



The Cultural Ecosystem Service of the Lower Songkhram River Basin: A Case Study of The Songkhram River View Point, Thailand

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Abstract— The objective of this study was to analyze willingness to pay for the entrance fee of the Songkhram River View Point which was represented of cultural ecosystem service (CES) of the Lower Songkhram River Basin (LSRB), located at Chaiburi, Tha Uthen District, Nakhon Phanom Province, Thailand by elicitation 600 samples in 4 villages including 1) Chaiburi, 2) Phanom, 3) Don Nang Hong, and 4) Nathon, using purposive sampling. The data was analyzed by single-bonded closed-ended CVM question, Non-parametric Model and Logistic Regression Model. The result revealed that the willingness to pay for the entrance fee of the Songkhram River View Point by mean of the Non-Parametric Model was 32.29 Bath per person per time (0.90 USD) and its total value of all visitors willing to pay was 19,372.96 Bath (539.04 USD). This finding also showed that the positive correlation of visitor's willingness to pay was income ($\text{sig} = 0.032$) and the Logistic Regression equation for the entrance fee of the Songkhram River View Point was $\text{WTP} = -1.4 + 1.96 X_1$.

Keywords— Cultural ecosystem service, lower Songkhram river basin, Songkhram river view point.

1. INTRODUCTION

The major environmental problems include declining ecosystem services, accelerating loss of biodiversity, increasing competition for limited land resource, continuing forest fragmentation, increasing pollution, and growing demand for limited water resources [1]. These trends are all parts of a system of rapid change that affects human wellbeing, and their magnitude is likely to increase in the coming decade unless serious efforts are made toward more sustainable form of development. The appropriate responses to that would support sustainable development. The proposed system begins with conserving the biological basis of ecosystem services management [2]. Economists have long recognized that ecosystems provide important benefit to society, and that prices can be assigned to many of them such as land, water, and timber. The full range of benefits recently has been given the umbrella label of ecosystem services (ES) [3].

Ecosystem provide many functions and services to human society, including air filtration, micro-climate regulation, noise reduction, rainwater drainage, sewage treatment, and recreational cultural and educational values [4]. These were divided into four broad categories: 1) provisioning services such as food and water; 2) regulating services such as flood and disease control, 3) supporting services such as nutrient cycling; and 4) cultural services such as spiritual, recreational, and cultural benefit [5]. Valuation of ES is useful tool available to decision maker tasked with managing resources [6]. Monetary ES can provide a range of benefits that can help inform resource allocation decision

however valuating ES is not identical to commodification them for trade in private market [7].

Some ES are easier to value than others, with cultural ecosystem services being particularly difficult [8]. Cultural ecosystem services (CES) are the subset of ecosystem services that provide non-material benefits such as spiritual enrichment, cognitive development, reflection, recreation, and esthetic experience [9]. Most of what is known about CES has been studies in natural ecosystems and CES may be more directly experienced. Their benefits may be more rapidly appreciated, particularly for aesthetic services (beauty appreciation), recreational services (recreational and leisure activities), inspirations for art and design, cultural heritage and identity services, spiritual or religious inspiration and education and science opportunities.

In contrast to other ecosystem services, there is therefore limited information and recognition about the benefits of CES for human well-being, particularly in terms of the information needed to support decision-making processes. This is because the intangible and subjective nature of CES makes it challenging to assign economic values. Identifying the spatial distribution of CES presents special challenges because they are usually intangible and incommensurate with economic valuation methods [10].

Developing new techniques and unbiased indicators to capture people's perceptions of CES have been standing challenges for economists, and the ecosystem research community [11]. Most studies including CES have focused on recreation and tourism and they have used common approach to evaluated CES such as, hedonic models [12], spatial value transfer [13], GIS based mapping [14], spatial indicator to assess opportunities for recreation and tourism [15], and Contingent Valuation Method (CVM) which is the popular assessment method [16]. Finding a proper way to assess and measure CES can provide essential insights for planning and

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management.

