captured more respondents which are less interested and have lower WTP (Lindhjem 2007). Results are mixed when comparing per person and per household WTP (Bateman and Munro 2005), but Quiggin (1998) finds that, under strict conditions, household WTP is higher than individual WTP.

Noonan (2003) conducts a meta-analysis of 65 CV studies in order to assess systematic patterns in the WTP estimates for cultural resources. He finds that studies in the cultural field are generally consistent with expectations. Characteristics of the goods being valued, as well as features of the survey methods, influence WTP estimates; e.g. the distribution of WTP estimates is influenced by survey design features, familiarity with the good, and whether the scenario involves more abstract goods.

Contextual factors such as differences in cultural and institutional settings between countries also influence WTP. Thus, benefit transfer of cultural heritage goods could lead to potentially large errors.

The aim of this paper is to compare two CV studies of cultural heritage sites in Thailand and Vietnam, test the validity and reliability of benefit transfer between the two sites, and discuss possibilities and difficulties in such transfers of values.

The structure of the paper is as follows. Section 2 presents the two surveys and data, and compares them. Section 3 describes the results in terms of respondents' attitudes and WTP for preservation of cultural heritage, factors that affect their WTP, and transfer errors of validity tests. Section 4 discusses the possibilities and difficulties of benefits transfer of cultural heritages and concludes.

2. The surveys and data

Two CV surveys have been conducted to estimate the economic benefits of preserving and restoring historic temple sites in Thailand and Vietnam, respectively. The two surveys have followed the same design principles (e.g. asking the same attitudinal questions, using the same valuation scenario description, bid design, payment vehicle, and elicitation method), in order to isolate the effect on WTP from differences between the sites and the affected population.

In the following sections, we describe in details the characteristics of each survey, present primary results from the two surveys, and identify the similarities and differences between them.

2.1 The Thailand survey – historic temples in the central region of Thailand

The Thailand survey (Seenprachawong 2006) was designed to investigate the preferences of individuals in the Bangkok Metropolitan Area (BMA) towards the preservation and restoration of historic temples in the central region of Thailand. These temples are considered to be the finest examples of the ancient cultural structures in Thailand. The survey selected

ten historic temples at risk of deterioration as the good to be valued (these are described briefly in appendix A). Text and photos were used to describe the current state of the historic temples. This was followed by a description of the proposed program to preserve and restore these temples. Photographs were used to illustrate the effect of the preservation program, which is the good that respondents were asked to value. Finally, respondents were asked whether they were willing to pay for this preservation program in terms of voting yes or no to pay a stated amount that was varied among sub-samples. After this referendum type DC CV question, respondents who were not willing to pay anything were asked to state their reasons for doing so. The questionnaire also included extensive sections with attitudinal and demographic questions.

Two payment vehicles were used: a one-time surcharge in income tax and a one-time voluntary donation. To overcome the incentive incompatibility of the voluntary contribution payment vehicle, a matching grant was included in the hypothetical scenario. In addition, the questionnaire followed the approach of Cummings and Taylor (1998), and included an explicit discussion on the hypothetical bias problem to reduce this bias (i.e. a "cheap talk" script). A secret ballot was used to reduce enumerator bias. Each respondent received a card that specified a predetermined amount of WTP to which he/she was asked to answer yes or no. The card was then put in a sealed envelope to prevent the interviewer from knowing the respondent's answer. The survey sample was split into four sub-samples, in order to test for the effect on WTP from different payment vehicles (tax vs. donation), and to test for the scope effect (two temples vs. ten temples).

The survey was conducted in the BMA because it offered logistical advantages, and residents in BMA could be assumed to have knowledge and attitudes that would be representative of other provinces in the central region of Thailand. In-person interviews were administered

from January to February 2005. The number of households in the BMA was 1,703,128. With the help of the National Statistical Office, a stratified random sample was obtained from the Socio-Economic Status Survey population in BMA. BMA is divided into 48 strata. Each stratum is homogenous in the sense that it belongs to a specific district that includes similar surrounding environments. The 48 strata were used to select a list of 800 households for the survey. A simple random sample of 10-25 households was chosen from each stratum. A total of 800 households were selected for interviews from these 48 strata. For a proper comparison with the voluntary payment vehicle, this study screened out households that did not pay income tax (approximately 18%) by inserting an income tax payment section in the questionnaire.

Out of the total of 800 households, 237 households could not be located and 43 households refused to answer. Thus, 520 respondents were interviewed: 280 households were asked to pay for ten temples and 240 households were asked to pay for two temples. Half of the respondents in each of these two groups were asked for a one-time surcharge on their income taxes, and the other half for a one-time donation to the trust fund.

Results showed that the survey did pass the scope test, indicating that respondents would be willing to pay more for a greater number of temples. The payment vehicle test showed that there was no significant difference in WTP between these two payments, indicating that it does not matter if the payment vehicle is in the form of income tax or a donation. Therefore we pooled the data of these two sub-samples when calculating mean WTP, which were 204 Baht[2] (US$5.09) and 251 Baht (US $6.27) for two and ten temples, respectively.

[2] Exchange rates in February 2006 US$: 1US$ = 40 Thai baht.

2.2 The Vietnam survey – Temples of the World Heritage Site My Son

The Vietnam survey (Tuan 2006) was designed to estimate the economic benefits of preserving temples at My Son, a UNESCO world heritage site, located in Quangnam province in the central region of Vietnam. This is a large complex of religious temples, originally consisting of more than 70 temples out of which 25 temples remain today. According to GHF (2002), this unique site is now in a state of significant disrepair, and urgently requires restoration and preservation.

The questionnaire began with a series of questions posed to obtain information about respondents' perception and attitudes towards the My Son temples. These attitudinal questions were identical to the Thailand questionnaire. Then respondents were presented with the valuation scenario of My Son temples, consisting of a description of the site in terms of text, maps, and photos. Respondents were provided with background information on the current condition of the site and a *status quo* scenario where the deterioration would continue due to insufficient resources for preservation. Then, the proposed preservation plan and its effect were presented. The respondents were told that the plan would improve the condition of the My Son temples and preserve the site for the future.

A one-time increase in tax was used as the payment vehicle. Since Vietnamese respondents were not familiar with the referendum type format[3], we used a special DC format we found to work well in Vietnam (appendix B). As in the Thai instrument, four price levels of local currencies were used. After the valuation section, debriefing questions were asked in order to determine what motivated respondents' WTP or refusal to pay. The questionnaire also included socio-economic data such as gender, age, education, employment status, and income.

[3] In the past 60 years, no referendum has been conducted in Vietnam (Tuoitre 2006).

The survey was administered in Quangnam province in the central region of Vietnam. In-person interviews were conducted in the August 2005. We selected a stratified sample consisting of 250 households; representative of households in the Quangnam province (see Paper 2 in this thesis for details of the selection procedure). 9 respondents refused to be interviewed which gives a net sample of 241 respondents.

Results showed that mean WTP for preserving of My Son temples was 43,495 VND[4] (US$2.74).

2.3 A comparison of the two surveys

In a DC CV study, a general valuation function would be in the form of:

$$\Pr ob.(yes\_to\_pay) = \beta_0 + \beta_1 X_i + \beta_2 C_i + \beta_3 A_i + \beta_4 S + \beta_5 M_s + \beta_6 Q_s + \varepsilon$$

where *Prob. (yes_to_pay)* is the probability of saying yes to pay the bid (amount) *X*, here it depends on: *Xi* = the bid amount the respondent *i* is asked; *Ci* = socio-economic characteristics of the respondent *i* (including income), *Ai* = attitudes of the respondent *i*, *S* = availability and quality of substitute sites, *Ms* = methodological characteristics of the survey *s*, *Qs* = site characteristics of the good being valued in survey *s*, β_j (j = 0, 6) are sets of parameters, and ε is the random error. In stated preference surveys like CV only the first three categories of variables are usually included in the valuation function. However, when performing benefit transfer we also need to consider the last two categories of variables.

Tables 1, 2, and 3 summarize and compare the two surveys with respect to these groups of variables; organized in characteristics of the goods, characteristics of the two markets, and methodological variables of the two surveys, respectively.

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[4] Exchange rates in February 2006 US$: 1US$ = 15,900 VND.

Table 1. A comparison of characteristics of the goods valued in the two surveys

Selection criteria	Thailand survey	Vietnam survey
Description of the good	This survey selected ten historic temples at risk of deterioration as the good to be valued. Located in different provinces in the central region of Thailand.	My Son is a complex of religious temples, out of which 25 temples remain today. Located in Quangnam province in the central region of Vietnam.
Valuation scenario	From the status quo (i.e. the current state of historic temples at risk of deterioration) to a proposed preservation program to preserve and restore these temples.	From the status quo (i.e. the current condition in that the deterioration continues) to a proposed preservation plan to preserve and restore the site.
Level of significance	A national public good (these temples are considered to be the finest examples of ancient cultural structures in Thailand).	A national and global public good (a UNESCO's world heritage site).

As shown in table 1, the characteristics of the two goods are not exactly identical. The differences include the public good itself and the geographical level of significance. In the Thailand survey, the good being valued is ten (and two) historic temples at risk of deterioration and these temples are located in different provinces in the central region of Thailand. While in the Vietnam survey, My Son is a large complex of temples, 25 of these temples remain today, and located in a small area. With respect to the level of significance, the temples in Thailand can be considered as a national public good, while the My Son temples in Vietnam are both a national and global public good (since My Son is on the UNESCO list of World Heritage Sites).

Table 2 compares characteristics of the two markets. In the Thailand survey, we asked Bangkok residents about their WTP for preservation of historic temples in the central region of Thailand, while in Vietnam we asked people in Quangnam province about their WTP for

preserving of temples in the same province. This means that the populations selected for these two surveys are different with respect to the geographical extent.

Table 2. A comparison of population characteristics of the two surveys

Selection criteria	Thailand survey	Vietnam survey
Respondents	Non-local residents Bangkok residents), household survey	Local residents (Residents of Quangnam province), household survey
Distance from the site	About 300km	Within 100km
Sex (1 for male, sex = 0 for female); Mean (std. dev)	0.49 (0.50)	0.49 (0.50)
Age (the respondents' age in years); Mean (std. dev)	34.06 (12.32)	43.18 (11.09)
Education (the respondent's number of years at school); Mean (std. dev)	13.54 (4.25)	9.14 (3.51)
Income (reported monthly household income in US$); Mean (std. dev)	782.45 (628.83)	71.37 (47.47)
Adjusted income (PPP adjusted[a] monthly household income (US$))	2,462	349
Number of respondents (N)	520	241

Note: [a] GDP/capita in 2005 for Thailand and Vietnam are US$8,368 and US$3,025, respectively. Nominal GDP/capita in 2005 for Thailand and Vietnam are US$2,659 and US$618, respectively (sources: IMF 2005). Thus the adjustment factors (equal to PPP-adjusted GDP per capita/ Nominal GDP per capita) are 3.15 and 4.89 for Thailand and Vietnam, respectively. Monthly household income in PPP adjusted exchange rate is calculated by multiplying the reported monthly household income with the adjustment factors.

Regarding the distance from the goods, the Thailand survey asked respondents in Bangkok which was about 300km away from the good being valued. In the Vietnam survey, respondents in the same local province were asked. If there is a distance decay effect, one would expect the Vietnam survey to yield higher estimates than the Thailand survey, *ceteris paribus*.

Table 2 also presents socio-economic characteristics of the respondents. The Thailand sample was younger; more educated and had much higher reported income than the Vietnam sample. Reported household monthly income (converted into US$) of Thai respondents is nearly eleven times higher than that of Vietnamese respondents. If we use the PPP to adjust income levels in the two countries, the difference is reduced to about seven times. However, if we use the PPP-adjusted at city specific level, the difference is considerably increased up to fifty five times. The difference in absolute income levels between the two samples coupled with other differences in the socio-economic characteristics of the two surveys could significantly affect WTP results and the accuracy of benefit transfer between the two goods.

Table 3. A comparison of methodological characteristics of the two surveys

Selection criteria	**Thailand survey**	**Vietnam survey**
Payment vehicle	Increase in income tax , and voluntary donation in split sample	Increase in income tax
Choice mechanism	Individual decision to vote 'yes' or 'no' (individual's WTP).	Family decision to choose option 'yes' or 'no' (household's WTP)
Financial mechanism	Special fund solely for the preservation of temples at risk in the central region of Thailand.	Special fund solely for the preservation of My Son temples.
Time of payment	One-time payment	One-time payment
Elicitation format	DC (binary, discrete choice)	DM (coded as binary, DC)
Stated prices in local currencies	50; 100; 200; and 500 Thai baht (4 amounts)	5,000; 20,000; 50,000; and 100,000 VND (4 amounts)
US$ equivalence	1.25; 2.5; 5.0; 12.5	0.31; 1.26; 3.14; 6.29
PPP-adjusted US$	3.93; 7.87; 15.74; 39.34	1.52; 6.17; 15.37; 30.79
Scope test	Yes; 2 temples versus 10 temples at different sites	No; one site with complex of temples

Table 3 compares the study design of the two surveys. In Thailand both tax and donation were used as payment vehicles, but results shown that there was no significant difference in WTP

between these two payment vehicles. In Vietnam all respondents were asked their WTP in terms of a tax.

In Thailand we asked an individual respondent if he himself would be willing to pay, while in Vietnam we asked a household head if his household would be willing to pay. One would expect that WTP per individual is lower than WTP per household. Thus, using individual WTP to predict household WTP would be expected to yield an underestimate.

As elicitation format, the Thailand survey used a referendum DC format, while in Vietnam we used a special DC question based on the dissonance-minimizing (DM) format[5] proposed by Blamey et al. (1999). The difference in political context between the two countries (where Vietnamese are not used to referenda) affects the choice of using the elicitation format.

With respect to the sensitivity to scope, only the Thailand survey tests this and finds that WTP is significantly higher for ten than for two temples. The next question is whether the complex of 25 temples at the My Son site is more comparable to two temples at two sites in Thailand, or ten temples at ten different sites in Thailand?

On the other hand, there are some similar features between the two surveys. These include scenario description (from the *status quo* to a proposed preservation program), property rights (WTP for an improvement), tax payment vehicle, financial mechanism (special fund solely for the preservation of temples in question), time of payment (one-off payment), elicitation method (coded as binary, discrete choice), and number of price levels (4 amounts), see tables 1, 2 and 3.

[5] As in Blamey *et al*. (1999), results of the WTP question (as seen in the appendix C) were coded as: option 1 = 'yes', otherwise = 'no'.

In table 4, we list factors that differ between the two surveys, and how they are expected to affect the WTP. The net effects of these differences are, however, difficult to predict as we do not know the magnitudes of the expected positive and negative effects on WTP, and for some effects we cannot even predict the direction of the effect.

Table 4. List of factors that are expected to affect the WTP results in the two surveys

1. Factors that could give *higher WTP* in the Thailand than in the Vietnam survey - Income (both actual and PPP adjusted). - Education (which could be proxies for income and knowledge/interest in cultural heritage). - Referendum DC vs. DM format (as Blamey *et al*. (1999) argued, the DM format can reduce the yea-saying problem that may occur in the DC format, and provide lower WTP).
2. Factors that could give *lower WTP* in the Thailand than in the Vietnam survey - Level of significance (a national public goods vs. a global public goods) - Distance from the site (about 300 km vs. within 100km), i.e. distance decay in WTP - Availability of substitute cultural heritage sites - Choice of mechanism (individual's WTP vs. household's WTP)
3. Factors with *unknown* direction of effect on WTP - Knowledge and attitude characteristics - Other socio-economic characteristics (gender, age)

If we perform a benefit transfer between these two cultural heritage goods without accounting for these differences, the transferred WTP estimate could potentially be non-informative. However, correcting for only a few of these factors might not provide a more accurate estimate as other factors remain. Thus, it could well be that in a naïve transfer without any corrections, factors affecting WTP in different directions could cancel out, and provide lower transfer errors.

In the following sections, we will compare results of these two surveys and test the validity and reliability of different methods for benefit transfer between the two goods.

