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Original Article

Willingness to pay for biological diversity conservation of the Lower Mekong River Basin in Thailand: A contingent valuation study

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Abstract

The objective of this research was to analyze the willingness to pay for biological diversity conservation of the Lower Mekong River Basin (LMRB) in Thailand. Questionnaires were collected from 763 households in 8 provinces located alongside the river including Chiang Rai, Nong Khai, Loei, Bueng Kan, Nakhon Phanom, Mukdahan, Ubon Ratchathani, and Amnart Charoen. The data were analyzed from the responses to the single-bounded closed-ended contingent valuation method questions and analyzed further using the non-parametric and logistic regression models. The results showed that the willingness to pay for biodiversity conservation by means of the non-parametric model was Baht 143.39 per year per household (US$ 3.99) and the total benefits were Baht 5,515,684.68 per year (US$ 153,471.38). This finding also revealed that the positive correlation of a household's willingness to pay include age (Beta = 0.08, sig = 0.001) and level of education (Beta = 1.130, sig = 0.009).

Keywords: willingness to pay, biological diversity conservation, the Lower Mekong River Basin, contingent valuation method

1. Introduction

Biodiversity is important for several reasons (Land and Water Australia [LWA], 2005). First, biodiversity is used directly as food and goods produced from natural resources and as the basis for tourism activities. Second, biodiversity supports the ecosystem and the way it functions. This in turn supports the people that depend upon the ecosystem services. For example, many kinds of organisms contribute to the success of fisheries because they are eaten by fish and insects pollinate agricultural crops and other plants, and forests help maintain soil cover and water balance. Third, once extinct species are gone they are lost forever. This robs future generations of the ability to benefit, in whatever way, from their existence. Fourth, biodiversity and nature are often regarded as good things in their own right with intrinsic or inherent values. This represents a non-use value for humans through enrichment of culture, religion, and art. Many people, or cultures, regard biodiversity as important for its own sake.

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Biodiversity is very important for human life; however, biodiversity is in serious decline not only in Thailand but also worldwide (Mekong River Commission [MRC], 2003). The state of global biodiversity is continuing to decline, with substantial and ongoing losses of populations, species, and habitats. For instance, vertebrate populations have declined on an average of 30% since 1970, and up to two-thirds of species in some taxa are now threatened with extinction. Declines are most rapid in the tropics, in freshwater habitats, and in marine species utilized by humans. Conversion and degradation of natural habitats are ongoing, with some having experienced declines of 20% since 1980 (United Nations Environment Programme [UNEP], 2012). Limited successes, such as saving particular species from extinction, reversing the decline of some populations, and restoring some habitats, are outweighed by continuing declines.

The benefits humans obtain from biodiversity are at risk. Conversion of natural habitats to large-scale, commercial agriculture has resulted in net benefits for the well being of humans. However, this has often been accompanied by reductions in other services, such as carbon sequestration and flood regulation (MRC, 2003). Continuing ecological degra-

dation, unsustainable levels of consumption and inequities in sharing of the benefits from biodiversity threaten the improvements in the well-being and health of humans that have been achieved in recent decades. A serious decline in biodiversity is an indicator of unsustainable development. There have been increased responses to the loss and degradation of biodiversity although these have failed to reduce the decline; therefore, more effort is needed.

Many goods and services provided by biodiversity are crucial, but not always quantifiable in monetary terms. Many of these goods and services are not traded in the market place and so do not have an obvious price or commercial value (UNEP, 2011). The negative effect is if these un-priced values are not included in the decision making process, the final decision can favor outcomes which have a commercial value. Hence, decision makers cannot have full awareness of the consequences for biological diversity conservation (Dikgang & Muchapondwa, 2012).