To contribute to the emerging research field of CES, the purpose of this research is to evaluate CES value of the Lower Songkharm River Basin (LSRB), Northeast Thailand, in term of the entrance fee to the Songkram River View Point, which is the representation of CES of the LSRB by using CVM technique. The study area is a Confluence of the Songkram and Mekong Rivers (Chaiburi, Tha Uthen, Nakhon Phanom Province, Thailand). The data was analysis by using single bounded closed-ended CVM question, Non-parametric Binary Logistic Model. Finally, the result of this research can add value to tourism management by helping to clarifying the tourism-nature-wellbeing relationship.

2. CULTURAL ECOSERVICE SYSTEM

The most frequency cited CES framework comes from the Millennium Ecosystem Assessment. CES assessments address four main classes of services namely; 1) provisioning services (i.e. food and water), 2) regulating services (i.e. regulation of flood and droughts), 3) supporting services (i.e. nutrient cycling), and 4) cultural services (i.e. recreation and spirituality) [17]. CES are important as they provide valuable insight into human-environmental interface, ultimately revealing critical pathways for sustainable interactions with natural resources [18]. The 2003 framework highlights CES obtained through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience. In 2003 the MA distinguish CES into ten major type including culture diversity, spiritual an religions values, knowledge system, educational values, inspiration, aesthetic values, social relations, sense of place, cultural heritage values and the most frequency evaluated category of CES is recreational and tourism [19]. The Millennium Ecosystem Assessment conceived of CES as distinct but equivalent to other ecosystem services (regulation, supporting, and provisioning). Other schemes however, acknowledge CES as being quite distinct from other ecosystem service. For example, CES cannot be cleanly grouped into a category because of overlaps with other type of ecosystem [20]. Fishing is cited as an example of where an ecosystem contributed to inspiration (a nonmaterial benefit) but also food (provision ecosystem service)

From the various categories of CES, we found that many of the definitions of CES are intangibility, which is perhaps the most commonly cited reason that CES are so difficult to measure. CES are broadly defined as the non-material benefits that result from paired human and environment interaction [21]. Most CES assessment focus on recreation and scenic beauty with less documentation of spiritual values, cultural identity, social cohesion, and heritage values [22]. Neglecting to acknowledge CES in resource management and decision making can lead to dire and unintended consequences including ineffective regulations, low adoption of regulations, and public dissatisfaction with both regulations and regulators.

Here, the objective of this study was to analyze willingness to pay for the entrance fee of the Songkharm

River View Point which was represented of cultural ecosystem service of the Lower Songkhram River Basin, located at Chaiburi, Tha Uthen, Nakhon Phanom Province, Thailand, to outline a process of capturing intangible benefit into monetary term by using Contingent Valuation Method.

3. STUDY AREA

The Songkhram River Basin taken as a whole is the second largest river catchment in northeast Thailand, including parts of Udon Thani, Nong Khai, Sakon Nakhon and Nakhon Phanom provinces and supports an estimated population of 1.7 million people. The Lower Songkhram River Basin (LSRB) includes about a quarter of the total basin area across 12 districts in three provinces, with a broad floodplain area that is reported to experience maximum 50-year floods of up to 185,000 ha. The Songkhram River flows about 430 km eastwards through Udon Thani, Sakon Nakhon, Nong Khai and into the Mekong River at Ban Chaiburi, Tha Uthen, Nakhon Phanom province (figure 1). Much of catchment comprises of flat plain and is formerly forested with tropical deciduous or monsoon forest, but most has now been cleared for agriculture; about 39% of the catchment is farmed for rice and the remainder for upland field crops, with some remnant forest land [23]. Wetland including rice fields, cover about 54% of the catchment and are concentrated along the lower part of the basin.

In the wet season, the level of both Songkhram and Mekong River increase until they are up to 13 meters higher than in the dry season and at a meeting of river has clearly different color. The Meeting of waters is the confluence between the clear Songkharm River and the brown Mekong River. For a long way the two rivers' waters run side by side without mixing. It is one of the main tourist attractions of LSRB.