3. Results

3.1 Public perceptions of the preservation of cultural heritages

Table 5 presents the responses to a number of attitudinal statements, sought to uncover respondents' underlying motives for supporting the preservation of cultural heritages. The first question asked respondents how important it was to have cultural heritages so that they and their family could visit them at the present time. This question was intended to reveal whether respondents had any direct use of these temples. 79% and 89% of respondents agree with this statement for the Thailand survey and Vietnam survey, respectively.

Table 5. Respondent's attitudes towards the importance of cultural heritage

Variables	**Description**	**Thailand** Mean (std. dev)	**Vietnam** Mean (std. dev)	**T-test** (p-value)
Attitude1 (use value)	It is important to have these sites so that you and your family can visit them now (1 = yes, 0 = no).	0.79 (0.40)	0.89 (0.31)	0.000
Attitude2 (non-use)	It is important to have these temples so that other people can visit them now (1 = yes, 0 = no).	0.99 (0.10)	0.97 (0.18)	0.077
Attitude3 (bequest)	It is important to have these sites so that future generations can visit them (1 = yes, 0 = no).	0.98 (0.14)	0.99 (0.09)	0.213
Attitude4 (existence)	It is important to have these sites because they inspire pride in our heritage (1 = yes, 0 = no).	0.98 (0.12)	0.97 (0.18)	0.537
Attitude5 (existence)	It is important to have these sites to remember events in history (1 = yes, 0 = no).	0.97 (0.16)	0.98 (0.11)	0.230

Another probing question on the importance of non-use values to respondents was in the form of a statement: "It is important to have these temples so that other people can visit them now". Agreement with this statement would suggest that a historic temple was recognized for its

non-use values (option and existence/altruistic values). A majority of respondents agreed with this statement.

Bequest value is a type of option value, which captures the belief that even if we do not use cultural heritages now, we have a duty to pass on these cultural assets to our children so that they can benefit from them. Nearly all respondents in both surveys agreed with this statement, indicating that respondents believe that historic temples are of value because of the benefits they can provide to future generations.

Statements 4 and 5 sought to reveal whether respondents felt that historic temples had "existence value" and therefore, that we had a duty to protect them. A majority of respondents did agree that we do have such a moral duty.

It is worth noting that among these five attitude statements, nearly all respondents agree with the last four statements in both Thailand and Vietnam (and there are no significant differences in these statements between the two surveys). Note, however, that a lower percentage of Thai than Vietnamese respondents agreed to the first statement (and there is significant difference in this statement between the two surveys), which reflects use values of the temples.

This significant difference could be explained by the Thai respondents having more substitute sites they could visit than the Vietnamese respondents. Thai respondents are people in Bangkok, far away from historical temples in the central region of Thailand. Thus, they have more cultural heritage sites than just historical temples in the central region they could visit. On the contrary, the Vietnamese respondents are local people, quite close to My Son temples. Thus, a visit to My Son may be the first priority in their decision to visit cultural heritage sites. The difference in availability of substitute sites would lead to higher WTP in the Vietnam than Thailand survey, *ceteris paribus*.

3.2 Determinants of the WTP

Respondents' WTP was modeled using logistic regression with the bid amounts and socio-economic variables as the explanatory variables for whether people said yes or no to paying the stated amount. This is the common approach in CV studies to test the validity of WTP results by examining how well the model corresponds to economic theory where individuals with higher income are expected to have a higher WTP than those with lower income. Table 6 reports results of the logit models.

Table 6. Estimated parameters of the logit models

Variables	**Description**	**Thailand**	**Vietnam**	**Pooled**
Coefficient (p-value)				
Constant		0.109 (.859)	-8.030 (.000)	0.342 (.467)
Bid	Bid amounts	-0.068 (.000)	-0.126 (.000)	-0.075 (.000)
Male	If respondent is male	-0.240 (.230)	0.263 (.647)	-0.055 (.737)
Age	The respondents' age	-0.010 (.274)	0.015 (.616)	-0.005 (.512)
Education	Years of schooling (edu ≥ 12)	0.423 (.158)	1.318 (.062)	0.404 (.060)
Income	Respondent's income	0.0002 (.000)	0.019 (.000)	0.0002(.000)
Attitude	Respondent's attitude	0.529 (.209)	1.646 (.104)	0.258 (.422)
Summary statistics				
Log-likelihood		-303.63	-64.04	-438.19
Pseudo-R^2		0.16	0.64	0.17
Chi-squared		113.38	233.55	161.24
No. of obs.		520	231	751

Note: The LR-test is used to see whether the two surveys originate from one and the same underlying sample. To this purpose, the two datasets are pooled and the logit model is estimated for the data set as a whole. The outcome of the LR-test statistic leads us to the rejection of the null hypothesis that data from the two surveys can be pooled into the same model. However, we include this model in our study because this pooled model is used to

reject/accept the null hypothesis of equality of function transfer (Hypothesis 3), as described in the appendix C.

As expected, the relationships between WTP responses and some socio-economic characteristics of respondents shown by the models were logical and in line with economic theory. The bid variable is negative and significant in all models, indicating that the probability of saying yes to pay decreases as the amount stated (i.e. price) increases. Income is positive and significant in all models, suggesting that a respondent with higher income has a higher probability of answering yes to pay. Education is positive in all models and significant in Vietnam and pooled models (at 10% level), implying that the probability of yes responses increases for a respondent with 12 years of schooling or more. Education might be a proxy of income, but also for increased knowledge about and interest in cultural heritage sites.

Results show that the respondents' attitude is positive, but significant (at 10% level) only in the Vietnam survey. Other socio-economic variables such as sex and age are not significant.

3.3 Mean WTP and WTP as a fraction of income

Table 7 reports WTP estimates from the two surveys. Mean WTP values are computed using the sample means of all variables in the logit models.

Table 7. Mean WTP estimates (US$)

	Thailand		**Vietnam**
	2 temples	10 temples	
Mean WTP (Non-adjusted exchange rate)	5.09	6.27	2.74
Mean WTP (PPP-adjusted exchange rate)	16.03	19.72	13.39
WTP as percentage of income (%)	0.05	0.07	0.32

As presented above, the Thailand survey performed two methodological tests: the payment vehicle test and scope test. We failed to reject the null hypothesis of equality between tax and donation payment, and therefore we pooled the data of these two sub-samples for further analyses. Respondents would pay significantly more for ten than for two temples, and thus passed this between-sample scope test.

Results show that WTP constitutes a much smaller part of annual household annual income in the Thailand survey, but this could be due to the fact that the Thailand survey asked for individual WTP whereas the Vietnam survey asked for household WTP.

3.4 Analysis of the income elasticity of WTP

WTP for a discrete change in a public good (z) from an initial level z_0 to a higher level z_1 can be defined from indirect utility function as follows:

$$V(q, y - WTP, z_1) = V(q, y, z_0)$$

where q is an n-vector of market prices of private goods, p is the price of the public good, and y is income.

WTP is estimated from a valuation function. Income is included as an explanatory variable in the valuation function. Income elasticity of WTP (ε_{WTP}) is calculated as:

$$\varepsilon_{WTP} = \frac{y}{WTP} * \frac{\partial WTP}{\partial y}.$$

For the Thailand survey, the estimated income elasticity of the WTP (ε_{WTP}) is 0.28, which is greater than zero but smaller than unity. This means that the good is income inelastic and thus the WTP is not very sensitive to changes in income. This suggests that improvements in

cultural heritages would be relatively more beneficial to low-income people than to high-income people.

For Vietnam the income elasticity of WTP is 3.67, which is greater than unity, and thus income elastic. This implies that cultural heritage is a luxury good[6] for people at this income level. This result might be reasonable since our survey respondents are local people in Quangnam province, i.e. a poor province in Vietnam with reported household monthly income is about US$70 and GDP per capita is about 35% of the national average (Vietnam statistical yearbook 2005). For this local population a visit to cultural heritage sites might very well be viewed as a luxury good.

The elasticity from the Vietnam survey is much larger than those reported by Kriström and Riera (1996) and Hokby and Soderqvist (2003). Kriström and Riera (1996) estimated the income elasticity of WTP for environmental improvements from a number of European datasets. They found that the income elasticity of WTP is consistently less than one, with a few exceptions. Hokby and Soderqvist (2003) presented 21 estimates of the income elasticity of WTP for environmental services in Sweden ranging between –0.71 and 2.83. However, our result is closed to results of Navrud and Vondolia (2005), especially with results of the local resident group. This study finds that the income elasticity of WTP for environmental protection can be very high for poor local residents in Ghana (1.77-2.99) and below unity (0.17-0.84) for a high income population (foreign tourists).

[6] Theoretically, luxury goods refer to income elasticity of demand, not of WTP, and thus we should use this term with caution. In the literature, the term of luxury good or normal good is used quite often in studies that investigate the income elasticity of WTP of environmental goods (Hokby and Soderqvist (2003); Kriström and Riera (1996)).

The above income elasticities of WTP for Vietnam and Thailand are calculated at mean income in each country. Since the income level in the two countries is very different, this could explain the difference in elasticities. We therefore calculate and compare elasticities at a common income level[7], which means a somewhat lower and much higher income level than average income for the Thailand and Vietnam samples, respectively. Using a common income level, we find that the income elasticities of WTP are reduced to 0.27 and 1.62 for the Thailand and Vietnam surveys, respectively. Even if the income elasticity of Vietnam is much smaller at this higher, common income level, and also within the range of elasticities found in other studies, there is still a large difference between the two countries. Thus, there must be other factors than income level that can explain the difference in elasticities. This also suggests that benefit transfer with adjustments for differences income level only, which is common in practice, will not be sufficient to avoid transfer errors in cultural heritage benefit transfers.

3.5 Tests of benefit transfer

In this section, we conduct tests of the validity and reliability of unit value transfers and function transfers when transferring WTP estimates between the two sites.

3.5.1 Equality of unit value transfers and functional transfers

We use a t-test to examine whether mean WTP values are the same between the two surveys. The likelihood ratio (LR) test is used to investigate the equivalency of the coefficients of the estimated WTP functions, as presented in appendix C.

[7] A common income level is the range of income (converted into US$ with PPP-adjusted exchange rate) that observations/ respondents of the two surveys have income in this range. In order to obtain the common income level, we remove observations with income that are out of this range from the two surveys.

For unit value transfers, results in table 8 show that mean WTP with PPP-adjusted exchange rate are not significantly different when we transfer values from Vietnam to Thailand (with two temples) and vice versa. However, mean WTP values in the other cases are significantly different.

Table 8. Results of validity testing based on the t-test and LR test

	Thailand (2 temples)	**Vietnam**	**Thailand** (10 temples)	**Vietnam**
Unadjusted mean WTP (unit value transfer; t-values (and p-values))	5.71 (0.01)	-3.43 (0.01)	8.55 (0.01)	-6.23 (0.01)
PPP-adjusted mean WTP (unit value transfer; t-values (p-values))	**1.34 (0.09)**	**-1.22 (0.11)**	3.20 (0.01)	-3.55 (0.01)
Functional transfer (LR (and p-values))	177.28 (0.01)	177.28 (0.01)	198.54 (0.01)	198.54 (0.01)

Note: Figures in bold mean that we cannot reject the null hypothesis of no significant difference at the 5 % level in mean WTP between the two surveys.

For function transfers, results of the LR test indicate that the null hypothesis of equal WTP functions is rejected at the 1% levels in all cases.

3.5.2 Transfer errors

The general definition of transfer error (TE) is:

$$TE = \left[\frac{\hat{WTP}_s - WTP_p}{WTP_p} \right] * 100$$

where WTP_p is the mean WTP of the policy site, WTP_s is the mean WTP of the study site. See appendix C for how to calculate the transfer error when conducting adjusted unit value transfer and valuation function transfer.

Table 9. Results of benefit transfers in terms of the transfer errors (TE)

Transfer methods	Policy site	2 temples	10 temples
		TE (%)	TE (%)
Unadjusted mean WTP	Thailand	-46	-56
(Naïve unit value transfers)	Vietnam	86	129
Adjusted mean WTP	Thailand- NAER[a]	489	379
(Unit value transfers with income elasticity equals 1)	Vietnam- NAER	-83	-79
	Thailand- CSER [b]	4,524	3,659
	Vietnam- CSER	-98	-97
Adjusted mean WTP	Thailand- NAER	108,143	87,888
(Unit value transfers with income elasticity calculated at mean income in each country (0.28, 3.67); using income elasticity at the *study site*)	Vietnam- NAER	-31	-15
	Thailand- CSER	208,576,416	169,547,646
	Vietnam- CSER	-61	-52
Adjusted mean WTP	Thailand- NAER	1,885	1,514
(Unit value transfers with income elasticity calculated at a common income level (0.27, 1.62); using income elasticity at the *study site*)	Vietnam- NAER	-29	-13
	Thailand- CSER	56,109	45,592
	Vietnam- CSER	-59	-50
Adjusted mean WTP	Thailand- NAER	44	17
(Unit value transfers with income elasticity calculated at mean income in each country (0.28, 3.67); using income elasticity at the *policy site*)	Vietnam- NAER	-100	-100
	Thailand- CSER	157	109
	Vietnam- CSER	-100	-100
Adjusted mean WTP	Thailand- NAER	41	14
(Unit value transfers with income elasticity calculated at a common income level (0.27, 1.62); using income elasticity at the *policy site*)	Vietnam- NAER	-95	-94
	Thailand- CSER	144	98
	Vietnam- CSER	-100	-100
Function transfer	Thailand	705	554
	Vietnam	-91	-91

Notes: [a] PPP-adjusted exchange rate at the national average (NAER); [b]PPP-adjusted exchange rate at city-specific levels (CSER) with GDP/capita of Bangkok in 2005 is 2.74 times higher than that of Thailand national average (source: www.nesdb.go.th.); GDP/capita of Quangnam in 2005 is equal 0.35 time of the Vietnam national average (Vietnam statistical yearbook 2005).

Results from table 9 show that transfer errors vary greatly, depending on techniques used in benefit transfers, transfer errors range from 46% to 129%; from 13% to 208,576,416%; and from 91% to 705% for naïve unit value transfer, unit value transfer with income adjustments, and function transfer, respectively.

For unit value transfer with income adjustments, transfer errors can be extremely large, dependent on the income elasticity of WTP used. In the standard case, with income elasticity assumed to be 1 (i.e. unity); transfer errors vary between 79% and 4,524%. However, since we have found income elasticities differ from unity, these should rather be used. We consider two approaches in calculation the elasticity: i) calculated at the mean income in each country and ii) calculated at a common income level. We also investigate the effects of using the income elasticity at the study site as well as at the policy site. Even though in most real benefit transfer exercises only the elasticity at the study site would be known, the policy site elasticity could be a better predictor of how WTP would change at the policy site, and especially if this elasticity is calculated at the same income level as the study site that the WTP is transferred from.

Using income elasticities at the *study site*, results show that transfer errors are substantially reduced when using elasticities calculated at a common income level compared to elasticities calculated at the absolute income in each country. The same is true for the cases where we use income elasticities at the *policy site*, but the reduction of transfer errors is much lower. Thus, our expectations in terms of reductions in transfer errors are supported. This transfer technique also gives lower transfer errors in 3 out of 4 cases compared to the naïve unit value transfer, but in cases only small reductions in transfer errors compared to this simple approach is achieved. Unexpectedly, exchange rates with national PPP-adjustments provide lower transfer errors than city-specific PPP–adjusted exchange rates.

We also derive the income elasticities of WTP that makes a perfect prediction of WTP between the study and policy sites (i.e. zero transfer error).

Table 10. Calculations of income elasticities of WTP when transfer error equals zero

Policy site	2 temples	10 temples
Thailand- NAER[a]	0.08	0.16
Vietnam- NAER	0.08	0.16
Thailand- CSER[b]	0.04	0.10
Vietnam- CSER	0.04	0.10

Notes: [a]PPP-adjusted exchange rate at the national average (NAER); [b]PPP- adjusted exchange rate at city-specific levels (CSER).