One economic concept often used to guide decisions by conservation managers or policy makers is the total economic valuation (TEV) of a species and ecological components. It has provided a framework for the assessment of economic aspects of conservation of species and other valuable environment amenities (Bandara & Tisdell, 2002). In the TEV concept, the total economic value of environmental goods and services can be categorized into 2 major components: use and non-use values. For instance, the use value of biological diversity can be found from direct use, such as the monetary value to be gained from fish, wood, recreation, and their indirect use, such as the benefit from flood control, storm protection, and CO_2 /O_2 stabilization. The non-use value of biological diversity such as option, existence, and bequest values cannot be traded in the market (International Union for Conservation of Nature [IUCN], 2008).

There are several techniques for the estimation of the non-market value of biological diversity. These include the travel cost method, replacement cost (Groot *et al.,* 2006), contingent valuation method (Mahan, 1997), conversion cost (Abila, 1998), benefit transfer (Schuijt, 2002), and participatory research method (IUCN Water and Nature Initiative, 2005). However, the contingent valuation method (CVM) may be the only appropriate method to estimate the full benefit of potential future conservation programs. In the CVM, the non-use value is generally measured based on the willingness to pay for environmental improvement and biodiversity conservation or the willingness to accept compensation for a damaged or diminished environment (Browwer *et al.,* 2013). The positive aspects of the CVM method allow us to estimate the total value more than components of the total value provide a bibliography of 1,600 CVM studies and relate publications.

The purpose of this study was analyzing the willingness to pay for biological diversity conservation of the Lower Mekong River Basin (LMRB) in Thailand by elicitation of 800 households in 8 provinces located alongside the river including Chiang Rai, Nong Khai, Loei, Bueng Kan, Nakhon Phanom, Mukdahan, Ubon Ratchathani and Amnart Charoen. The data was analyzed using single-bounded closed-ended CVM questions, non-parametric and logistic regression models.

Finally, by valuating biodiversity using economic techniques and incorporating those values into the decision-making process could be a powerful way to demonstrate the importance of biological diversity of LMRB protection in Thailand to the broader public.

2. Materials and Methods

2.1 Study area: the Lower Mekong River Basin

The Mekong River is the longest river in Southeast Asia. It begins a 4,200 km journey in the mountains of the Tibetan Plateau. From there, it flows through China, Lao PDR, Myanmar, Thailand, Cambodia, and Viet Nam finally reaching the South China Sea. Its annual volume of water (>475 billion m^3) places it eighth in the world of great rivers. The river and its numerous tributaries, backwaters, lakes, and swamps support many unique ecosystems and a wide range of globally-threatened species. The productivity of the Mekong River Basin is dependent on a dramatic process of flooding and recession, which endows the basin wide range of habitats (MRC, 2013).

The Lower Mekong River Basin (LMRB) is the Cambodian, Laotian, Thai, and Vietnamese parts of the Mekong River Basin. It has a population of some 62 million people and an area of 606,000 km^2. The entire Basin includes parts of Myanmar and the Yunnan Province of China as well and has an area of 795,000 km^2. The Basin covers 86% of the area of Cambodia, 97% of the area of Lao PDR, 36% of the area of Thailand, and 20% of the area of Vietnam (MRC, 2013). This ecosystem is fundamental to the viability of natural resource-based rural livelihoods of a population of 55 million people living in the Lower Mekong Basin – equivalent to more than 90% of the population of the entire Mekong Basin and about one-third of the total population of Cambodia, Lao PDR, Thailand, and Viet Nam combined (MRC, 2009).

After the Amazon, the LMRB is the second most biodiverse river in the world and supports the world's largest freshwater capture fishery of about 2.3 million tons/year with an estimated commercial value of US$2,000 million/year (MRC, 2010). The river's annual flood pulse continues to support a rich fishery although there are reports of declining catches. The basin is one of the most productive inland fishery basins in the world. It provides a wide variety of breeding habitats for over 1,300 species of fish and the annual rise and fall of the river ensures a nutrient-rich environment for fish. The fishery provides a livelihood not just for fishers and their families but also for thousands more who are employed full or part time making and selling food products and fishing gear, repairing boats, and providing hundreds of related services. At the height of the rainy season, the LMRB is like a vast fish pond teeming with aquatic plants and animals in fields and ponds, lakes, streams and even in roadside ditches (MRC, 2002).