A confluence of the Songkram and Mekong River, Tha Uthen, Nakhon Phanom province, Thailand, is called the Songkharm River View Point and it is represented the CES of the LSRB. This study provides both provisioning services and cultural services. The provisioning services are involving local occupation such as planting, fishing and selling food processing product from both rivers. For cultural services, this area provides scenic view along the bank of the both River and different color will clearly appear for the visitors to see. The recommended activity is walking, sitting and enjoying natural view. At study area there are not many facilities provided for the visitors, including accommodation, restaurant, shop, souvenir shop, rented boat for tour guiding, as well as local tour guide because of no entrance fee. As the result, The LSRB is one of common property which is first come first serve character, everybody can consume by not take care of them. The local authority does not have enough budgets to organize and manage this area to be sustainable ecotourism because they do not understand about CES value.

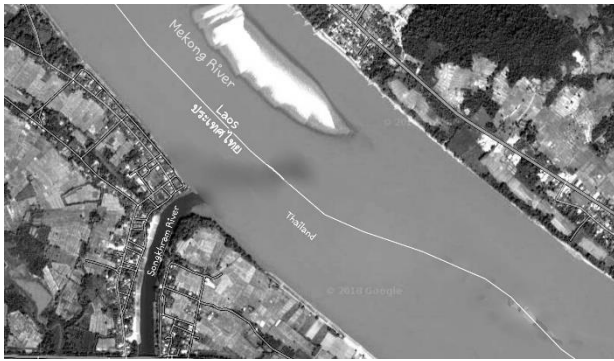


Fig.1. Study area with 17°39'11.2"N 104°27'57.5"E; The Songkhram River View Point at Ban Chaiburi, Tha Uthen, Nakhon Phanom province, Thailand.

4. CONTINGENT VALUATION METHOD CONCEPT

Contingent Valuation Method (CVM) is the stated preference technique that can be used to estimate both use and non-use values. CVM is the most widely used method for estimating non-use values and it also the most controversial of the non-market valuation method. CVM is called contingent valuation because people are asked to state their willingness to pay on a specific hypothetical scenario and description of the environmental service. This method had been used to measure scenic quality and outdoor recreation [16] and had involved a survey of a sample of people on the amount they would be willing to pay for entrance fee of recreation area to improve and manage public facilities [24]. The CVM is an increasingly popular method for valuating cultural ecosystem service [25]. The CVM has more potential for converting intangible value to be tangible value and had been widely applied to value the nonmarket ecosystem services provided by natural resource [25].

This research therefore chose CVM to measure the CES in the study area based on visitor’s willingness to pay (WTP) for entrance fee of a cultural area. It is used to estimate the potential value of the CES provided by the Songkram River View Point which was represented CES of the Lower Songkhram River Basin (LSRB).

In this approach, this study learned about the preferences of respondents for certain CES based on their answers to questions about hypothetical choices. In addition, this paper calculated the reveal preference by using entrance fee as a market value to indicate how much stakeholders would be willing to pay for enjoying the CES and to complement the WTP estimate. Conventional market-based approaches offer a basis for valuing ecosystem services that can be transacted in market. Therefore, the value of CES was based on WTP and a market value based on entrance fee. We used three equations of non-parametric model; Eq. (1) for the percentage of visitor on start bid in each group; Eq. (2) for the total willingness to pay of all visitors; Eq. (3) for the average willingness to pay.

$$S(B_j) = n_j/N_j \tag{1}$$

where,

- S(B_j) The percentage of visitors on start bid in each group
- n_j The number of visitors on bidding in each group
- N_j All of visitors in each group
- J Visitors group (j = 1, ..., j)

$$WTP\ total = \sum_{i=0}^j [S(B_j) - S(B_j + 1)] \times N \times M_j \tag{2}$$

where

- WTP total The total willingness to pay of all visitors
- N The total samples (N = 600).
- M_j Mean of bidding in each group

$$Mean\ WTP = WTP\ total / N \tag{3}$$

where,

- Mean WTP The average willingness to pay of all visitors
- WTP total The total willingness to pay of all visitors
- N The total samples (N = 600).