Results from table 10 show that income elasticities of WTP that would give zero transfer error vary from 0.04 and 0.16, depending on whether the WTP estimate is derived from the Thailand sub-samples asked WTP for two or ten temples; and whether we calculate PPP-adjusted exchange rate at national average or city-specific level. This means that if the income elasticities of the two sites are close to zero and the difference in income elasticities between the two surveys is small, we could obtain a perfect transfer of WTP between the study site and the policy site. This also shows that the naïve unit value transfer (which implicitly assumes zero income elasticity) is a simple and in many cases more reliable value transfer techniques than the more advanced unit value transfers described above; especially compared to those based on income elasticities at the study sites which are commonly used in benefit transfer.

The results shown that transfer errors clearly reduce when we move from using the income elasticities at the study site to using the income elasticities at the policy site. Thus, if we use the income elasticities at the study site when doing a benefit transfer, this could lead to serious biases in transferred estimates. If the income elasticities of the two sites had been closer, the

income elasticities of the study site would have been a good predictor for the income elasticities at the policy site.

A comparison between unit value transfer and function transfers show that unit value transfer of unadjusted mean WTP and adjusted mean WTP with using income elasticities at the policy site provides lower transfer errors than functional transfer. Unit value transfer of adjusted mean WTP with unity income elasticities and income elasticities of the study site provides substantially higher transfer errors than function transfer.

The overall range of transfer errors in this study is considerably higher compared to similar benefit transfer validity tests of environmentally related health effects. Several studies have tested the validity and reliability of cross-country benefit transfer in the context of developing countries. Alberini *et al*. (1997) transferred U.S. WTP estimates to avoid an episode of ill health to Taiwan, and found an average transfer error across four different possible transfers of 34% (calculated by Ready and Navrud (2006)). Chestnut *et al*. (1998) transferred the U.S. estimates of median WTP to Bangkok, Thailand, and found transfer errors ranging from 18% to 35%, depending on the ill-health episode valued (cited in Ready and Navrud (2006)). Barton and Mourato (2003) found transfer errors of 87% to 130% when comparing WTP values to avoid ill health episodes from Portugal to Costa Rica. About-Ali and Belhaj (2006) transferred WTP for air quality improvements between Morocco and Egypt and found transfer errors of 60 to 220%.

Ready and Navrud (2006) reviewed cross-country benefit transfer studies conducted to date and found that the average transfer error for cross-country benefit transfers was in the range of 20% to 40%, but individual transfer error was as high as 100–200%. Thus, the lowest transfer errors observed in our study on cultural heritage are of the same magnitude as those found in

cross-country benefit transfer in Europe and the U.S. for environmental goods and health impacts.

4. Possibilities and difficulties in benefits transfer of cultural heritage goods

The overall range of transfer errors found in our study is significantly larger than transfer errors found in benefit transfer studies for environmental goods and environmentally health impacts. Two hypotheses that benefit transfer studies in the field of environmental economics generally support are those (1) the more similar between the study site and policy site, the higher the validity of a benefit transfer; (2) the more information is being used in benefit transfer, the better it will predict value at the policy site (Navrud and Ready 2007). The former refers to as the similarity in terms of the definition of the good itself, the level of its provision, the extent to which it will change, and the affected population. The latter advocates the use of functional transfers as opposed to unit value transfers. Rosenberger and Phipps (2007) argue that functional transfers can reduce generalization errors compared to unit value transfers. This is due to functional transfers enable the calibration of the function to differences between the study site and the policy site.

As Eftec (2005) argued, cultural heritage goods are highly heterogeneous; it is unlikely to find out two cultural heritage sites that are exactly identical. Each cultural heritage site has its own distinctive features or uniqueness in terms of physical characteristics. It is unlikely that a perfect match can be made between a study site to a policy site. In addition, the body of literature on valuation studies of cultural heritage goods is heterogeneous and limited (about 60 valuation studies on very different cultural heritage goods (Tuan and Navrud 2007)).

This study finds that there is a significant difference in income elasticity of WTP between the two countries. Some of this difference is due to differences in income level. In other words, if

the income levels in the two countries are similar, the difference in income elasticities of WTP is smaller but still large. Thus, there are other factors than income that explain the difference in WTP. This makes it difficult to conduct a benefit transfer between countries as income is the one variable that we usually have statistics on at the policy site and can adjust for.

We also find that using the income elasticities at the *study site* when transferring lead to serious biases in transferred WTP estimates. This is a weakness of benefit transfer, since in practical benefit transfers (where we had not have a primary valuation study at the policy site), we would only have and use the income elasticities observed at the study site (or unity income elasticities) when we transfer, while the theoretically correct one would be the income elasticities at the policy site. Mean WTPs with PPP-adjusted (at the national average level) for differences in income level and using income elasticities at *policy site* yield much lower transfer errors than using the study site elasticities, but only slightly lower errors compared to the unadjusted WTP. Thus, in practical transfers, when income elasticities at the policy site are not available, unadjusted unit transfer would be the best method. Especially, since we also find that function transfers have larger transfer errors than these two unit transfer methods. This latter result implies that, the more information is being used in benefit transfers, the less robustness the validity of results. This is inconsistent with results observed in benefit transfer studies of environmental economics. Loomis (1992); Parsons and Kealy (1994); Brouwer and Spaninks (1999); and VanderBerg *et al*. (2003) find that functional transfers outperform unit value transfers. A feasible explanation for this is due to considerable differences in physical characteristics between the two sites as well as differences between the two markets. Physical differences across sites are a typical challenge for benefit transfers of cultural heritage goods. In environmental goods, as Rosenberger and Phipps (2007) argued, a gain in accuracy of

functional transfers compared to unit value transfers may be more a function of similarities of the sites than the calibration of site characteristics in the functional transfers. This is because WTP functions from valuation studies usually include only variables measuring socio-economic characteristics of the respondents (including income) and not physical characteristics of the site (i.e. because these characteristics are constant in individual models). However these physical characteristics are important for calibrating values across sites (Rosenberger and Phipps 2007).

As this study have discussed, physical differences across cultural heritages are likely to be larger than for both environmental related health impacts and environmental goods. This makes it more difficult to capture these physical differences in benefit function transfers of cultural heritage goods. Thus, even if we make more corrections for differences in income and socio-economic characteristics, transfer errors are not reduced but could rather increase since we are not at the same time correcting for important physical, cultural and institutional differences between sites.

To conclude, benefit transfer of cultural heritage could be highly unreliable due to lack of knowledge about which factors affects WTP for the heterogeneous group of cultural heritage goods, and data on factors we know influence WTP (i.e. income elasticity of WTP at the policy site). If one still decides to perform transfers, our results suggest that he could do just as well (or bad) by performing a simple unadjusted unit value transfer than more complex benefit transfer methods. The result of this study implies that benefit transfer will not provide accurate WTP estimates for cultural heritage goods to be used in cost-benefit analyses and other policy analyses until we have performed more primary valuation studies designed to gain more knowledge about factors that determine WTP for these goods and which we can find data on at the policy site.

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Appendices

Appendix A. Description of Ten Historic Temples in the Thailand survey

Temple Name	Location	Year Built (A.D.)
1) Indraram	Amphawa District, Samut Songkram Province	1757
2) Bangkaeyai	Amphawa District, Samut Songkram Province	1814
3) Klang	Muang District, Samutprakan Province	1756
4) Ubosataam	Muang District, Uthaitani Province	1781
5) Kiean	Wiseschaichan District, Angthong Province	1657
6) Chomprasart	Muang district, Samut Sakorn Province	1605
7) Taprakaohai	Muang District, Pitsanulok Province	1588
8) Yaitakinaram	Muang District, Nakonnayok Province	1780
9) Chalor	Bangguay District, Nonthaburi Province	1757
10) Amphawan	Banna District, Nakonnayok Province	1595

Appendix B. CV question used in the Vietnam survey

Suppose the preservation plan for My Son is implemented, and each household would have to pay a (one-time) fee of --- VND in tax increase. This fee is to be used for no other purposes than preserving My Son. If the majority of people advocate this plan, this fee will be collected, and My Son will be preserved. Otherwise, My Son heritage would be likely to continue to deteriorate.

Do you agree to pay for implementation of this preservation plan? (Please choose the one option which most closely resembles your view)

1. Yes (go to IV3)
2. No (go to IV1)
3. Yes, if I have money (go to IV1, select option 1)
4. Yes, but too expensive (go to IV1, select option 2)
5. Yes, if an acceptable method of paying is found (go to IV1, select option 3)
6. Yes, if other people agree (go to IV1, select option 4)
7. Yes, if period of payment is extended (go to IV1, select option 5)
8. Others (specify) ----------
9. DK

Appendix C. Testing the validity and reliability of benefit transfer

The validity and reliability of estimates are statistically tested by two main approaches: unit value transfers and function transfers.

1. **Unit Value transfers**: both unadjusted and adjusted unit value transfers are performed. The statistical hypotheses tested are:

Hypothesis 1: Equality of unadjusted mean WTP $H_0 : WTP_p = \hat{WTP}_s$

Hypothesis 2: Equality of adjusted mean WTP $\mathrm{H}_0 : WTP_p = \hat{WTP}_s(Y_p / Y_s)^{\varepsilon} = \widetilde{WTP}_p$

where WTP_p is the mean WTP of the policy site, WTP_s is the mean WTP of the study site, $\widetilde{WTP}_p$ is the mean WTP estimated at the policy site using income adjustments, Y_p is the average income of the policy site, Y_s is the average income of the study site, ε is the income elasticity of WTP.

The transfer errors were calculated by using the formula bellow.

$$TE_{unadjusted} = \left[\frac{\hat{WTP}_s - WTP_p}{WTP_p} \right] * 100$$

$$TE_{adjusted} = \left[\frac{\widetilde{WTP}_p - WTP_p}{WTP_p} \right] * 100$$

2. **Function transfers**: this approach transfers the entire value function estimated for the study site to the policy site. The statistical hypothesis is then:

Hypothesis 3: Equality of WTP functions

$$H_0 : \tilde{\beta}_p = \hat{\beta}_s$$

$$H_0 : \tilde{\sigma}_p{}^2 = \hat{\sigma}^2{}_s$$

where β is the vector of coefficients and σ^2 is the variance-covariance matrix.

The transfer errors are computed using the following formula.

$$TE_{adjusted} = \left[\frac{\widetilde{WTP}_p - \widehat{WTP}_p}{\widehat{WTP}_p} \right] * 100$$

Where $\widetilde{WTP}_p = \hat{\alpha}_s + \hat{\beta}_s * \overline{X}_p$

where $\widehat{WTP}_p$ is the estimated mean WTP of the policy site, $\widetilde{WTP}_p$ is the predicted mean WTP of the policy site based on the estimated WTP function ($\hat{\alpha}_s$ and $\hat{\beta}_s$) at the study site, and $\overline{X}_p$ is the vector of mean values for the explanatory variables at the policy site.

The first and second hypothesis can be tested by *t*-test or *Z*-test. The *t*-test assumes that the underlying distribution of the population sample is normal, while the test statistic has a student distribution. For large samples, the test statistic for these two tests is the same

$$t = Z = \frac{(WTP_p - \widehat{WTP}_s)}{s / \sqrt{n}}$$

where WTP_p is the estimated mean WTP value at the policy site, $\widehat{WTP}_s$ is the estimated mean WTP value at the study site, *s* refers to the standard deviation of estimator, n is the number of observations and n-1 is the degrees of freedom.

Hypothesis 3 can be tested by the Likelihood Ratio (LR) test as

$$LR = -2(LL_{pooled} - (LL_1 + LL_2))$$

where LL_{pooled} is the outcome of the log-likelihood function, the subscripts '*1*' and '*2*' refer to the Thailand sample and Vietnam sample respectively, and the subscript '*pooled*' refers to the pool of these two samples. The degrees of freedom are equal to the number of restrictions imposed.

Paper 4

Estimating errors due to yea-saying in dichotomous choice contingent valuation studies in a developing country

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Abstract. Yea-saying in Dichotomous Choice (DC) contingent valuation (CV) studies leading to overestimation of willingness-to-pay (WTP) have been observed in many developed countries. This could be an even larger problem in developing countries. We have adapted a modified version of the Dissonance-Minimizing (DM) format proposed by Blamey *et al*. (1999) to estimate the error due to yea-saying. Comparing the results from the DM format with the traditional DC approach we find that DC overestimates willingness-to-pay (WTP) for preservation of a cultural heritage site in Vietnam by 200 to 700%. However, this is the same magnitude of errors that have been found in developed countries, and therefore we cannot say that yea-saying in DC question is a bigger problem in developing countries than in developed countries. It rather seems to be a universal problem that leads to significant overestimation of WTP. Our results show that the DM approach can be used to avoid this problem also in a developing country context.

Keywords: contingent valuation, dichotomous choice, dissonance-minimizing, yea-saying.

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1. Introduction

Yea-saying is defined as the respondents' tendency to agree with CV questions regardless of their true views (Mitchell and Carson 1989). Yea-saying is known to occur in DC formats of CV studies, e.g. Kanninen (1995); Ready and Hu (1995); Ready *et al*. (1996); Berrens *et al*. (1997); and Blamey *et al*. (1999). Bateman *et al*. (2002) present two views on explaining why yea-saying occurs. The first view is a type of compliance bias[1] where a respondent tends to say yes because s/he sees it as the socially desirable response[2]. The second view is related to strategic behavior if a respondent has a WTP that is lower than the stated amount but still says yes to signal overall support the environmental good.

Two approaches have been proposed to tackle the presence of yea-saying in DC questions. The first approach is to include follow-up questions aimed at identifying the likely yea-sayers who then can be excluded from the analysis if necessary (Stevens *et al*. 1991; Spash and Hanley 1995; Ready and Hu 1995). The second approach is to use a new elicitation format proposed by Blamey *et al*. (1999), referred to as the dissonance-minimizing (DM) format. The DM format was designed to allow respondents to express multiple attitudes in the CV questions in order to reduce their dissonance, and thus their yea-saying.

The DM format is a special DC format which avoids possible yea-saying by allowing respondents to support an environmental program without having to commit dollar values (Blamey *et al*. 1999). In a standard DC format, respondents who favor the environmental

[1] Compliance bias is where a respondent purposefully misstates a valuation in an attempt to comply with some presumed expectation. Yea-saying can be viewed as a type of upward compliance bias, while nay-saying may also exist with a downward compliance bias (Berrens *et al*. 1997).

[2] The tendency to give the socially desirable answer may be considered as the tendency to give the right answer or to say what others presumably want to hear (Ross and Mirowsky 1984).

good but face a higher bid amount than their true WTP may still say yes to register support for the environmental good. The idea behind the DM format is to allow respondents to say no to the bid question, but still express support for the environmental good Blamey *et al*. (1999). Svedsater (2007) is prone to view the DM format as a more inclusive response format which captures a wide array of attributes and dimensions of the public good and its provisions. Within the inclusive response format, the respondent has many options for supporting (or not supporting) the public good, rather than exclusively stating their WTP, and this is expected to reduce the presence of yea-saying.

Previous studies provide some evidence that the DM format could reduce yea-saying arising in DC CV studies. For example, Blamey et al. (1999) and Nocera et al. (2002) find that the use of the DM format provides lower WTP estimates than the DC format. Svedsater (2007) uses the inclusive response format (i.e. a modified DM format) and finds no significant difference in WTP values between this modified DM format and multiple bounded DC format.

In this study, we apply a similar type of DM format which allows respondents to select one among many options (hereafter referred to as the Multiple Response Options (MRO) format) of the preservation program for a cultural heritage site in Vietnam. The aim of this paper is to test how the MRO format can be used to reduce yea-saying in a developing country context, i.e. by estimating the economic benefits of preserving the My Son cultural heritage site for three groups of Vietnamese respondents.