In Thailand, the wetlands of the LMRB support a wide range of biodiversity assets, some of which are recognized to be rare, endangered or threatened. However, little systematic or comprehensive data on biodiversity have been collected in the past and many flora and fauna groups are not well documented in the available literature. The best studied taxa are birds and fish, but even these are lacking temporal in-depth knowledge of the distribution, ecology, and status of individual species or even families. Little informa-

tion exists for whole groups such as amphibians, reptiles, invertebrates, and even small mammals. Findings from the Mekong River Commission (MRC) report (MRC & ICEM, 2011) showed that the biological diversity of the LMRB in Thailand has dramatically decreased due to 3 causes: i) destruction of spawning grounds or dry season refuges as a result of stream bed dredging, ii) removal or alteration of vegetation, and iii) bank modifications which include local change in the quality (e.g., pollution) and quantity of water available as a result of storage in dams and abstraction for irrigation and the construction of barriers (e.g., dams, weirs, and diversions) which, apart from the local environmental disturbances they might cause, act as physical barriers to fish migration.

This research focused on 32 villages located in 8 provinces in Thailand that hold about 38,465 households in only 5,031 km^2 of land.

2.2 Contingent valuation method concept

The 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 is also the most controversial of the non-market valuation methods. 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 generally involves a survey of a sample of people on the amount they are willing to pay for some aspect of biodiversity to be improved and conserved (Thibodeau & Ostro, 1981).

The CVM is an increasingly popular method for valuating biodiversity. It has more potential for capturing biodiversity's more abstract benefits than revealed preference techniques. The CVM is flexible and works the best when estimating values for goods and services that are easily identified and understand by the users. The nature of CVM studies and the results of CVM studies are not difficult to analyze and describe.

2.3 Data collection

The researcher used the Mitchell and Carson concept (Carson & Hanemann, 1989) to select 800 samples from the total population in 32 villages by purposive sampling. The data were collected in study areas between June and July, 2015. Adults aged between 18 and 65 years old were the target groups and each questionnaire was collected on a face-to-face basis by trained interviews who described the meaning of each questionnaire and available choices to participants in order to avoid response bias.

In order to assess WTP, demographics, socio-economic variables, environmental training experience, participant's opinion on biodiversity conservation of the LMRB, and contingent valuation were assessed. The respondents were asked to give the distance from their houses to the Mekong River and their home address at the beginning of the questionnaire in order to avoid repeat participation.

The first part of the questionnaire contained demographic questions including gender, age, marriage status, education, occupation, distance between home and the Mekong River, environmental training experience, and environmental organization.

The second part was socio-economic status such as monthly household income, monthly household expenditure, and family size.

The third part included the opinions on biodiversity conservation of the LMRB. The questions in this part involved agreement and disagreement of the participants in biodiversity of the Mekong River, such as the Mekong River is the source of world biodiversity, biodiversity of the Mekong River has been decreasing, Mekong giant catfish is the most important species of fish in the Mekong River, the populations of Mekong giant catfish and Chao-Phaya giant catfish have been decreasing, and the Mekong wetland area is a habitat for fish and reptiles.

The forth part contained the contingent valuation survey including the willingness to pay and the amount of payment. The core questions were these: In order to prepare biodiversity conservation funding of the Mekong River to express the mind of the community on biological conservation of the Mekong River, would you be willing to pay 100, 200, 300, 400 or 500 Baht per household per year? And how much in terms of maximum and minimum are you willing to pay?