Finally, this research used Logistic Regression Model to identify variable that affected the visitor’s decision on WTP. The model was used to identify variables that affected the visitor’s decision on WTP. The positive WTP was the dependent variable and independent variables were gender, age, marriage status, occupation, education, environmental training experience, environmental organization, and income.

5. DATA COLLECTION

The researcher used Mitchell and Carson concept [27] collecting 600 samples from the total population in 4 villages including Chaiburi, Phanom, Don Nang Hong, and Nathon, Nakhon Phanom Province, Thailand, by purposive sampling. The target groups were tourists who had visited study area and each questionnaire was collected on face-to-face basis by trained interviewer, who described the meaning of each questionnaire and available choices to visitors in order to avoid response bias. In order to assess WTP, demographics variables, participant’s opinion on the LSRB tourism, and willingness to pay for entrance fee to enjoy CES of the LSRB were assessed. The visitors were asked about the frequency of times to visit the study area in order to elicited purposive sampling.

The questionnaire was divided into 4 sections; the first section contained demographic questions including gender, age, marriage status, occupation, education, and environmental training experience; the second section contained socio-economic question including monthly household income, monthly household expenditure and family size; the third section contain the opinions on tourism management of LSRB. The question in this part involved agreement and disagreement of visitors in

tourism management of study area (i.e. the public facilities are high quality and dis-deteriorated, the public facilities do have enough for tourists, the visitor information centers do have enough for tourist, there are security officers covered the area, and the commercial and accommodations do have enough for tourists); and the forth section contained the contingent valuation survey including willingness to pay and the amount of the payment. The core questions were as follow: in order to prepare public facilities for visitors to enjoy at the LSRB; Do you willing to pay 10, 20, 30, 40 or 50 Bath per time? and, how much maximum and minimum were your willingness to pay?

6. STATISTICAL ANALYSIS

The statistical analysis of this research was descriptive analysis (i.e. mean and standard deviation), non-parametric model, and logistic regression model as indicated above.

7. RESULTS

Demographics

In total, this study received 600 responses to our survey. Summarizes the demographic results was shown in table 1. The largest group of visitors (52%) was female, following by male (48%). The average age of visitors was 45 years old. The respondents were approximately equally divided among the 4 villages which include Chaiburi, Phanom, Don Nang Hong, and Nathon village. In terms of education, 66.8% were primary school, following by high school and non-educated (21.5% and 4.7%, respectively). Substantial more marriage than single participated in the survey (78.1% versus 20.4%, respectively). For household income per month, 47.5% were 25,001 – 75,000 Baht, following by 36.4% were 7,501-15,500 Baht. Most (89.7%) of the visitors had environmental training experience several times. In addition, 92.8% of the visitors were environmental membership organization. Finally, the average distance between the visitor's resident to the study area was 0.8 kilometers.

Table 1. Descriptions of independent variables

Metric variables		Percentage (%)	Mean
1. Gender	Female	52.0	-
	Male	48.0	-
2. Age (year)	-	-	45.0
3. Marriage status	Seperated	1.5	-
	Single	20.4	-
	Marriage	78.1	-
4. Occupation	Retry	0.2	-
	Bussiness	5.1	-

Metric variables		Percentage (%)	Mean
	Contractors	20.9	-
	Other	5.5	-
	Fishermen	0.4	-
	Farmer	67.9	-
5. Education level	Other	0.5	-
	Graduate school	0.2	-
	Vacational	3.1	-
	Bachelor	3.1	-
	Non educated	4.7	-
	High school	21.5	-
	Primary school	66.8	-
6. Household income (Baht)	N0	1.1	-
	< 2,500	9.7	-
	2,501-7,500	47.5	-
	7,501-15,500	36.4	-
	15,001-25,000	4.6	-
	25,001-50,000	0.5	-
7. Environmental training experience	Yes	10.3	-
	No	89.7	-
8. Environmental organization	Yes	7.2	-
	No	92.8	-
9. Distance between resident to study area (Kilometers)	-	-	0.8