Results from the MRO format are coded following two data coding approaches. The first one is to code option ‘yes’ as yes, and all other options as ‘no’. The underlying principle of this coding approach is to allow respondents to say ‘no’ to the CV question, but still support the

program (i.e. this is the DM approach (Blamey *et al*. 1999)). The second approach is to code option 'no' as no, and all other options as 'yes'. This mimics the traditional DC approach, where respondents would say 'yes' to the CV question, despite that their true answers are 'no' as saying 'yes' to pay the stated amount is the only way of showing that they support the program when their WTP is lower than the stated amount. A comparison of these two coding approaches can then be interpreted as the error introduced by yea-saying. We expect that the institutional and cultural setting in a developing country like Vietnam may lead people to give socially desirable answer (see, e.g. Whittington 1998; Bell 2004; Zhongmin *et al.* 2006), which could lead to an even higher degree of yea-saying.

The paper is organized as follows. In the next section, we discuss an approach to modify the standard DM format, namely the MRO format. In section 3, we describe the case study of the My Son cultural heritage site in Vietnam. In section 4, we present the survey design and the implementation of the survey. The fifth section describes the WTP question formats used in the surveys, while section 6 reports the CV results, estimate the error due to yea-saying and compare with results from studies in developed countries using the DM format. The conclusions are drawn in the final section.

2. Elicitation methods – multiple response options format

The DC format is the most popular elicitation methods for CV studies because it mimics behavior in the real markets and closely resembles people's experience with political situations and voting schemes (Hoehn and Randall 1987; FAO 2000). The DC format has also been shown to be potentially incentive-compatible if the choice has some consequences for the respondent (Carson *et al.* 2000).

Unfortunately, the DC format may be prone to the presence of yea-saying arising from respondent's tendency to agree with statements regardless of content, despite improvements in design standards (Kanninen 1995; Ready *et al*. 1996, 2001; Blamey *et al*. 1999). The yea-saying tendency may be more pronounced in developing countries where people are not routinely asked their opinions on decision-making and where they may have traditional attitudes of deference to governments and may have a propensity to give a socially desirable answer (Bell 2004; Zhongmin *et al*. 2006). This is likely to be the case in Vietnam, since the country is in the early stages of economic transformation from a centrally-planed economy to a market-based economy and people are therefore used to administered prices rather than market-determined prices. In addition, the Vietnamese respondents are not familiar with the referendum type format, e.g. no referendum has been conducted in Vietnam in the past 60 years (Tuoitre 2006).

The DM format is an extension of the DC format which allows respondents to respond separately to multiple attributes of the public good, rather than solely stating their support through a single yes/no response within the DC format. The DM format also allows respondents to object to particular aspects of the CV scenario. For example, respondents may support the provision of a public good due to its benefits, but may oppose it because of an irrelevant payment vehicle. Similarly, they may find the provision of a public good as important, but be reluctant to pay for it because they cannot afford payment. By allowing respondents to support a public good without having to commit monetary values and allowing them to protest against any aspect of the CV scenario, the DM format is thus expected to reduce the presence of yea-saying, see e.g. Blamey *et al*. (1999); Nocera *et al*. (2002); Svedsater (2007).

The elicitation format used in this study is similar to the DM format proposed by Blamey *et al*. (1999). More particularly, we use a more comprehensive response format which captures a wide range of aspects of the public good and its provision. Our MRO format allows respondents to select one among many options in the CV question regardless of price.

3. Case study of My Son cultural heritage preservation

To evaluate the MRO format, we apply a CV survey to estimate the value of preservation of a world cultural heritage site in Vietnam, i.e. the My Son temple in Quangnam province. Despite its designation, the site is now in a poor state of repair and is in danger from ravages of the weather and from the tourism pressure and, therefore, urgently requires preservation and conservation efforts, see Tuan (2006) for further details.

This study assesses WTP formats used to value a proposed preservation program of My Son (see Paper 2 in this thesis for further details of the program). The program is secured to improve the condition of My Son and preserve the site for the future. The hope is that estimating and expressing in monetary terms the economic benefits of the My Son preservation program would help stop any further degradation of the site and justify the necessary investment.

4. Survey design and implementation

Respondents of this study were three different groups[3] of Vietnamese people that were thought to benefit from the preservation of My Son. These include visitors to My Son, visitors

[3] Four groups of respondents were surveyed: those included foreign visitors to My Son plus these three Vietnamese groups. For the purpose of this paper, we restrict our attention to these three groups (results of the foreign visitors group were presented in Paper 1).

to the area surrounding My Son[4] who do not visit My Son during the current trip (referred to as visitors to Hue/Hoian), and local residents.

Three surveys were carried out. The first survey was conducted at My Son to interview visitors to the site. The second one was surveyed in Hue and Hoian to interview visitors to Hue/Hoian. The third one was administered in Quangnam province to interview local households, Quangnam is the local province where My Son located.

Face-to-face interviews were used to gather primary data for the study. The surveys were carried out in the summer 2005 with a total of 724 interviews. The sample was equally distributed among three surveys, i.e. 245 for visitors to My Son, 238 for visitors to Hue/Hoian, and 241 for local residents.

During the surveys, respondents were provided detailed descriptions of the good being valued, and then they were asked whether they would be willing to pay for the good (see Paper 2 for detailed descriptions of the CV scenario).

Details of payment vehicles outlined in the questionnaires are as follows: for visitors to My Son, a one-off special fee (levied via an increase in the entrance fee) was used. Tax was the payment vehicle used for visitors to Hue/Hoian and local residents. However, several types of payment were assessed in the pre-tests, including a fee (a cultural preservation fee, an electricity bill, a water bill or a departure fee that visitor to Hue/Hoian have to pay when they

[4] i.e. those visitors visiting Hue (a city located 170 km north of My Son) and Hoian (a town located 60 km east of My Son). Hue and Hoian were selected, as they are two of the largest tourist destinations in Vietnam, and the places where most visitors stay during their trips to My Son.

left the places), a tax[5], and a donation. The results of focus groups and pre-test surveys showed that a tax was the payment method that most people would accept.

The bid amounts were stated in the local currency, and were equivalent to US$0.31, US$1.25, US$3.13, and US$6.25; and were the same for all groups of respondents.

5. WTP question formats

Details of the elicitation formats used in the questionnaires are as follows. For visitors to My Son, the CV question was framed as in table 1.

Table 1. The CV question to interview visitors to My Son

One way to help pay for it would be to have every adult visitor to My Son pay a one-time special fee via an increase in entrance fee.
If an increase of the entrance fee to your visit to My Son by ---- VND for the preservation program of the My Son sanctuary is to be undertaken, would you pay for it? (Please choose the one option which most closely resembles your view).
(1) Yes
(2) No [*go to Q. IV1*]
(3) Yes, if I have money [*go to Q. IV1, select category 1*]
(4) Yes, but a lower price [*go to Q. IV1, select category 2*]
(5) Yes, if an acceptable method of paying is found [*go to Q. IV1, select category 3*]
(6) Yes, if other people agree to pay [*go to Q. IV1, select category 4*]
(7) Yes, if period of payment is extended [*go to Q. IV1, select category 5*]
(8) Others (specify) ----------
(9) Don't know/ Not sure

Notes: Q. IV1 is the follow-up question (which is presented in table 2); Italic phrases in brackets are instructions to interviews.

[5] There is no type of tax that covers the majority of the studied population (i.e. in Vietnam income tax is only levied on high-earned income people, land use tax is on the process of removing). Thus, we do not state any particular type of tax in this case. If respondents want to know more about the tax, they are told that it would be a type of general tax such as income tax, land use tax or another type of tax that consumers would have to pay when they bought goods.

The CV question provided many reply options, as shown in table 1. These options can be interpreted as follows.

Option (1): 'yes' means that respondents favor the program and can afford the payment. Option (2): 'no' can be interpreted as respondents derive no benefits from the preservation program, or they may not find any appropriate option in the list and have their own reasons for not being willing to pay. Respondents' stating this 'no' option were asked for their reasons for refusing to pay. From a series of categories used in the follow-up question, the respondent's answer was registered by the one category which most closely resembles to his/her view. Option (3): 'yes, if I have money' can be inferred as the respondents' budget constraint kicking in. This means that respondents support the program but cannot afford the amount they are asked to pay. Option (4): 'yes, but a lower price' can be implied that respondents favor the program but may find the cost is too high. This can also be viewed as a reflection of respondents' budget constraints. Option (5): 'yes, if an acceptable method of paying is found' means that respondents object to the payment vehicle but otherwise support the program. Option (6): 'yes, if other people agree to pay' means that respondents need to know other people's opinion about the program before making their own decision to pay for it. This could be a type of collective decision making. This could also reflect that respondents need more information about the program before they answer. Another possible interpretation of this option is the issue of fairness, e.g. respondents may think that it is fair if all people in their community contribute, and only then will they themselves contribute to the provision of the public goods. Option (7): 'yes, if period of payment is extended' implies that respondents find the program important and the payment vehicle acceptable but oppose to a one-time payment. Option (8): 'others' captures other reasons, e.g. that respondents protest against a particular aspect of the CV scenario but otherwise find the preservation program is important.

The CV question provides multiple options and asks the respondent to select the one which most closely resembles his/her view. This way of framing the CV question reminds the respondent that there are many reasons why s/he may support (or oppose) the program.

Respondents with options (3), (4), (5), (6), and (7) were checked for their reasons of not being willing to pay. The respondent's answer was recorded as one of the categories listed in the follow-up question, see table 2.

Table 2. Categories used in the follow-up question

Q. IV1. If your answer is no. Why are you not willing to pay for preservation of the My Son? *[Write down the answer and tick what is closest to respondent's answers]*

(1) I have no spare income but would otherwise pay
(2) I think the cost is too high
(3) I would pay if there is an acceptable method of payment
(4) I would pay if other people agree to pay
(5) I would pay if payment period is extended
(6) There are other sites that I prefer to visit
(7) I feel the preservation of My Son temples is unimportant
(8) I do not believe paying will solve the problem
(9) I think it is the government's responsibility
(10) I do not trust the institutions that will handle the money for preservation work
(11) I oppose the preservation program regardless of costs
(12) Other reasons: (specify) …….
(13) Don't know/ Not sure

Note: Italic phrase in bracket is instruction to interviews.

CV questions used to interview visitors to Hue/Hoian and local residents were posed in the same way as the CV question used to interview visitors to My Son (except for the payment vehicle), and were described in appendices 1 and 2, respectively.

6. Results

6.1 Bids and proportions of CV answers

For visitors to My Son, the distribution of CV answers to the bids is reported in table 3.

The bottom row in table 3 reports the total number (and percentage) of respondents select each option in the CV question.

Table 3. Bids and proportion of CV-answers for visitors to My Son

Bids (US$)	**CV answer**									**Total**
	Yes	No	Yes, if I have money	Yes, but a lower price	Yes, if an acceptable method is found	Yes, if other people agree	Yes, if payment period is extended	Others	DK	
0.31	43 (69.4)	10 (16.1)	3 (4.8)	0	2 (3.2)	2 (3.2)	0	1 (1.6)	1 (1.6)	62 (100)
1.25	31 (50.8)	11 (18.0)	8 (13.1)	5 (8.2)	3 (4.9)	1 (1.6)	2 (3.3)	0	0	61 (100)
3.13	18 (29.5)	17 (27.9)	8 (13.1)	7 (11.5)	7 (11.5)	4 (6.6)	0	0	0	61 (100)
6.25	12 (19.7)	17 (27.9)	13 (21.3)	8 (13.1)	4 (6.6)	2 (3.3)	1 (1.6)	1 (1.6)	3 4.9	61 (100)
Total	104 (42.4)	55 (22.4)	32 (13.1)	20 (8.2)	16 (6.5)	9 (3.7)	3 (1.2)	2 (0.8)	4 (1.6)	245 (100)

Note: Numbers in parentheses are percentages of CV answers. Others are specified as 'I already paid enough', 'the current situation is satisfactory'.

For visitors to Hue/Hoian, the distribution of CV answers to the bid amounts is reported in table 4. The last row in table 4 reports the total number (and percentage) of respondents cite each option of the CV question.

Table 4. Bids and proportion of CV-answers for visitors to Hue/Hoian

Bids (US$)	**CV answer**									Total
	Yes	No	Yes, if I have money	Yes, but a lower price	Yes, if an acceptable method is found	Yes, if other people agree	Yes, if payment period is extended	Others	DK	
0.31	49 (81.7)	6 (10.0)	2 (3.3)	0	1 (1.7)	0	0	2 (3.3)	0	60 (100)
1.25	32 (54.2)	12 (20.3)	7 (11.9)	6 (10.2)	1 (1.7)	1 (1.7)	0	0	0	59 (100)
3.13	28 (46.7)	15 (25.0)	5 (8.3)	7 (11.7)	3 (5.0)	2 (3.3)	0	0	0	60 (100)
6.25	8 (13.6)	27 (45.8)	6 (10.2)	10 (16.9)	2 (3.4)	1 (1.7)	0	4 (6.8)	1 (1.7)	59 (100)
Total	117 (49.2)	60 (25.2)	20 (8.4)	23 (9.7)	7 (2.9)	4 (1.7)	0	6 (2.5)	1 (0.4)	238 (100)

Note: Numbers in parentheses are percentages of CV answers. Others are specified as 'if I visit the site', 'being far away from the site I feel paying anything is irrelevant to me', 'I think that other temples are more important than My Son', and 'if the site is well preserved'.

Table 5. Bids and proportion of CV-answers for local residents

Bids (US$)	**CV answer**									Total
	Yes	No	Yes, if I have money	Yes, but a lower price	Yes, if an acceptable method is found	Yes, if other people agree	Yes, if payment period is extended	Others	DK	
0.31	43 (71.7)	6 (10.0)	4 (6.7)	1 (1.7)	1 (1.7)	4 (6.7)	0	0	1 (1.7)	60 (100)
1.25	30 (50.0)	10 (16.7)	6 (10.0)	0	1 (1.7)	9 (15.0)	2 (3.3)	0	2 (3.3)	60 (100)
3.13	28 (45.9)	11 (18.0)	7 (11.5)	1 (1.6)	1 (1.6)	8 (13.1)	4 (6.6)	1 (1.6)	0	61 (100)
6.25	8 (13.3)	20 (33.3)	14 (23.3)	6 (10.0)	0	4 (6.7)	2 (3.3)	1 (1.7)	5 (8.3)	60 (100)
Total	109 (45.2)	47 (19.5)	31 (12.9)	8 (3.3)	3 (1.2)	25 (10.4)	8 (3.3)	2 (0.8)	8 (3.3)	241 (100)

Note: Numbers in parentheses are percentages of CV answers. Others are categorized as 'there is not enough information', 'I am too old to pay for it'.

For local residents, the distribution of CV answers to the bid amounts are reported in table 5; the bottom line refers to the total number (and percentage) of respondents select each option.

Compared with the first two surveys (visitors to My Son and visitors to Hue/Hoian), the local residents survey has a large number of respondents saying 'yes, if other people agree to pay', 'yes, if payment period is extended', and 'don't know'. More specifically, 25 respondents said that they would pay if other people agree to pay for the preservation program. As we discussed above, for a long time living under the centrally-planed economy, the Vietnamese respondents may be familiar with a tradition of making decision collectively (following the majority opinion). This does not necessarily mean that they could not make their own decisions, but simply because they are affected by the old practice. The collective arrangement may be more prominent in local household survey as opposed to the first two surveys of visitor (as they are coming from around the country). 8 respondents said that they would pay if the period of payment is extended. This might imply that respondents' WTP is constrained by a one-time payment. However, this option seems to us less certain than the responses related to budget constraints. 8 respondent selected 'don't know/ not sure' option.

6.2 Analysis of no-responses and protest responses

Respondents' refusing to pay was also asked for their reasons for this behaviour. A series of categories in the follow-up question were checked to determine whether those unwilling to pay represent a valid presentation or reflect a protest against some aspects of the CV scenario.