2.4 Statistical analysis

The statistical analysis of this research was divided into 3 parts. The descriptive analysis of this study is presented as mean and standard deviation. The non-parametric model was used to calculate the willingness to pay for biological diversity conservation as follows:

1) The percentage of respondents on the start bid in each group was calculated as:

$$S\,(Bj) = nj/Nj \quad (1)$$

Where S

(Bj) = the percentage of respondents on the start bid in each group

nj = the number of respondents on bidding in each group

Nj = all respondents in each group

j = respondent group (j=1,…,J)

2) The total willingness to pay of all respondents was calculated by this equation:

$$\text{WTP total} = \sum_{j=0}^{j}(S(Bj) - S(Bj+1) * N * Mj \quad (2)$$

where

WTP total = the total willingness to pay of all respondents

N = the total samples (N = 763).

Mj = mean of bidding in each group

3) The average willingness to pay was calculated by this equation:

$$\text{Mean WTP} = \text{WTP total} /N \quad (3)$$

The logistic regression model was used to identify variables that affected the decisions of the respondents on WTP. A positive WTP was the dependent variable and independent variables were gender, age, marriage status, family size, occupation, education, the distance from home to the Mekong River, environmental training experience, environ-

mental organization, monthly household income, and monthly household expenditures.

3. Results

3.1 Demographic profile

In this study, 763 questionnaires were collected from 800 questionnaires sent to the communities. There were nine independent variables including gender, age, marriage status, occupation, education, household income, environmental training experience, environmental organization member, and distance between their homes and the Mekong River (Table 1).

Table 1. Descriptions of independent variables.

Metric variables			Percentage (%)	Mean
1.	Gender	Female	40.6	-
		Male	59.4	-
2.	Age (year)	-	-	50.67
3.	Marriage status	Seperated	1.4	-
		Single	14.3	-
		Marriage	84.3	-
		Retry	1.7	-
4.	Ocupation	Bussiness	2.5	-
		Gov.Officer	3.6	-
		Other	5.6	-
		Worker	10.4	-
		Farmer	76.2	-
		Other	0.3	-
5.	Education level	Graduate school	0.6	-
		Vacational	2.8	-
		Bacherlor	3.1	-
		No	3.4	-
		High school	19.7	-
		Primary school	70.1	-
		N0	5.0	-
6.	Household income (Baht)	< 2,500	30.3	-
		2,501-7,500	53.1	-
		7,501-15,500	8.2	-
		15,001-25,000	1.9	-
		25,001-50,000	1.1	-
		> 50,000	0.4	-
7.	Environmental training experience	Yes	30.8	-
		No	69.2	-
8.	Environmental organization	Yes	18.0	-
		No	82.0	-
9.	Distance between home to the Mekong River (Kilometers)	-	-	6.70

3.2 Opinions on biodiversity conservation of the LMRB

The results reported that the local community was very concerned about biodiversity of the Mekong River (Table 2). They had the highest positive agreement with 91.5% of respondents on the topic that the Mekong River is the source of world biodiversity. The other positive responses were: 90.4% agreed with the statement 'biodiversity of the Mekong River is a very important factor for local community income'; 87.6% agreed with the statement 'biodiversity of the Mekong River is very important for tourism; 87.4% agreed with the statement 'biodiversity of the Mekong River is the pride of Thailand; 85.8% agreed with the statement 'biodiversity of the Mekong River is decreasing; 81.5% agreed with the statement 'Mekong wetland area is a habitat for fish and reptiles; 80.0% agreed with the statement 'Mekong giant catfish and Chao-Phaya giant catfish are decreasing; 78.5% agreed with the statement 'there are a lot of species of birds because the Mekong wetland area is a habitat for fish; 72.2% agreed with the statement 'there are more than 2,000 species of plants on the riverbank of the Mekong River; and 65.9% agreed with the statement that 72.2% agreed with the statement 'the Mekong giant catfish is an important species of fish in the Mekong River'.

Table 2. Percentage of agreement and dis-agreement on biodiversity conservation of the LMRB.