The opinions on tourist management of the Songkhram River View Point (LSRB)

The Lower Songkhram River Basin (LSRB), Tha Uthen, Nakhon Phanom province, Thailand, which was represented the cultural ecosystem service (CES) of the LSRB. In order to know about ecotourism awareness of visitors this research focused on the opinions of visitors about tourist management of study area. The results found that the visitors had the highest positive agreement with 96.9% in topic the public facilities are high quality and dis-deteriorated. 93.8 % agreed with statement that; the public facilities do have enough for tourists; 88.0%

agreed with statement that; the visitor information centers do have enough for tourist; 40.3% agreed with statement that; there are security officers covered the area; 88.1% agreed with statement that; the commercial and accommodations do have enough for tourists; 79.6% agreed with statement that; there are interpretations, regulatory and warning signs covered the area; 75.8 % agreed with statement that; the safety equipment dose has enough for tourists.; 91.2 % agreed with statement that; there are good practices waste management in the area; 36.3 % agreed with statement that; the deterioration

have found in the area; and 70.4 % agreed with statement that; the visitors are cover carrying capacity. The results were shown in table 2.

The wiliness to pay for entrance fee to the Songkram River View Point

The results from Non-parametric Model which were Eq. (1), Eq. (2), and Eq. (3) were shown in table 3.

Table 2. The opinions on tourism management of the Songkhram River View Point

Statements	Agreement percentage
1. The public facilities are high quality and dis-deteriorated.	96.9
2. The public facilities do have enough for tourists.	93.8
3. The visitor information centers do have enough for tourist.	88.0
4. There are security officers covered the area.	40.3
5. The commercial and accommodations do have enough for tourists.	88.1
6. There are interpretations, regulatory and warning signs covered the area.	79.6
7. The safety equipment dose has enough for tourists.	75.8
8. There are good practices waste management in the area.	91.2
9. The deterioration has found in the area.	36.3
10. The visitors are more over than carrying capacity of the area.	70.4

Table 3. The wiliness to pay for entrance fee to the Songkram River View Point

Group (j)	Number (Nj)	Bidding (bid)	Yes (nj)	Eq. (1) Percent in group (nj/Nj)	WTP in group (Baht/time)
0	0	0	0	1	262.14
1	206	10	188	0.91	1,037.92
2	148	20	118	0.80	5,782.99
3	153	30	63	0.41	-4,102.94
4	28	40	17	0.61	16,392.86
5	65	50	0	0.00	-
Total	600			Total WTP (Eq.(2))	19,372.96 (539.04 USD)
				The average WTP (Eq.(3))	32.29 (0.90 USD)

Table 3 revealed that, the percentages of the amount of WTP for 10, 20, 30, 40, and 50 Baht/person/time accounted for 91%, 80%, 41%, 61% and 0%, respectively. Slightly visitors with about 10% of all visitors expressed their unwillingness to pay for entrance fee to the Songkhram River View Point at 50 Baht because 2 reasons; i.e. they thought that this bid was too high for one person/time and the study area was public services that means everyone can entrance for free.

Finally, the willingness to pay by means of the Non-Parametric Model was Bath 32.29/person/time (0.90 USD/person/time) and its total value of all visitors willing to pay was Bath 19,372.96 Thai Bath (539.04 USD).

Factors affecting willingness to pay for entrance fee of the Songkhram River Basin View Point

The calculating Logistic Regression Model for WTP for

entrance fee of the LSRB was shown in Table 4.