A common approach that the majority of CV practitioners applied to identify protest responses is that they classified 'no'-responses into: i) those associated with a rejection of the

payment vehicle, ii) 'no'-responses related to other reasons than lack of current or future use benefits, and iii) 'no'-responses linked to other reasons than ability to pay or budget constraints. These responses include the government should pay; those who pollute should pay; I pay enough already; it is unfair to ask me to pay anything; don't want to place money on the issue; it's not my problem; there is not enough information; do not understand the question; who do not give a reason for their response; or fail to cite a reason at all (Sutherland and Walsh 1985; Edwards and Anderson 1987; Jorgensen *et al*. 1999, 2001; Whittington *et al*. 1992).

Our classification of genuine 'no' and protest responses are presented in table 6.

Table 6. Respondents' reasons for not being willing to pay

Respondent's reasons for being not willing to pay	**Visitors to My Son**	**Visitors to Hue/Hoian**	**Local residents**
(1) I have no spare income	34 (25.0)	25 (21.0)	41 (33.1)
(2) I think the cost is too high	34 (25.0)	41 (34.5)	20 (16.1)
(3) If an acceptable method of paying is found*	19 (14.0)	11 (9.2)	4 (3.2)
(4) I would pay if other people agree to pay*	13 (9.6)	4 (3.4)	25 (20.2)
(5) I would pay if payment period is extended*	3 (2.2)	2 (1.7)	8 (6.5)
(6) There are other sites that I prefer to visit*	3 (2.2)	1 (0.8)	0
(7) The preservation of My Son is unimportant*	2 (1.5)	1 (0.8)	1 (0.8)
(8) I do not believe paying will solve the problem*	3 (2.2)	0	1 (0.8)
(9) It is the government's responsibility *	10 (7.4)	14 (11.8)	16 (12.9)
(10) I do not trust the institutions that will handle the money for preservation work*	5 (3.7)	1 (0.8)	2 (1.6)
(11) I oppose the plan regardless of costs*	1 (0.7)	0	0
(12) Other reasons*	9 (6.6)	19 (16.0)	6 (4.8)
Total respondents not being willing to pay	136	119	124
Total protest (cate.3-12)	68 (50.0)	53 (44.5)	63 (50.8)

*Notes: This table is similar to table 6 of the Paper 1, except that this table does not include 'don't know/ not sure' option; Categories with * are classified as protest responses; Numbers in parentheses are percentage.*

The follow-up question has eleven response categories plus an 'other reasons' category. These categories are in line with the above options in the CV question. The first two categories represent valid reasons for indicating that the respondent receives no benefits from the preservation program or faces budget constraints. The remains of ten categories are classified as protest responses.

For visitors to My Son, 136 (57.8%) respondents selected a 'no'-response. Of 136 respondents in this group, half of them are defined as valid 'no'-responses and the other half are protesters. For visitors to Hue/Hoian, 119 (50.8%) respondents chose a 'no'-response. Among these 'no'-responses, 66 (55.5%) are considered as valid 'no'-response and 53 (45.5%) are regarded as protest responses. With local residents, 124 (54.8%) respondents stated zero WTP. Of which 61 (49.2%) respondents are defined as non-protest responses and 63 (50.8%) respondents are protest responses.

The last row in table 6 presents total numbers (and %) of protest responses for each survey. The number (and %) of protest responses are not much different among these surveys.

6.3 Mean WTP estimates

Mean WTP estimates are potentially affected by a decision on whether to include or exclude protest responses in the sample (Halstead *et al*. 1992; Lindsey 1994; Jorgensen *et al*. 1999; Jorgensen and Syme 1995; 2000). While some authors argue that protest responses should be rejected from the analysis, other authors contend to include these protest responses. Jorgensen *et al*. (1999) argued that protest responses cannot be included in cost-benefit analysis because they do not represent true economic values.

Halstead *et al*. (1992) stated that the censoring of protest bids may bias aggregate WTP estimates in a manner that is not easily predicted, and that an alternative to censoring protest bids is to include them as legitimate zero bids (cited in Jorgensen *et al*. (1999)). McGuirk et al. (1989) suggested that protest bids in the referendum model should be considered as legitimate since the CV is aimed as measuring the values of a proposed policy rather than a commodity (cited in Raybould (2005)).

In this study, we include protest responses in the calculation of mean WTP estimates.

To calculate mean WTP estimates, we code the data from the CV question following two approaches. In the first approach, we code option 'yes' as yes (category 1 in table 1), no otherwise (cate. 2-8). Don't know option is removed from the sample (cate. 9). The idea behind this coding approach is to allow respondents to say 'no' to the CV question, but to still support the program. This is the DM coding approach (Blamey *et al*. 1999), and here it is referred to as a 'standard DM' coding. In the second coding approach, we code option 'no' as no (cate. 2) and yes otherwise (cate. 1, 3-8). Don't know option is excluded from the analysis (cate. 9). The reasoning behind this approach is to allow respondents to say 'yes' to the CV question, despite their true answers being 'no'. This coding mimics the DC approach, and is hereafter named the 'mimic DC' coding. By comparing these two data coding approaches, the study can check for yea-saying and the magnitude of this behaviour if it exists.

The distribution of CV answers to the bid amounts following the 'standard DM' coding of these groups are shown in table 7.

Table 7 shows that 43.2% of visitors to My Son, 49.4% of visitors to Hue/Hoian, and 46.8% of local residents are classified as yes-response to the CV question. Results show that the

percentages of yes-response monotonically decrease as the bid amounts increase in all groups, as expected.

Table 7. Bids and proportion of yes-answers from 'standard DM' coding

Bids (US$)	**Visitors to My Son**		**Visitors to Hue/Hoian**		**Local residents**	
	N	% yes	N	% yes	N	% yes
0.31	61	70.5	60	81.7	59	72.9
1.25	61	50.8	59	54.2	58	51.7
3.13	61	29.5	60	46.7	61	45.9
6.25	58	20.7	58	13.8	55	14.5
	241	43.2	237	49.4	233	46.8

Results from the 'mimic DC' coding of these three surveys are presented in table 8.

Table 8. Bids and proportion of yes-answers from 'mimic DC' coding

Bids (US$)	**Visitors to My Son**		**Visitors to Hue/Hoian**		**Local residents**	
	N	% yes	N	% yes	N	% yes
0.31	61	83.6	60	90.0	59	89.8
1.25	61	82.0	59	79.7	58	82.8
3.13	61	72.1	60	75.0	61	82.0
6.25	58	70.7	58	53.4	55	63.6
	241	77.2	237	74.7	233	79.8

Table 8 shows that 77.2% of visitors to My Son, 74.7% of visitors to Hue/Hoian, and 79.8% of local residents are defined as yes-response to the CV question. This means that if we mimic the DC coding, the percentages of yes-response increase significantly compared to results from the DM coding (i.e. 33 percentage points higher for visitors to My Son, 25 for visitors to Hue/Hoian, and 33 for local residents). Results of this coding approach show that, there are

very high percentages of yes-response at the highest bid. Our results are similar to Blamey *et al*. (1999) in the way that they cannot avoid 'fat tail' problems at the highest bid[6].

Next, we presents mean WTP estimates based on the 'standard DM' and 'mimic DC' coding approaches.

Table 9 reports non-parametric and parametric estimates. The difference between non-parametric and parametric estimation is that the former reduces the restrictions imposed on the underlying WTP distribution. For the non-parametric approach, a lower bound estimate for mean WTP is calculated by $\Sigma t_j(F_{j+1}-F_j)$, where t_j is the bid amounts; F_j is proportion of no-answers. The confidence interval for a lower bound WTP can be constructed because of the asymptotic normality (Haab and McConnell 2002).

The parametric estimates (without covariates) are calculated based on the simple linear model, which contains the bids and an intercept. Mean WTP[7] is equal to *–Intercept/Bidcoeff*, where *Bidcoeff* is the coefficient of the bids. The confidence intervals for the parametric estimates are obtained by using the Krinsky and Robb (1986) bootstrapping procedure with 1000 draws.

The parametric estimates with covariates are calculated following Hanemann (1984) as:

$$Mean(\max WTP) = \frac{1}{\beta}\left[\ln(1+\exp(\frac{\alpha \mathbf{Z}_i}{\beta})\right]$$

where β is the estimated parameter of bids, $\boldsymbol{Z}_i$ is a vector of individual's variables and α is vector of corresponding parameters. One implication of this prescription is that WTP is

[6] At the highest bid, Blamey *et al*. (1999) show that 57.8%, 78.7%, and 68.4% of respondents agree to pay for three different DC question formats DC1, DC2, and DC3 respectively.

[7] In the case of a linear utility function and a symmetric, mean zero error, the mean and median WTP are equal (Haab and McConnell 2002).

assumed to be positive for all respondents. The confidence intervals for the parametric estimates are obtained using the Delta method (Greene 2000).

Table 9. Mean WTP estimates (US$) from the 'standard DM' coding

	Visitors to My Son	**Visitors to Hue/Hoian**	**Local residents**
Non-parametric estimates[a]	1.90	2.07	1.97
	[1.49-2.31][b]	[1.69-2.45]	[1.59-2.35]
Parametric estimates	1.76	2.53	2.23
(without covariates)	[0.99-2.52]	[1.94-3.12]	[1.55-2.90]
Parametric estimates	2.69	3.07	1.99
(with covariates)	[1.78-3.61]	[2.26-3.87]	[1.33-2.65]

Note: [a] Lower bound estimate for WTP, [b] Numbers in [] are 95% confidence intervals.

Results from table 9 show that mean WTP values based on different methods of calculation (i.e. non-parametric, parametric without covariates, and parametric with covariates) are not much different in all groups of respondents, ranging from $1.8 to $2.7 for visitors to My Son; from $2.1 to $3.1 for visitors to Hue/Hoian; and from $2.0 to $2.2 with local residents.

Table 10 reports mean WTP values calculated based on the 'mimic DC' coding.

Table 10. Mean WTP estimates (US$) from the 'mimic DC' coding

	Visitors to My Son	**Visitors to Hue/Hoian**	**Local residents**
Non-parametric estimates[a]	4.59	4.10	4.58
	[4.16-5.02][b]	[3.67-4.59]	[4.26-5.11]
Parametric estimates (without covariates)	12.40	6.77	9.41
	[2.33-22.48]	[4.94-8.60]	[5.43-13.39]
Parametric estimates (with covariates)	16.89	8.51	11.42
	[-5.09-38.88]	[4.87-12.15]	[5.09-17.76]

Note: [a] Lower bound estimate for WTP, [b] Numbers in [] are 95% confidence intervals.

Table 10 shows that, results of mean WTP estimates for each survey vary greatly, depending on the methods of calculation. A common pattern found in all of these surveys is that: mean WTP values are highest in parametric estimates with covariates, then parametric estimates without covariates, and lowest in non-parametric estimates. This implies that if we impose more restrictions on the underlying WTP distributions, mean WTP values get larger (i.e. parametric estimates vs. non-parametric); if we use more complicated models (i.e. parametric with covariates vs. parametric without covariates), mean WTP values are more divergent. For example, for visitors to My Son, mean WTP estimates are $4.6 for non-parametric estimate, $12.4 for parametric estimates without covariates, and $16.9 for parametric estimates with covariates.

6.4 Calculation of estimate errors

In this section, we calculate estimate errors based on different assumptions in data coding approaches in order to check the robustness of the results. The estimate error is the ratio of the 'mimic DC' coding to the 'standard DM' coding.

Table 11. Errors due to yea-saying (%)

	Visitors to My Son	**Visitors to Hue/Hoian**	**Local residents**
Non-parametric estimates	242	198	233
Parametric estimates (without covariates)	707	268	423
Parametric estimates (with covariates)	627	277	574

Table 11 shows that, for visitors to My Son, the error is highest in parametric estimates without covariates (707%), and lowest in non-parametric estimates (242%). For both visitors to Hue/Hoian and local residents, we find that estimate errors increase in the same way: from

non-parametric estimates to parametric estimates without covariates then to parametric estimates with covariates. This means that estimate errors increase as we impose more restrictions on the WTP distribution and select more complex models to compute mean WTP values. In other words, the 'standard DM' coding increases welfare estimates greatly as opposed to the 'mimic DC' coding. This could be viewed as an evidence of the occurrence of yea-saying in the DC data coding.

Reviews of the literature shown that there have been only three DM CV studies to date (i.e. Blamey *et al*. 1999; Nocera *et al*. 2002; and Svedsater 2007). Svedsater (2007) found no effect in using DM as compared to double bounded DC. Our results are somewhat consistent with results from Blamey *et al*. (1999) and Nocera *et al*. (2002), given that these two studies are conducted in developed countries and concerned with different goods. For the Blamey *et al*. (1999), by the same way of calculation, results of the DC/DM ratios (calculated at median WTP values) of three different treatments DC1/DM1; DC2/DM2; and DC3/DM3 are 788%; 663%; and 433%, respectively. In Nocera *et al*. (2002), the ratio between the DC and DM method (calculated at mean WTP values) of the 'care' program is 119% and 125% for logit model and non-parametric model, respectively; the DC/DM ratio of the 'research' program is 109% and 124% for logit and non-parametric models, respectively.

6.5 Valuation functions

This section analyzes factors potentially affecting the WTP. Table 12 presents results of regression analysis with logit models based on the 'standard DM' and the 'mimic DC' data coding (models of the 'standard DM' coding are similar to those models in Paper 1). In these models, we include three sets of explanatory variables: the price the respondent is asked (*bids*), the respondents' socio-economic characteristics (*sex*, *age*, *income*, and *education*), and

the respondents' knowledge and attitudes towards the cultural heritage site (their previous knowledge about the site (*know*), if they have visited it before (*visit*), their awareness the importance of it existence (*importance*), and if they have plan to visit it in the future (*ftrip*).

Table 12. Estimated parameters of the logit models

Variables	**Visitors to My Son**		**Visitors to Hue/Hoian**		**Local residents**	
	'standard DM'	'mimic DC'	'standard DM'	'mimic DC'	'standard DM'	'mimic DC'
Coefficient (p-value)						
Constant	-1.664 (.000)***	0.799 (.121)	0.292 (.384)	1.758 (.000)***	-11.25 (.000)***	-1.57 (.013)**
Bids	-0.021 (.000)***	-0.006 (.154)	-0.031 (.000)***	-0.016 (.000)***	-0.06 (.000)***	-0.02 (.003)***
Sex	0.0004 (.820)	-0.004 (.766)	0.002 (.158)	0.002 (.017)**	-0.005 (.751)	0.001 (.754)
Age	-0.001 (.810)	0.009 (.864)	-0.001 (.276)	-0.0002 (.747)	-0.009 (.848)	-0.001 (.890)
Income	0.001 (.452)	0.008 (.876)	0.0004 (.721)	-0.001 (.535)	4.69 (.000)***	1.08 (.000)***
Education	0.465 (.161)	0.103 (.756)	2.292 (.000)***	1.193 (.002)***	2.40 (.040)**	-0.23 (.747)
Know	0.569 (.194)	0.130 (.769)	0.001 (.342)	0.001 (.367)	0.56 (.420)	1.32 (.002)***
Visit	-0.363 (.415)	-0.513 (.242)	-0.002 (.829)	-0.002 (.865)	1.65 (.051)	-0.12 (.855)
Importance	0.022 (.000)***	-0.002 (.968)	-0.699 (.009)***	-0.848 (.002)***	1.32 (.043)**	1.11 (.005)***
Ftrip	2.628 (.000)***	1.028 (.002)***	0.694 (.010)***	0.843 (.002)***	0.18 (.809)	0.65 (.117)
Summary statistics						
LogL function	-119.43	-119.80	-101.25	-107.72	-55.57	-84.48
Pseudo R^2	0.27	0.07	0.38	0.20	0.65	0.28
Chi squared	90.69	19.27	126.01	52.72	250.89	65.33
No. of obs.	241	241	237	237	233	233

*Notes: ** = parameter significance at at least at the 5% level, *** = parameter significance at at least at the 1% level.*

The theoretical expectations are: i) as price increases the probability of saying yes decreases, ii) a respondent with higher income has higher probability of saying yes, and iii) if respondents have more knowledge about and positive attitudes towards the preservation of the site, they are more willing to pay for it.