	Statement	Percentage	
		Agree	Dis-agree
1.	The Mekong River was the world biodiversity source.	91.5	8.4
2.	Biodiversity of the Mekong River had decreasing.	85.8	14.2
3.	Mekong giant catfish was the important species of fish in the Mekong River.	65.9	34.1
4.	Mekong giant catfish and Chao-Phaya giant catfish had decreasing.	80.0	20
5.	The Mekong wetland area was fisheries and reptiles habitat.	81.5	18.5
6.	There were a lot of species of birds because the Mekong wetland area was fisheries habitat.	78.5	21.5
7.	There were more than 2,000 species of plants on riverbank of the Mekong River.	72.2	27.8
8.	Biodiversity of the Mekong River was very important factor on local community income.	90.4	9.6
9.	Biodiversity of the Mekong River was very important on tourism.	87.6	12.4
10.	Biodiversity of the Mekong River was the pride of Thailand.	87.4	12.6

3.3 Willingness to pay for biological conservation of the LMRB

The results from the non-parametric model revealed that, 763 (95.38%) of the 800 valid participants reported being willing to pay for biological diversity conservation of the LMRB. The percentages of the amount of WTP for 100, 200, 300, 400, and 500 Baht accounted for 53%, 25%, 9%, 2%, and 4%, respectively (Table 3). However, the respondents had more conservation mind and concerned about biodiversity decreasing (Table 2). More than half of the sample population

Table 3. Descriptions of dependent variables.

Group (j)	Number (Nj)	Bidding (bid)	Yes (nj)	Percent in group (nj/Nj)	WTP in group (Baht/year/hh)
0	0	0	0	1	17,839.93
1	139	100	74	0.53	31,770.98
2	157	200	40	0.25	31,698.83
3	158	300	14	0.09	18,460.83
4	154	400	3	0.02	-6,602.33
5	155	500	6	0.04	16,244.52
Total	763				109,410.31
				Mean	143.39 (USD 3.99)
				Total	5,515,684.68 (Baht/year)

(79.95%) expressed their unwillingness to pay because they did not have enough money to pay for conservation and they thought the government should take action on this situation. The willingness to pay by means of the non-parametric model was Baht 143.39 per household per year (US$ 3.99) and the total value was Baht 5,515,684.68 per year (US$ 153,471.38).

3.4 Factors affecting willingness to pay for biological diversity conservation of the LMRB.

The estimated logistic regression model for WTP biological diversity conservation of the LMRB is presented in Table 4. Only variables that had a significant impact on WTP ($P<0.05$) were included based on a systematic search procedure. The model was highly significant based on the Wald chi-square statistic (43.25). This finding also revealed that a positive correlation of a household's willingness to pay included age (Beta = 0.08, sig = 0.001) and education (Beta = 1.13, sig = 0.009). The logistic regression model for WTP biological diversity conservation of the LMRB is the following equation:

$$WTP = 0.08\ X_1 + 1.13\ X_2 \quad (4)$$

where

WTP = Willingness of respondent to pay
X_1 = Age of the respondent
X_2 = Education level of respondent (X_2 = 1,..., 6)

where 1 = No education, 2 = Primary school, 3 = High school, 4 = Vocational training, 5 = Bachelor's degree, and 6 = Graduate degree.

Table 4. Factors affecting willingness to pay ($\alpha = 0.05$).

No	Indepentdent variables	Beta	SE	Exp	Sig
1.	Age	0.08	0.023	2.62	0.001
2.	Education	1.13	0.44	3.10	0.009
	Constant		9.99		
	Nagellkerke R^2		0.36		
	Correctly overall percentage		74.5		

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

4. Discussion

4.1 Opinions on biodiversity conservation of the LMRB

The results conclude that local opinions on biodiversity conservation were in positive agreement at high percentages. The local people were concerned about the importance of biodiversity and they knew that the biology of the LMRB was related to their lives. If the LMRB were destroyed, the quality of life would decrease. Therefore, that was the major reason the local people decided to pay for biological conservation.

4.2 Willingness to pay

The non-parametric model showed that the percentage of positive respondents decreased as the amount of money increased. Since the occupation of the respondents in this research was farmer (76.2%), their household income was low (Baht 2,501-7,500 per month). Although, they had high positive thinking on biodiversity conservation of the LMRB, they could not pay more.