Table 4. Factors affecting willingness to pay

Independent variables	Beta	SE	Exp	Sig
Income	1.96	0.912	7.067	0.032
Constant		-1.4		
Nagellkerke R ²		0.347		
Correctly overall percentage		74.5		

Note: Beta = Coefficients of the variables; SE = Standard Error; Exp = The expectation of event; Sig = The statistical significance at 0.05 level.

The Table 4 showed that only variables that had a significant impact on WTP at 0.05 levels were included base on systematic search procedure. The model was highly significance base on the Wald chi-square statistic. This finding also revealed that the positive correlation of WTP was income (Beta = 1.96, sig = 0.032). The Logistic Regression Model for the entrance fee of the LSRB as follow:

$$WTP = -1.4 + 1.96 X_1$$

where WTP là willingness to pay of visitors and X_1 is the income of visitor with:

1	=	1-2,500	Baht/month
2	=	2,501-7,500	Baht/month
3	=	7,501-15,000	Baht/month
4	=	15,001-25,000	Baht/month
5	=	25,001-50,000	Baht/month

8. DISCUSSION

The opinions on tourist management of the Songkhram River View Point were concluded that most of visitor had higher positive agreement on tourist management at higher percentage. They thought this area had good procedure for tourism due to high quality and safety of public facilities and accommodation, clearly information, interpretation, regulatory, and warning signs, and good practice waste management. Whereas, there were slight negative opinion on the amount of security officer the visitors thought that this area was too large and had not enough the officer to take care of. Although, there were not enough officers there was less deterioration. Due to the characteristic of the study area, crowded visitors have not affected the large area.

The visitors' willingness to pay for entrance fee to the Songkharm River View Point located in Nakhon Phanom Province was Bath 32.29 /person /time (0.90 USD) that was higher than entrance fee to the Phu Langka national park which located in same province [28] (Bath 10/person/time or 0.28 USD). The reason behind this phenomenon was all of respondents in this research were domestic visitor who their hometown was study area.

The thought that if all of visitor pay for this View Point the benefit such as public facilities and accommodation would return to their hometown.

The Factors affecting willingness to pay for entrance fee of the Songkhram River Basin View Point revealed that the positive significant correlation of visitor's willingness to pay was income. That mean, if the visitors have high income, they would have paid more due to high income high payment capacity [29]. In case of Thailand, the study could recommend that the government should try the way to support local people to get high income such as develop community labor skill, and support not only formal but also non- formal education which were the positive correlation factors with income [30] and comprise it as national agenda. This policy both conserved ecosystem service and developed quality of life of people.

9. CONCLUSION

This research learned about the cultural ecosystem service of the Lower Songkhram River Basin by choosing the Songkhram River View Point as a case study. The study area was a confluence of the Songkhram and Mekong River, Tha Uthen, Nakhon Phanom Province, Thailand. The purpose of this study was to analyze willingness to pay for the entrance fee of the Songkharm River View Point by using the Contingent Valuation Method (CVM). In addition, the CVM had more potential for converting the intangible value to be tangible value and had been widely applied to value the nonmarket ecosystem services provided by the natural resource. 600 respondents in 4 villages including Chaiburi, Phanom, Don Nang Hong, and Nathon, Nakhon Phanom Province, Thailand were collected by a purposive sampling technique. Finally, this research used mean and standard deviation for describing a variable, non-parametric model for calculation average willingness to pay, and logistic regression model for identifying variables that affected the visitor's decision on WTP. The results concluded that the WTP for the entrance fee of the Songkhram River View Point by mean of the Non-Parametric Model was Bath 32.29 / person/time (0.90 USD) and its total value of all visitors willing to pay was Bath 19,372.96 (539.04 USD). This finding also revealed that the positive correlation of WTP was income (Beta = 1.96, sig = 0.032). The Logistic Regression Model for the entrance fee of the Songkharm River Basin was $WTP = -1.4 + 1.96 X_1$. This model could imply the willingness to pay for the cultural ecosystem service of the Lower Songkhram River Basin by substitution each visitor's income (1, 2, 3, 4 or 5) into the model.

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