Here we pay attention to assessing the performance for two classes of models ('standard DM' vs. 'mimic DC') of the three surveys. As expected, the *bids* variable is negatively and significantly in all models (except the 'mimic DC' model of visitors to My Son).

Income is positive and significant in both models of the local residents. *Education* is positive and significant in both models of the visitors to Hue/Hoian; it is significant in the 'standard DM' model for the local residents. *Know* is only statistically significant in the 'mimic DC' model of the local residents. *Importance* is positive and significant in the surveys of visitors to My Son (except the 'mimic DC' model) and local residents, but negative in both models of visitors to Hue/Hoian. *Ftrip* is positive and significant in both models of visitors to My Son and visitors to Hue/Hoian. Results from table 12 suggest that the 'standard DM' models are more responsive than the 'mimic DC' models.

Table 12 also shows that the 'standard DM' models yield higher chi-squared and pseudo R-squared than the 'mimic DC' models. This can be interpreted as the 'standard DM' data coding provides better models than the 'mimic DC' coding.

7. Conclusions

In this study, we apply a similar type of DM format which allows respondents to select one among many options of the public goods regardless of price. The MRO format was used to

estimate the economic benefits of preserving My Son cultural heritage site in Vietnam for three groups of respondents. The study is aimed to calculate estimate errors due to yea-saying by comparing WTP estimates derived from the two data coding approaches: the DM and DC coding. The application of the DM format in order to estimate the economic benefits of the cultural heritage good in a developing country is the novelty of this study.

We find that the DM coding approach provides much lower estimates than the DC data coding. Estimate errors, which are calculated by the ratio between the DC and DM coding, range from 200% in non-parametric estimate and up to 700% in parametric estimate. This could be viewed as an evidence of yea-saying induced by DC question. The DM coding approach provides better and more responsive logit functions as compared to the DC coding. In other words, coding the multiple response options data in a way that allows respondents to say 'no' to the CV question (but still supports the good) offer better valuation functions than coding the data that allows respondents to say 'yes' to the CV question (even though their true answers are 'no').

In a CV study conducted to value environmental restoration in rural China, Zhongmin *et al*. (2006) found that median WTP elicited using the DC referendum question format was *nine* time larger than the payment card. They argued that this excessive yea-saying induced in the DC question may arise because their respondents have not had a long history of open elections or voting on referenda involving raising taxes to pay for public projects. To a certain extent, there are some similar contextual features between our study and Zhongmin *et al*. (2006). For example, there are some similarities in cultural and political settings between China and Vietnam. Respondents in these two studies have not had experience with referendum type elicitation question format. We hypothesize that using the DC question

format in a developing country like Vietnam might lead to a risk of exacerbating the presence of yea-saying.

However, compared to results from previous studies conducted in other developing country as well as in developed countries, the same magnitude of errors can be found, and therefore we cannot say that yea-saying in DC questions is a bigger problem in developing countries than in developed countries. It rather seems to be a universal problem that leads to significant overestimation of WTP.

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Appendices

Appendix 1. The CV question to interview visitors to Hue/Hoian

One way to help pay for it would be to have every adult visitor pay a one-time special fee via an increase in tax.

If an increase in tax by ---- VND for the preservation program of the My Son sanctuary is to be undertaken, do you agree to pay for it? (Please choose the one option which most closely resembles your view).

(1) Yes

(2) No [*go to Q. IV1*]

(3) Yes, if I have money [*go to Q. IV1, select category 1*]

(4) Yes, but a lower price [*go to Q. IV1, select category 2*]

(5) Yes, if an acceptable method of paying is found [*go to Q. IV1, select category 3*]

(6) Yes, if other people agree to pay [*go to Q. IV1, select category 4*]

(7) Yes, if period of payment is extended [*go to Q. IV1, select category 5*]

(8) Others (specify) ----------

(9) Don't know/ Not sure

Appendix 2. The CV question to interview local residents

Suppose that we were to have a referendum that every household would pay a one-time preservation fee via an increase in tax. If the referendum was passed by a majority voting, the fee would be collected, and the My Son Sanctuary would be preserved. Otherwise, the My Son sanctuary would be likely to continue to deteriorate.

If an increase in tax to your household by ---- VND for the preservation program of the My Son sanctuary is to be undertaken, do you agree to pay for it? (Please choose the one option which most closely resembles your view).

(1) Yes

(2) No [*go to Q. IV1*]

(3) Yes, if I have money [*go to Q. IV1, select category 1*]

(4) Yes, but a lower price [*go to Q. IV1, select category 2*]

(5) Yes, if an acceptable method of paying is found [*go to Q. IV1, select category 3*]

(6) Yes, if other people agree to pay [*go to Q. IV1, select category 4*]

(7) Yes, if period of payment is extended [*go to Q. IV1, select category 5*]

(8) Others (specify) ----------

(9) Don't know/ Not sure

Paper 5

Valuing direct use values of wetlands:

a case study of Tam Giang-Cau Hai lagoon wetland in Vietnam

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Abstract.

Tam Giang-Cau Hai (TGCH) lagoon wetland directly or indirectly provides the livelihoods for about 300,000 people living around and on the lagoon. Due to expansion of aquacultures, intensive fishing, and lack of an appropriate management scheme, the biological resources in the lagoon are degraded. This study provides information on the direct use values of the lagoon wetland, using a market price approach. We find that the direct use values derived from aquaculture, capture fisheries, agricultural production, and sea grasses and fresh water hydrophytes collection in the lagoon is VND4.7 million per hectare per year in 2005. Among these uses, capture fisheries provide the highest value in terms of net benefits, followed by agricultural production. Aquaculture yields the largest figure of total benefits, but has a negative net benefit (i.e. a loss). This information on economic values can be used for designing new policies and making trade-offs among alternative management options for the lagoon wetland.

Keywords: economic valuation, direct use values, lagoon, wetlands

1. Introduction

The Tam Giang-Cau Hai (TGCH) lagoon complex lies along the coastal line of Thua Thien Hue (TTH) province in Vietnam. The complex covers 219.18 km^2, forming the largest lagoon system in Southeast Asia. The lagoon complex plays a vital role in lives of the local people and the socio-economic development of the province (Hoang 1998; Thanh *et al*. 1998; Nam *et al*. 2003). However, the lagoon complex is currently under a number of critical issues and threats. Large area of the lagoon wetland has been reclaimed for agriculture and aquaculture (Yen 2001; Phap *et al*. 2002). The aquatic ecosystems are being polluted by chemical and fertilizer run-off from intensive agriculture practices, and by organic effluents from towns and villages in the surrounding area (Hoi *et al*. 1997; Sourcebook 2001). Fishery resources are being over exploited and destroyed by destructive methods (Thanh *et al*. 1998; Phap *et al*. 2002; Tuyen 2002). A rapidly increasing population, high population density, backward practices and poverty of people living on[1] and around the lagoon increases pressures to the lagoon complex (Hoi *et al*. 1997; Thanh *et al*. 1998; Xuan *et al*. 2007). Other human activities in the upstream catchments of rivers have negative impacts on the lagoon. For example, the construction of reservoirs in upstream rivers threatens to reduce nutrient inflows and alter hydrological regimes of river draining into the lagoon (Hoi *et al*. 1997; Thanh *et al*. 1998; Xuan *et al*. 2006a). In addition, the lagoon wetland is threatened by natural causes such as sudden moves of inlets of the lagoon increase sedimentation and erosion, leading to a decline in salinity and an increase in flooding to the lagoon area (Hoi *et al*. 1997; Nam *et al*. 2003). The management of the lagoon resources had not been paid due attention for a long time, which have led to problems and increased conflicts between different resources uses, among

[1] There were 1,036 households with 5,227 persons living on boats (sampan people) in the lagoon (Nam *et al*. 2003).

the stakeholders, and between lagoon resource management and uses (Tuyen 2002; Xuan *et al*. 2006a; 2006b).

Economic valuation can provide useful information to wetland management; see Barbier *et al*. (1997). Information on the rate of harvest of natural resources, harvesting methods in order to determine the optimal level of exploitation over time, and the overall status of natural resources are needed to effectively manage wetlands (Torell *et al.* 2001). In addition, the economic values of wetland goods and services are important in cost benefit analysis of development projects, helping policy makers to make responsible decisions and trade-offs (Torell *et al.* 2001; Lambert 2003). These values are also important in determining the contribution of wetland resources to a country's gross domestic products (Torell *et al.* 2001). The information on wetland values can help policy makers to develop policies that reflect the value of the resources and issues associated with their management and conservation (Torell *et al.* 2001; IUCN 2003; Thang and Bennett 2005).

However, there is currently a lack of information on the economic values of wetlands in Vietnam in general and the TGCH lagoon wetland in particular. Very few valuation studies of wetlands have been conducted in Vietnam[2]. Specifically, no valuation study on the economic values of the lagoon wetland has been conducted. This leaves a gap in knowledge of economic values of the lagoon wetland. This information gap, coupled with a lack of an appropriate policy for wetland management, poses a big challenge to management of the lagoon complex.

[2] To our knowledge, only two wetland valuation studies have been done in Vietnam, both studies used secondary data to assess some of the wetlands' use values. VEPA/IUCN (2000) estimate main direct and indirect use values (i.e. timber; fuelwood; NTFPs; fisheries; tourism; wildlife harvesting; water route protection; storm protection; carbon sequestration) of Can Gio mangrove forest in Ho Chi Minh City. Thang and Bennett (2005) assess direct use values of wetland in Camau province in Mekong River Delta.

This study aims at estimating the direct use values of wetlands in TGCH lagoons, using a market price approach.

TGCH lagoon complex is composed of a system of coastal lagoons, from north to south referred to as: Tam Giang, Sam-Chuon, Thuy Tu, and Cau Hai lagoon. Due to time and resource constraints, this study focuses on estimating the direct use values of resource-based economic activities occurring on Tam Giang lagoon. Primary data of these activities on the Tam Giang lagoon in 2005 were collected.

The paper is structured as follows. Section 2 presents the TGCH lagoon, problems in lagoon resource use and management, and the challenges in use and management of the lagoon. Section 3 describes methods applied in the paper; sampling strategy; and data collection. Section 4 presents empirical results. Section 5 discusses the results, highlights the limitations of the study, and concludes with discussions of policy implications.

2. Background to Tam Giang-Cau Hai lagoon wetland

2.1 The Tam Giang-Cau Hai lagoon

TGCH lagoon consistes of three main areas: the Tam Giang lagoon in the north, the lagoons of Sam-Chuon and Thuy Tu in the middle, and Cau Hai lagoon in the south. The lagoon is connected to the sea via Thuan An and Tu Hien inlets, and separated from the sea by a large sand dune system. With an area of 219.18 km^2, the TGCH lagoon complex is known as the largest wetland of its type in Vietnam (approximately 50% of the total lagoon area of the country). The natural resources of the complex are used to support the livelihoods of local communities (Hoang 1998; Thanh *et al*. 1998; Nam *et al*. 2003; Xuan *et al*. 2006a).

To date, 921 species, 444 genus and 237 families have been recorded in the TGCH lagoons. A list of 73 species of waterfowl has been identified; out of which 34 are migrant species, 21

enlisted in the EU List of strict protection and one species enlisted in the Vietnam Red List of endangered species (Thanh *et al*. 1998; Nam *et al*. 2003).

The lagoon is thought to provide coastal protection, serve as a buffer to saltwater intrusion into intensively cultivated areas inland, and regulate the micro-climate of surrounding areas. The lagoon facilitates transport for a large number of boats between communes and villages on their shores. It also provides commercial ports for thousands of fishing boats, and a sheltered, sea port for ocean-going vessels (Sourcebook 2001; Thanh *et al*. 1998; Nam *et al*. 2003).

The lagoon provides important spawning, breeding and nursery grounds for aquatic species. The influx of nutrients from many inland rivers entering the lagoon supports high levels of primary productivity in the lagoon. This productivity in turn supports large numbers of migration waterfowls, as well as the fisheries production in the lagoon (Thanh *et al*. 1998; Tien *et al*. 2000).

The lagoon also provides many products such as fish, crabs, shrimps, *molluscs*, seaweed and hydrophytes species that are important resources not only for local consumption but also for export with high economic values. About 300,000 inhabitants which is about 1/3 of the provincial population have settled around and on the lagoon and earned their livelihood by directly or indirectly exploiting the lagoon resources. More than a half of the lagoon population (58%) has their livelihood based on agricultural production such as crops and livestock. Capture fisheries and aquaculture are main sources of income for many households around and on the lagoon. Sea grasses and fresh water hydrophytes of various species are harvested to provide feeds for aquaculture, fertilizer and organic matter for crops (Hoang 1998; Nam *et al*. 2003; Xuan *et al*. 2007).

2.2 Problems in lagoon resource uses and management

There is a number of critical problems in resource use and management in the TGCH lagoon. These include over fishing, over expansion of aquaculture, water pollution, degradation of biodiversity, and conflicts between uses and user groups.

Thanh *et al*. (1998) report that the number of persons employed in the fisheries has almost doubled (from 5,500 to 9,000 people), and the number of fishing boats has increased from 3,110 to 4,675 in the period of 1977– 1997. However, fisheries yields have declined from 3,600 tons to 2,000 tons over a ten year-period (Hoi *et al*. 1997). In addition, capture fisheries households have a tendency to use motorized boats and destructive fishing gears such as push net, dragnet, and electricity gear leading to over and destructive exploitations of the lagoon aquatic resources (Xuan *et al*. 2006a).

Large areas of the lagoon have been reclaimed and encroached for shrimp and fish aquaculture (Yen 2001; Phap *et al*. 2002). The total area of aquaculture in the lagoon was 830 ha in 1995, reached 1,850 ha in 2000, was almost double in 2004, and currently comprised 4,000 ha (Mien and Phap 1999; Xuan *et al*. 2006a; 2007).

The lagoon is being polluted by pesticide run-off from intensive agricultural practices and deforestation, and by organic effluents from towns and villages in the surrounding areas (Hoi *et al*. 1997; Sourcebook 2001). The lagoon environment is increasingly polluted due to the chemical uses for sanitizing ponds, shrimp diseases, feed (especially fresh feeds) residues. Unplanned and over-construction of shrimp ponds, high density of fishing gears, constructions of irrigation systems and dams in the upstream reduce the water flows and wastes discharged to the sea (Xuan *et al*. 2006b). In addition, the lagoon water pollution is worsened due to oil leakages from fishing and transport boats, oil supply ports and garage

stations around the lagoon (Xuan *et al*. 2006b). The lagoon water pollution has caused biodiversity reduction, disturbance to the lagoon ecosystems, possible loss of aquatic species, expansion of toxic species to the environment such as toxic seaweed, and poisonous shrimps (see ICZM 2004a; Vietnam-France 2003).

One of the most important roles of the TGCH lagoon is as a nursery and breeding ground for many aquatic species. However, the uses of destructive fishing methods and construction of shrimp ponds have destroyed spawning grounds leading to threats to the reduction of biodiversity (Tien *et al*. 2000). Other causes such as organic matters, oil leakages, chemicals uses, and residues from agricultural practices and aquaculture are considered to be threats to biodiversity of the lagoon (Phap and Thuan 2002).

Due to weaknesses of the present management, a lack of respect among user groups because of differences in customs; traditions and life styles, conflicts among resource-based economic activities and user groups have occurred and become more critical (Tuyen and Brzeski 1998; Tuyen 2002).

2.1 Challenges in lagoon resource uses and management

Major threats and challenges to the TGCH lagoon include: high population growth rate, lack of appropriate policies for the lagoon resource management, and impacts of globalization and global environmental changes.

One of the big challenges to use and management of the TGCH lagoon is a rapidly increasing population (at a rate of 1.8% per year which is significantly higher than the provincial average at 1.6%), high population density of this region (413 persons/km^2 compared to 222 persons/km^2 of the province average in 2004), and old practices and poverty of people living around the lagoon (TTH-DOF 2004; Xuan *et al*. 2006b).