4.3 Factors affecting willingness to pay

Significant positive correlations were found between the household's willingness to pay and the age and education level. That means, if the respondents are older and have a higher level of education, they are willing to pay more (Juan *et al.,* 2016). Age was significant with willingness to pay because with age comes experience (Luckthan, 2011). Older people, more than younger people, have the opportunity to know the pros and cons of a real situation (Sukmonkolral, 2000). The level of education was also significant with the willingness to pay because a higher education brings more knowledge (Challcharoenwattana & Pharino, 2016). A person who has a higher education has good opportunities to perceive complex correlations between humans and nature (Wei & Jia, 2012).

4.4 Policy implications

This research supports higher education, including formal and non-formal education, for the local people who are direct users of the natural resources. Based on the results, the respondents who had higher formal education felt the need to conserve the biodiversity and pay for the conservation (Kamri, 2013). In case of Thailand, the study recommends that the government should find ways for the local people to attain a higher formal education and put it in the national agenda. An alternative way is non-formal education. Related organizations, such as local administrations, Ministry of Education, and non-government organizations, can find ways to bring environment education to the people on particular topics of the environment which can be practical, cost effective, and time saving. These policies would not only conserve the natural biological diversity of the LMRB but also improve the quality of life of Thailand.

5. Conclusions

The primary objective of this research was analyzing the willingness to pay for biological diversity conservation of the LMRB in Thailand. The samples were collected by purposive sampling from 800 households in 8 provinces located alongside of the river including Chiang Rai, Nong Khai, Loei, Bueng Kan, Nakhon Phanom, Mukdahan, Ubon Ratchathani, and Amnart Charoen. This research used single-bounded closed-ended CVM questions and the non-parametric and logistic regression models as tools to analyze the data. The results concluded that the willingness to pay for biodiversity conservation by means of the non-parametric model was Baht 143.39 per year per household (USD 3.99) and the total benefit would be Baht 5,515,684.68 per year (USD 153,471.38). This finding also revealed that the positive correlation of a household's willingness to pay included age (Beta = 0.08, sig = 0.001) and level of education (Beta = 1.130, sig = 0.009). These results can be used in the decision-making of policy makers regarding the economic feasibility of biodiversity conservation funding.

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References

Abila, R. (1998). Utilization and economic valuation of the Yala Swamp wetland, Kenya. In. M. Gauler (Ed.), *Strategies for wise use of wetlands: Best practices in participatory management* (pp. 89-95), Proceedings of a Workshop held at the 2nd International Conference on Wetlands and Development (November 1998, Dakar, Senegal), Wageningen, The Netherlands: IUCN - The World Conservation Union / Wetlands International / World Wide Fund for Nature.

Bandara, R., & Tisdell, C. (2002). *Economics, ecology and the environment, Working paper No. 67, Willingness to pay for conservation of the Asian elephant in Sri Lanka: A contingent valuation study*. Brisbane, Australia: The University of Queensland. Retried from https://ageconsearch.umn.edu/bitstream/48738/2/WP67.pdf

Browwer, R., L., Bernder, Kuil, O., Papyralis, E., & Bateman, I. (2013). *A synthesis of approaches to assess and value ecosystem services in E.U. in the context of TEEB*. Amsterdam, The Netherland: Institute for Environmental Studies, University Amsterdam. Retrieved from http://ec.europa.eu/environment/nature/biodiversity/economics/pdf/EU%20Valuation.pdf

Carson, R. T., & Hanemann, W. M. (1989). *Hand book of environmental economics*. Berkeley, CA: Universtiy of California.

Challcharoenwattana, A., & Pharino, C. (2016). Wishing to finance a recycling program? Willingness-to-pay study for enhancing municipal solid waste recycling in urban settlements inThailand. *Habitat International, 51*, 23-30.