There is a lack of appropriate policies for the lagoon resource management. In fact there exist many legal documents involved in wetland management of lagoon resources. However, there remains a gap in the dissemination of these documents from central to local governments (Phap 1997). Functions and responsibilities of government agencies in the lagoon resource management are not clearly defined and overlap. There is a lack of agreement on coordination mechanisms among local authorities at different levels in activities relating to the lagoon resource management, and a lack of enforcement measures for implementation (Nam *et al*. 2003; Xuan *et al*. 2006b). These legislative limitations have led to environmental pollution and degradation of the lagoon resources.

The Vietnamese economy has gradually joined the world economy, and Vietnam has become a member of WTO. Since aquaculture from the lagoon is mainly produced for export to world markets, this sector is directly influenced by the impacts of globalization. The lagoon farmers are directly affected by international market prices with its volatile nature, strict regulations of food safety, import-export regulations, and the competition with products from many other countries worldwide. For example, an increase in market prices would attract producers to broaden their aquaculture production. This could be very risky to local people who have low education, lack of market information, and lack of understanding of international exported legislations, and therefore, shocks to their production are inevitable (Xuan *et al*. 2006b).

3. Methodology

3.1 Total economic value

Total economic value (TEV) of wetlands includes both use and non-use values (Barbier *et al*. 1997). Use values can be derived from people direct or indirect uses of wetlands through wetland goods and services. Direct uses of wetlands could involve both commercial and non-

commercial activities such as harvesting of fish, collection of fuel wood, and use of the wetlands for recreation (Barbier *et al*. 1997). Indirect use values refer to values provided by wetlands that maintain and protect natural and human systems through services such as maintenance of water quality and flow, flood control and storm protection, and the production and consumption activities they support (IUCN 2003). A special category of use value is option value, which is a premium placed on maintaining wetland resources for future possible use (IUCN 2003). Non-use values are associated with benefits derived from knowing that a resource is maintained (Turner *et al.* 2000). Non-use values include biodiversity, cultural heritage, and bequest values. In general, use values involve some human interaction with the resource whereas non-use values do not (Barbier *et al*. 1997). Table 1 presents a classification of TEV for wetlands.

Table 1. Classification of total economic value for wetlands

Use values			**Non-use values**
Direct use value	Indirect use value	Option value	
- Fish harvest - Agriculture - Fuelwood collection - Recreation - Transport - Wildlife harvesting - Peat/energy	- Nutrient retention - Flood control - Storm protection - Groundwater recharge - External ecosystem support - Micro-climatic stabilization - Shoreline stabilization, etc.	- Potential future uses (as per direct and indirect uses) - Future value of information	- Biodiversity - Culture heritage - Bequest values

Source: Barbier et al. (1997)

3.2 Market price method

Market price is a straightforward approach to estimate the value of wetland goods. Market prices reflect what people are willing to pay for wetland products; i.e. the marginal value they place on them (Barbier *et al*. 1997). However, two difficulties may arise in relation to the use of market prices for valuing wetland products. Firstly, many wetland products have no market at all. These products are harvested for own use by households and never sold in the market. Secondly, market prices may be distorted because of market interventions or imperfect competition such as exchange rate controls, price ceiling settings, taxes, subsidies, and monopolies (Emerton 1998). In this case, market prices do not reflect the real value of wetland products.

In this paper, we apply a market price method to estimate direct use values from the Tam Giang lagoon. The direct use values derived from local uses that can be assessed from resource-based economic activities taking place in the lagoon such as aquaculture, capture fisheries, agricultural production, and sea-grass[3] collection. When the products are sold in the market, market prices are used to calculate the generated gross income. However, if the products are used only for subsistence purposes, the gross income was calculated based on surrogate prices for which two approaches can be applied. The first one is to use market prices of the closest substitute for such a product. The second approach is to use the opportunity cost of time and labor spent in collecting and preparing the wetland product. However, the cost of extraction must be subtracted from the gross income to derive the direct use value (Sathirathai 2003).

$$\text{Local direct use value} = \text{Net income generated for local use} = \{PiQi - Ci\}$$

[3] In this case, sea-grass refers to as sea grasses and fresh water hydrophytes.

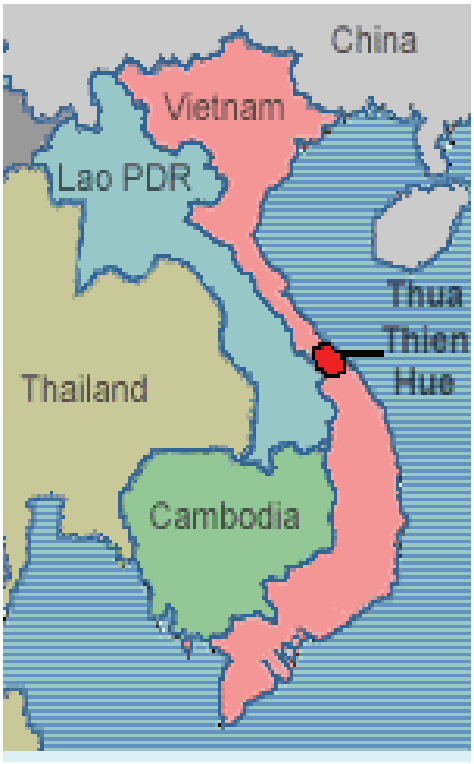
where P = prices of product i; Q = amounts of product i being collected; C = costs involved in the collection of product i.

This paper only emphasizes on the direct use values derived from four key economic activities currently taking place in the lagoon: (i) aquaculture, (ii) capture fisheries, (iii) agricultural production, and (iv) sea-grass collection.

There are several other economic activities in the lagoon such as boat transportation, tourism and recreation, and titanic mining, which are also provided important sources of income for the local people (Xuan *et al*. 2007). However, because of data limitation, time and budget constraints, we can not assess them all. This study does not assess indirect use values as well as non-use values of the lagoon wetland.

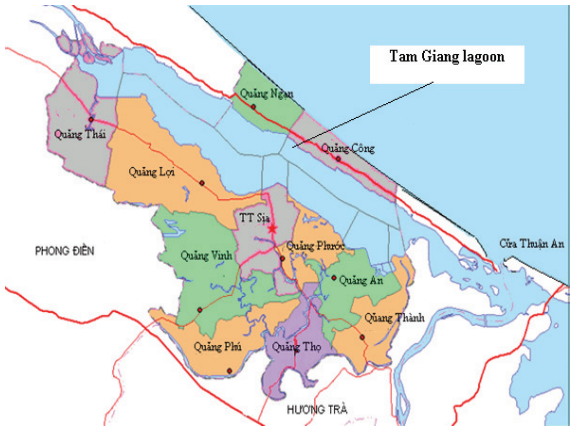
We have selected Tam Giang lagoon as a case study for a number of reasons. Firstly, the Tam Giang lagoon has all types of economic activities that are representative for activities in the TGCH lagoon. This area is highly polluted because of over expansion of shrimp and fish aquacultures, as well as the high density of fishing gears. Secondly, the area of the Olau River's mouth, which is a part of the Tam Giang lagoon, is currently proposed to become a wetland protected area (ICZM 2004b). Thirdly, because of time and resource limitations, we focus our study on the Tam Gaing lagoon, and carry out the survey in 10 different communes/ town located around the Tam Giang lagoon; see figure 1.

Figure 1. Location of the study of Tam Giang lagoon



Map of Vietnam

Map of Thue Thien Hue province



Map of Tam Giang lagoon

Source: Adapted from http://www.mekong-protected-areas.org/vietnam/field.htm (16/07/07).

Household surveys were conducted to obtain primary data on frequencies and quantities of different products collected from studied activities on the lagoon, as well as the labour spent in collecting those products. Secondary data and published information were gathered from different departments of TTH province, libraries of colleges in Hue, research institutes, management boards of related projects[4].

[4] E.g. Integrated Management of Lagoon Activities (IMOLA 2005), Integrated Coastal Zone Management (ICZM 2003; 2004a), Project of Research and Sustainable Development in the Lagoon (Vietnam-France 2003).

A total number of 1,290 household interviews in these 10 communes/ town were conducted during the spring 2006.

3.3 Sampling strategy and data collection

Table 2 shows the population, sample, and fraction of interviewed households to total number of households taking part in each activity.

Table 2. Sampling strategy

Activities	Total number of households in the area	No. of households participated in activities	% of participated households to total households	No. of interviewed households	% of interviewed households to participated households
	(1)	(2)	(3=2:1)	(4)	(5=4:2)
Aquaculture	15,424	1,461	9.5	395	27.0
Capture fisheries	15,424	1,620	10.5	405	25.0
Agri. production	15,424	5,802	37.6	365	6.3
Sea-grass collection	15,424	279	1.8	125	44.8

Table 3. Sampling strategy

Activities	**Sample size**	**Interviewed sample**	**% of interviewed sample**
Aquaculture	395	357	90.4
Capture fisheries	405	336	83.0
Agricultural production	365	372	101.9
Sea-grass collection	125	124	99.2
Total	1,290	1,189	92.2

Table 3 presents the sampling strategy for four key economic activities on the Tam Giang lagoon. Out of the total of 1,290 households proposed for interviewing, the household numbers for each activity are 395 households for aquaculture, 405 households for capture fisheries, 365 households for rice cultivation and aquatic poultry raising (agricultural

production), and 125 households for sea-grass collection. The total number of interviewed households is 1,189; i.e. a response rate of 92.2%.

4. Empirical results

This section presents direct use benefits from resource-based economic activities on the Tam Giang lagoon. These include aquaculture, capture fisheries, agricultural production, and sea-grass collection.

4.1 Aquaculture

In order to assess the direct use value of aquaculture in the lagoon, some selected criteria were used:

- Costs of production (C): refers to the sum of the costs that households paid in order to do aquaculture production. Costs of production are composed of direct cost (DC), subsistence/self-sufficient costs (SC), depreciation cost of ponds (Dc), and cost of borrowing money (i).

$$C = DC + SC + Dc + i$$

+ Direct costs (DC) are all the costs that households paid in cash for buying materials; feeds, annual maintaining of ponds, hiring labours, paying tax; fees, and other costs. These costs are based on market prices.

+ Subsistence costs (SC) refer to the costs that households do not use cash for payment and household can be produce themselves such as household's labour, subsistence materials, etc. These costs are calculated based on opportunity costs.

+ Depreciation cost of ponds (Dc) is the cost associated with the value of ponds that declines over time.

+ Cost of borrowing money (i) refers to interest rates that households paid for banks or other borrowing sources and other costs associated with the loan.

- Benefits (B): are calculated by multiplying quantity (Q) with market price (P).

$$B = Q \times P$$

- Net benefits (NB): is defined by subtracting costs from benefits.

$$NB = B - C$$

There are two main types of aquaculture in the lagoon: shrimp and fish. There are two methods of shrimp farming: semi-intensive and improved-extensive[5]. For fish, two methods of fish aquaculture are found: pond-farming and cage-farming.

Table 4 presents the average area per household for different types of aquaculture in the lagoon. On average, the average area per household is 0.5ha for households with semi-intensive and improved-extensive shrimp farming, 0.4ha for households with pond-farming of fish, and about 96m^2 for cage-farming of fish. For cage-farming of fish, households usually do fish farming in cage with an average area of 100m^2.

Table 4: The average area of aquaculture per household (m^2/household)

Household groups	Min	Max	Mean	Std. dev.	No. of obs.
Semi-intensive households	500	20,000	5,148	2,164	141
Improved-extensive households	2,500	8,000	4,964	1,209	14
Pond-farming households	100	17,000	4,115	5,016	24
Cage-farming households	40	250	96	50	76
No. of observations					255

Table 5 reports direct use values derived from 1 hectare of aquaculture.

[5] The classification of semi-intensive or improved-extensive farming method is based on the level of investments per hectare on shrimp farming.

Table 5. Direct use value from 1 hectare of aquaculture (VND1000[6]/ha)

Type of aquaculture	Method of farming	Benefits	Production costs	Net benefits
Shrimp	Semi-intensive	49,178	61,984	-12,806
	Improved-extensive	34,225	41,022	-6,796
Fish	Pond-farming of fish	37,372	43,856	-6,485
	Cage-farming of fish	438,593[7]	174,624	263,969

Results from table 5 show that the benefits per hectare are VND49.2 million, VND34.2 million, VND37.4 million, and VND438.6 million for semi-intensive shrimp farming, improved-extensive shrimp farming, pond-farming of fish, and cage-farming of fish, respectively. Cage-farming of fish yields a very high benefit per hectare since this is a type of supper-intensive farming with high investments.

Production costs of aquaculture include direct cost, depreciation cost of ponds, and cost of borrowing money. This study does not include subsistence costs in the production costs because it is difficult to collect data on households' labour and subsistence materials used in aquaculture.

Among these types of aquaculture, direct costs account for about 82%; 76%; 85%; and 71% of the production costs of semi-intensive shrimp; improved-extensive shrimp; pond-farming of fish; and cage-farming of fish, respectively. Among items of direct costs, costs for buying feeds and seeds usually make up the largest part, followed by cost for annual maintenance of ponds (Xuan *et al*. 2007).

In general, households in the region pay a very large share of their investment for building ponds. Thus, it is necessary to take into account the cost of construction of ponds depreciated

[6] US$1 = VND 16,000.

[7] This figure is aggregated in order to compare with other types of aquaculture in the lagoon.

over time. In this study, we assume a remaining value of ponds equal to 50% of the initial value, the life time of ponds is 10 years, and we apply a linear depreciation method. With these assumptions, we find that depreciation costs account for about 8%; 13%; 8%; and 5% of the production costs of semi-intensive shrimp; improved-extensive shrimp; pond-farming of fish; and cage-farming of fish per annum in 2005, respectively (Xuan *et al*. 2007).

In addition, households usually have to borrow money for aquaculture and, therefore, we need to include the cost of borrowing money in our calculation. However, households commonly use their loan for many purposes (e.g. building house, buying motorcycle, buying foods, paying for school fees, etc.) besides using it for aquaculture. Thus, it is difficult to account for the proportion of loan used for aquaculture. Based on results from Xuan *et al*. (2006c), we assume that households in the region use 50% of the loan for aquaculture. This means that the cost of borrowed money is based on 50% of the household's loan. In this study we find that costs of borrowing money account for about 9%; 11%; 7%; and 24% of the production costs for semi-intensive shrimp; improved-extensive shrimp; pond-farming of fish; and cage-farming of fish, respectively (Xuan *et al*. 2007).

Results from table 5 show that shrimp farming is the most inefficient resource-based activity in the lagoon: the production costs are larger than the benefits. Semi-intensive shrimp farming has the largest loss of -VND12.8 million/ha; followed by improved-extensive shrimp farming, -VND6.8 million/ha per year in 2005. This means that shrimp farming method with higher investment per hectare gets larger the loss. The net benefit of pond-farming of fish is also negative, -VND6.5 million/ha. Meanwhile, cage-farming of fish gives a positive net benefit, with about VND2.6 million/100m^2 of cage per year in 2005.

Table 6. Total benefit from aquaculture in the lagoon

Type of aquaculture	Total of area	Benefit/ha	Cost/ha	Net benefit/ha	Aggregated net benefit
	ha	VND1000	VND1000	VND1000	VND1000
	(1)	(2)	(3)	(4=2-3)	(5=1x4)
Semi-intensive shrimp farming	604.58	49,178	61,984	-12,806	-7,742,275
Improved-extensive shrimp farming	83.49	34,225	41,022	-6,796	-567,395
Pond-farming of fish	41.48	37,372	43,856	-6,485	-268,973
Cage-farming of fish	2.80	438,593	174,624	263,969	739,493
Total	732.35	-	-	-	-7,839,150

Table 6 shows the aggregated benefits from aquaculture for the whole study area (i.e. the Tam Giang lagoon). The aggregation of net benefit of aquaculture in the lagoon per year in 2005 is -VND7.8 billion[8]. In other words, aquaculture activities in the lagoon produce at a net loss. It is important to note that 2005 is the year of serious loss for aquaculture (about 60% of aquaculture households are lost).