Dikgang, J., & Muchapondwa, E. (2012). *The valuation of biodiversity conservation by the South African Khomani San "Bushmen" Community*. Dar es Salaam, Tanzania: Environmental for Development, University of Dar es Salaam. Retrieved from http://www.rff.org/files/sharepoint/WorkImages/Download/EfD-DP-12-10.pdf

Groot, R. D., Stuip, M., Finlayson, M., & Davidson, N. (2006). *Valuing wetlands: Guidance for valuing the benefits derived from wetland ecosystem services* (Ramsar Technical Report No. 3/CBD Technical Series No. 27). Ramsar Convention Secretariat, Gland, Switzerland and Secretariat of the Convention on Biological Diversity, Montreal, Canada.

International Union for Conservation of Nature Water and Nature Initiative. (2005). *Integrating wetland economic values into river basin management*. Gland, Switzerland: Author.

International Union for Conservation of Nature. (2008). *Payments for ecosystem services: The background, Ecosystem and livelihoods group Asia*, Gland, Switzerland: Author.

Juan, C. T., Carrillo, B., Charris, C. A., & Velilla, R. A. (2016). Coral reefs under threat in a Caribbean marine protected area: Assessing divers' willingness to pay toward conservation. *Marine Policy, 68*, 146-154.

Kamri, T. (2013). Willingness to pay for conservation of natural resources in the Gunung Gading National Park, Sarawak. *Procedia - Social and Behavioral Sciences, 101*, 506–515.

Luckthan, W. (2011). *The evaluation of foreign tourists' willingness to pay for Conserving Doi Suthep-Pui National Park, Chiang Mai Province* (Doctoral Thesis, Chiang Mai University, Chiang Mai, Thailand).

Land and Water Australia. (2005). *Making economic valuetion work for biodiversity conservation*. Melbourne, Australia: Snowy Mountains Engineering Corporation (SMEC).

Mahan, B. L. (1997). *Valuating urban wetland: A property pricing approach*. Portland, OR: U.S. Army Corps of Engineer.

Mekong River Commission (MRC). 2002. Fish migrations of the Lower Mekong River Basin: implications for development, planning and environmental management. Technical paper no. 8, Mekong River Commission, Lao PDR.

Mekong River Commission. 2003. Biodiversity and fisheries in the Mekong River Basin. Mekong Development Series No.2., Mekong river commission, Phnom Penh.

Mekong River Commission (MRC). 2009. The Mekong River report card on aquatic ecological health 2008, Mekong River Commission, Lao PDR.

Mekong River Commission (MRC). 2010. Report on the 2008 bio monitoring survey of the lower Mekong River and selected tributaries: MRC Technical Paper No. 27, Mekong River Commission, Lao PDR.

MRC and ICEM. 2011. Mekong wetlands ecosystem service and biodiversity and climate change, Mekong River Commission, Lao PDR.

Mekong River Commission (MRC). 2013. MRC Technical Paper No. 40: 2011 Annual Water Quality Data Assessment Report, Vientiane, Lao PDR.

Schuijt, K. 2002. Land and water use of wetlands in Africa: economic values of African wetlands. Interim report IR-02-063, IIASA, Laxenburg, Austria.

Sukmonkolral, C. 2000. Willingness to pay the utilization of coral resource on tourism: A case study of Ko Chang national park in Trat province. Mahidol University, Thailand.

Thibodeau, F.R. and Ostro, B.D. 1981. Economic value of the Cherles River basin wetlands. Journal of Environmental Management. 12, 19-30.

UNEP. 2011. The Ecosystem Service Framework: A Critical Assessment, Publishing Service. Kenya.

UNEP. 2012. GEO Global Environment Outlook 5: Environment for the future we want, Malta progress limited LTD, Malta.

Wei, W.P. and Jia, J.B. 2012. Tourists' willingness to pay for biodiversity conservation and environment protection, Dalai Lake protected area: Implications for entrance fee and sustainable management. Ocean and Coastal management, 62, 24-33.