4.2 Capture fisheries

At present, there are more than ten different types of equipments (gears) for capture fisheries activities in the lagoon such as fish corral, fish traps, pushing net, drag-net, drift-net, fish-pot, gill-net, cast netting, etc.

Shrimp and fish are two major products from capture fisheries production in the lagoon. The capture fisheries production in the lagoon also provides other products such as crab, oyster,

[8] Given that we do not include subsistence costs in the total production costs and, therefore, net benefits are exclusive of subsistence costs.

and squid. However, shrimp and fish products generate high and stable sources of income for local households. This study focuses on fish and shrimp products.

In order to calculate total benefit of capture fisheries, it is important to identify the number of fishing days for each product and average net revenue for each day.

Results from our household survey show that capture fisheries for fish and shrimp take place all year, with some seasonal features. For fish products, the high season of fisheries is from December to the next August, and the low season is during September to November. For shrimp product, the high season is from February to June, and the low season is in the other period of the year. The number of fishing days for the whole year is 267 days and 223 days for fish and shrimp, respectively.

Table 7 shows results of direct use value derived from capture fisheries; showing that the capture fisheries production yields a benefit of VND14.7 million/household/year. In the study area, there are 1,620 households involved in the capture fisheries, which yield a total benefit of VND23.9 billion per year in 2005.

Table 7. Direct use value from capture fisheries (VND1000)

Criteria	Benefit	Production cost	Net benefit
Per household	14,772	4,725	10,047
For all fishing households in the lagoon	23,931,153	7,654,500	16,276,653

The production cost of capture fisheries consists of cost of fuels, cost for buying and repairing fishing equipments, cost for hired labour, fees, etc. The costs of fuels and repairing fishing equipments account for 95% of the costs. Other costs such as hired labour and fees account for only about 5% of the production cost since the production of capture fisheries mainly uses the labour of the households.

Table 7 shows that the net benefit of the production of capture fisheries per household per year in 2005 is VND10 million. The net benefit for all households involved in capture fisheries activities in the lagoon is VND16.3 billion per year in 2005.

4.3 Agricultural production

For agricultural production, the study focuses on two main agricultural activities: rice cultivation and farming of aquatic poultry.

Direct use value from rice crop

From our household survey, we find that there is a lack of information and data on other crops such as potatoes, cassava, and beans. This study focuses on assessment of direct use value from rice cultivation. Rice cultivation is a major crop in this region, which is accounted for 67.62% of the area of agricultural crops.

Table 8 shows that gross benefit per hectare of rice crop in 2005 is VND10.3 billion.

Table 8. Direct use value from rice production in 2005 (VND1000)

Criteria for calculation	Benefit	Production costs	Net benefit
Per 1 hectare	10,295	6,222	4,073
For total area of rice crop in the lagoon	17,546,730	10,605,135	6,941,595

Due to a lack of secondary data on the area of rice crop that cultivated in[9] and around the Tam Giang lagoon, we assume that about 50% of the area of the Tam Giang lagoon wetland is used for rice cultivation. Results from our survey show that the total area of rice cultivation in the studied region is 1,704 ha, which yields a total benefit of VND17.5 billion (see table 8).

[9] Located in the north end of TGCH lagoon, Tam Giang lagoon is composed of both fresh water (the area of the Olau River's mouth) and brackish water bodies. Rice and other crops are cultivated in the fresh water area.

The production costs of rice cultivation include seeds, fertilizers, chemicals, machinery, and hired labour. It is worthy of noting that the production costs of rice crop do not include household's labour cost. Net benefit per hectare of rice crop in 2005 is VND4.1 million. For the total area of rice crop in the lagoon, the total net benefit is VND6.9 billion/year in 2005.

Direct use value from aquatic poultry farming

Aquatic poultry farming (duck, goose) is an important income-generated activity for many local households in the region. The total number of the aquatic poultry farming in the area is 43,270 heads, in which duck is a majority (with a total of 40,958 ducks, and accounted for 95.5%).

In order to assess direct use value for the aquatic poultry farming, we calculate benefits and costs based on 1000 ducks, and then generalize the result to all of the aquatic poultry in the lagoon.

Table 9 shows that an average farming 1000 ducks in 2005 yields a benefit of VND37 million. The benefit for all of the aquatic poultry in the lagoon is VND1.6 billion/year in 2005.

Table 9. Direct use value from aquatic poultry farming (VND1000)

Criteria for calculation	Benefit	Production costs	Net benefit
Per 1000 ducks	37,000	21,110	15,890
For the whole aquatic poultry	1,600,990	913,430	687,560

The production costs of aquatic poultry farming consist of seeds, feeds, medicines, and hired labour (but exclude cost of household's labour and cost of subsistence feeds).

The net benefit per 1000 ducks is VND15.9 million per year in 2005. For the whole aquatic poultry in the lagoon, the net benefit is VND678.6 million per annum in 2005. It is important

to note that during the study year (2005), aquatic poultry farming in the region was heavily affected by bird disease which led to a significant decrease in the number of aquatic poultry. For example, the number of aquatic poultry in 2005 is only about 1/7 times compared to the number in 2003. Thus, the direct use value from the aquatic poultry farming in the lagoon would have been higher if it had not been affected by bird disease.

4.4 Sea-grass collection

As in other regions in Vietnam, sea grasses and fresh water hydrophytes of various types are harvested to provide feeds for livestock, poultry, and fish. Sea-grass in the lagoon region are also harvested to provide fertilizer and organic matter for crops, such as tobacco, red pepper and tomato, which are grown on the dry, sandy soils nearby. The majority of the people in the lagoon harvest sea-grass for subsistence purposes; some of them collect sea-grass for commercial purposes.

The market price method is applied to estimate direct use benefit from sea-grass products that are sold in markets. However, results from our survey show that only 28% of these products are sold in markets, the rest is harvested for subsistence. For simplicity, we assume that all products from sea-grass collection are harvested to be sold in markets. Based on this assumption, we find that sea-grass products collected from the Tam Giang lagoon provide a total benefit of VND3.1 billion.

The costs of sea-grass collection include fuel cost, labour cost, and costs for minor repair of boats. Sea-grass gathering activity requires a small investment cost, mainly for a boat and other simple (home-made) equipments, regular costs are fuel (accounts for 67%) and labour (28%).

Table 10 reports direct use benefit from sea-grass collection.

Table 10. Direct use benefit from sea-grass collection (VND1000)

	Benefit	Production costs	Net benefit
Sea-grass collection	3,130,229	265,025	2,865,204

Table 10 shows that sea-grass products harvested from the Tam Giang lagoon provide a net benefit of VND2.9 billion in 2005.

4.5 Aggregation of total benefits

This section aggregates the economic benefits of four main studied activities. Table 11 presents results of four key economic values which accrue from the lagoon: aquaculture, capture fisheries, agricultural production, and sea-grass collection.

Among these activities, capture fisheries provides the highest net benefit to local people followed by rice crops. Aquaculture yields the largest figure of gross benefits (i.e. VND35.4 million), but has a negative net benefit. Table 11 shows that the net benefit of aquaculture is -VND7.8 million per annum in 2005. Note that the aquaculture in the lagoon was heavily affected in 2005, about 60% of the aquaculture households were lost in this year.

Table 11. Aggregation of direct use values from the Tam Giang lagoon (VND1000)

Activities	Total benefits	Total production costs	Total Net benefits
1. Aquaculture	35,369,417	43,208,567	-7,839,150
2. Capture fisheries	23,931,153	7,654,500	16,276,653
3.1 Rice crop	17,546,730	10,605,135	6,941,595
3.2 Aquatic poultry farming	1,600,990	913,430	687,560
4. Sea-grass collection	3,130,229	265,025	2,865,204
Total	81,578,519	61,824,570	18,931,862

In the next section, we calculate the aggregated direct use value per hectare from the lagoon. The aggregation of direct use values from the lagoon is VND18.9 million (table 12). The total

area of the Tam Giang lagoon is 4,268 ha. Therefore, the average direct use value per hectare per year is about VND 4.4 million (US$277). This figure would have been larger if other direct use values of the lagoon such as tourism; transport; and mining had been measured.

Table 12. Direct use values from the lagoon per hectare (VND1000)

Criteria	Total benefits	Total costs	Total net benefits
For the whole Tam Giang lagoon	81,578,519	61,824,570	18,931,862
Per hectare	19,114	14,486	4,436

5. Discussions and Conclusions

5.1 Discussions of the results

Results from section 4.5 show that across four activities in the lagoon, aquaculture yields the highest *total benefit* to local people (VND35.4 billion), followed by capture fisheries (VND23.9 billion), agriculture production (rice crop and aquatic poultry farming with a total value of VND19.1 billion), and then sea-grass collection (VND3.1 billion). However, if we are looking at the net benefit of these activities, capture fisheries provides the highest *net benefit* (VND16.3 billion), following by agriculture with about VND6.9 billion. Sea-grass collection yields a net benefit of about VND2.7 billion. Aquaculture yields a negative net benefit (-VND7.8 billion) per annum in 2005. It is interesting to observe that capture fisheries, have lower production costs compared to aquaculture and agriculture, yield the highest net benefit among the four activities in the lagoon. This implies that, under the current condition of the lagoon where the water body is highly polluted because of over expansion of aquacultures and over fisheries, activities associated with higher production costs are likely to obtain lower net benefits or even lost. Keeping in mind the fact that the survey was carried out in 2005, when diseases in aquaculture and bird disease occurred that seriously affected to

aquaculture production and aquatic poultry farming. Thus, the net benefits would have been higher if these diseases had not occurred.

The aggregation of net benefits for the whole Tam Giang lagoon is estimated at VND18.9 billion, and the average value per hectare is VND4.4 million per year in 2005. Note, further, that this study does not include the use value of other activities in the lagoon such as tourism, transportations, and titanic mining. The figure would have been higher if we had included the direct use value derived from these unmeasured activities.

In order to compare the direct use values of Tam Giang lagoon wetland with other wetlands in Vietnam, we present results from previous studies in the country. There have been two studies of wetland valuation in Vietnam to date.

VEPA/IUCN (2000) estimates main direct and indirect use values (including timber; fuelwood; NTFPs; fisheries; tourism; wildlife harvesting; water route protection; storm protection; carbon sequestration) of Can Gio mangrove forest in Ho Chi Minh City. Results show that the total use value of Can Gio forest is about VND95 billion per annum for the area of 30,000ha mangrove forest, or VND3.2 million per hectare per year, on average, with the price calculated in 1999.

Thang and Bennett (2005) assess direct use values of wetland in Camau province in Mekong River Delta. This study finds that wetlands in Camau have the direct uses of capture fisheries, aquaculture, timber, fuelwood, *Nypa fruticans* and medicinal plants, with the estimated average value of VND7,5 million/ha per year, calculated at the price in 2001.

5.2 Limitation of the study

A number of limitations remain in this study. First, the selection of the study area following administration boundary of communes (including 10 communes/ towns) in the two districts

was advantageous in terms of gathering secondary data, but did not include all communes associated with the Tam Giang lagoon (there are two more communes related to the Tam Giang lagoon that are not included in the scope of this study). In addition, many economic activities in the lagoon are indivisible; these activities can not be separated following administration boundaries (e.g. capture fisheries, sea-grass collection). This limitation may have an effect on the accuracy of the estimated direct use value of the lagoon.

Second, this study focuses only on estimation of direct use values derived from four main activities in the lagoon: aquaculture, capture fisheries, agricultural production, and sea-grass harvesting. There are many other activities currently taking place in the lagoon, e.g. titanic mining; tourism; transport; agricultural production of other crops (beside rice); capture fisheries of other aquatic products (along with shrimp and fish). If we had included all of these benefits in the estimation, the estimated value would have been larger.

Third, this study does not include the opportunity costs of household's labour as well as subsistence materials in estimation of the production costs. If we had included these costs in the estimation, the results of net benefits derived from the lagoon would have been lower.

The attempt to incorporate many direct use values in an economic valuation of wetlands, conducted in Tam Giang lagoon, is the strength of this study.

5.3 Conclusions

TGCH lagoon directly or indirectly provides the livelihoods for about 300,000 people living in and around the lagoon. However, the lagoon resources are currently degraded or have declined because of a number of reasons such as over expansion of aquaculture; over fishing; lack of an appropriate management scheme. Thus, information about the economic values of different uses of the lagoon wetland could be useful for policy making.

This study provides information on direct use values of the lagoon wetland. Using a market price approach in the case study of the Tam Giang lagoon, we find that the direct use values derived from aquaculture; capture fisheries; agricultural production; and sea-grass collection in the lagoon, was VND4.4 million per hectare per year in 2005. Among these activities, capture fisheries provide the highest value, followed by agricultural production; sea-grass collection; and aquaculture.

This result may be useful for policies and decisions in making trade-offs among alternative management and use options of the lagoon wetland[10]. For example, one may compare direct use values estimated from the lagoon wetland to values from agricultural production of rice crop if the lagoon wetland is reclaimed for rice cultivation. As this study has shown, rice crops in (and around) the lagoon yields the net benefit of VND4.1 million/ha per year in 2005, while if the lagoon wetlands are maintained as the current situation, it would provide the net benefit of VND4.4 million/ha per year derived from the four studied activities. Taking into account the fact that these values are exclusive of use values from other unvalued activities such as tourism; transport; mining, as well as option and nonuse values of the lagoon wetland,

[10] There was a number of proposed options for management and uses of the TGCH lagoon resources. The TGCH lagoon was included on a list of 16 proposed marine protected areas compiled on behalf of the Ministry of Science, Technology and the Environment in 1998 (Sourcebook 2001). In their plan for establishing marine and protected systems for Vietnam, the Asian Development Bank (ADB 1999) reiteratively proposed to set up a marine protected area at the TGCH lagoon. TTH Provincial Department of Science and Technology prepared the pre-feasibility research to nominate the establishment of the TGCH lagoon as a wetland nature reserve (Nam *et al*. 2003). In 2004, the Vietnam - Netherlands Integrated Coastal Zone Management (VNICZM) Project on behalf of the People's Committee of TTH Province proposed to establish a wetland protected area for the area of the Olau River's mouth (ICZM 2004b). As yet, no specific institutional framework is established. In addition, in a master plan for management and uses of the TGCH lagoon recently proposed by TTH Provincial Department of Fisheries, the proposed area for aquaculture in the lagoon will be reached 7,000ha in 2010 from the current area of 4,000ha (Xuan *et al*. 2007). As there is, no clear option in management and uses of the TGCH lagoon wetland will be selected in the future.

it seems more profitable from the society point of view maintain the current resources in the wetlands rather than growing rice all over the wetlands.

We may compare the total value estimated with the provincial gross domestic product (GDP) to see the contribution of the Tam Giang lagoon in the regional GDP. The total area of Tam Giang lagoon is made up 0.84% the total area of land in TTH province. However, the total benefit derived from the lagoon is 1.15% compared to the TTH provincial GDP. This suggests that the Tam Giang lagoon provides a higher value per hectare than the provincial average.

There is also room for further research, especially in terms of extending the assessment to estimate the total economic value including indirect use as well as non-use values of the lagoon wetland.

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The thesis consists of five self-contained papers. The first four papers are concerned with economic valuation of cultural heritage goods. The last one estimates direct use values of coastal wetlands in Vietnam.

The first paper estimates the economic benefits of preserving temples at the My Son cultural heritage site using the contingent valuation method, and shows how these benefits can be captured and used to justify preservation investments. The second paper compares the estimates from contingent valuation and choice modeling methods, and pools the results from these two independent stated preference methods. The third paper compares contingent valuation studies of cultural heritage sites in Thailand and Vietnam, and discusses possibilities and difficulties in cross-country transfer of cultural heritage values. The fourth paper finds that errors due to yea-saying in dichotomous choice contingent valuation studies are not larger in developing countries than in developed countries. The last paper estimates the direct use values of wetlands, with a case study of Tam Giang-Cau Hai lagoon wetland in Vietnam.

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