

Willingness to Pay for Conservation of the Asian Elephant in Nakai Nam Theun National Protected Area in Laos

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Abstract

The Asian elephant (*Elephas maximus*) is an ecologically important species in the forest ecosystem of Laos. The species is endangered and on the edge of extinction owing to illegal hunting, destruction of elephant habitat, and forest degradation. Payment for conservation could be one of the potential mechanisms to enhance Asian Elephant conservation efforts. This paper aims to estimate local residents' Willingness to Pay (WTP) for conservation of the Asian elephant in Nakai-Nam Theun National Park (NNT NP) in Laos, which is a recognised "Key Biodiversity Area" within the Indo-Burma biodiversity hotspot. The data were collected using a self-administered questionnaire survey, with a total of 490 respondents living adjacent to the NNT NP, covering seven villages in two districts in Khammouane Province, Laos. The study employed the Contingent Valuation Method (CVM) to identify the factors affecting WTP. The results showed that respondents were willing to pay a significant amount of money in the form of increasing activities for conservation and protection of NNT NP. Mean WTP for the conservation of the Asian elephant was \$8 per household per year. Approximately 62% (303 local people) of the respondents were willing to pay for the conservation of the Asian elephant. The research findings will be helpful for planners and decision makers to formulate better future strategies for conservation of Asian elephants in Laos and in similar developing countries in the Southeast Asia region.

Keywords

Asian Elephant, Willingness to Pay, Contingent Valuation, Laos

1. Introduction

Over the past few decades, Laos has witnessed economic progress through adoption of more market-oriented economic policies from the late 1980 onwards, with a high dependence on exports based on natural resources. With an increasing investment in agriculture and mining, and increasing population growth, more and more forestlands and forest resources have been destroyed and degraded over time (Phimmavong et al., 2009). In order to stop the rapid rate of forest destruction and degradation in Laos, in 2016 Prime Minister Thongloun Sisoulith, after hosting a successful Asia Pacific Economic Cooperation summit in Vientiane, issued Prime Minister's Order (PMO) No.15 (PMO15) banning the export of unprocessed wood and implementing much stronger enforcement measures in order to conserve natural forest and Asian life (Smith et al., 2021). The PMO15 also responded to international commitments, namely, obligations under the International Convention on Biodiversity, which requires the conservation of plant and wildlife diversity and urges the government of Laos to have strategic plans and conservation mechanisms.

Laos holds Indochina's largest remaining Asian elephant population (Ahlering et al., 2011). Asian elephants in Laos used to be widespread in rainforest areas but now can no longer be found in 13 provinces. In addition, elephant numbers are much lower than before while still sufficient in some areas (Khamkhoun, 2002). In the 1980s, the Lao elephant population was estimated at between 2000 and 3000, with a total of about 1332, but no official confirmation has been made. However, in 2008, it was estimated there were approximately 800 wild and 500 captive elephants in Laos (Ministry of Agriculture and Forestry, 2009). The largest number, and probably most endangered, Asian elephants in Laos are in Xayaburi, Khammouane and Bolikhamxay provinces (Khamkhoun, 2002). The Asian elephant population is spread throughout Asia but limited to India and also Andaman, Bangladesh, Bhutan, China, Nepal, Sri Lanka, Myanmar, Thailand, Sabah and Vietnam (Khamkhoun, 2002).

Elephants have not only played a key role in Lao culture but also support ecosystem, such as acting as seed dispersers (Campos-Arceiz & Blake, 2011). At present, habitats for Asian elephants are being lost as forest areas are transformed into agriculture (Santiapillai & Jackson, 1990) while there is extensive poaching, habitat loss and human-elephant conflict.

The NNT NPA in Khammouane Province represents the largest protected area in Laos, with rich biodiversity and outstanding landscapes as well as a large and endangered elephant population (Khamkhoun, 2002). Wildlife movement

and seasonal migration patterns along the Nam Theun Economic Corridor (linking the Nakai-Nam Theun and Phouhinboune national protected areas) have been identified as important areas for the NNT NP elephant population and the Nam Theun Economic Corridor. [Boonratana \(2000\)](#) also reported that the frequency of elephant migration in the area is increasing every year, possibly due to deforestation, which has led to conflicts between elephants and humans, affecting local people and Asian elephant populations. As well as the transformation of agricultural habitats that result in competition for habitat and resources between Asian elephants and humans, these conflicts not only destroy crops and property but also the lives of people and elephants. Payment for conservation could be one of the potential mechanisms to enhance Asian elephant conservation efforts ([Bandara & Tisdell, 2002](#); [Poufoun et al., 2016](#)).

Due to the above-mentioned problems, this paper aims to analyse the factors that determine the conservation of Asian elephants and the assessment of WTP for the conservation of Asian elephants in the NNT NP. The objectives of the research were as follows: 1) to study the overall situation of Asian elephant conservation; 2) to assess the factors that determine the willingness to pay for the conservation of Asian elephants; and 3) to assess the WTP for the conservation of Asian elephants in the NNT NP.

Currently, due to increasing human populations, the National Protected Areas which are home to Asian elephants' habitat is degrading and destroyed rapidly. There has been no examination of the local residents' Willingness to Pay (WTP) for conservation of the Asian elephant in all National Parks in Laos. The research results may offer significant information to support national park managers and decision makers to formulate better future strategies for sustainable management of Nakai-Nam Theun National Park particularly the conservation of Asian elephants in Laos. This paper contributes to economic social science employing the contingent valuation method, with specific reference to globally endangered species. The Asian elephants have no apparent use value within the National Protected Areas currently, and this paper reveals that the key message of understanding and measuring existence value, as has been highlighted elsewhere (e.g. [Han & Lee, 2008](#); [Schutgens et al., 2019](#)) and this paper shows how important the findings could recommend for payments proposed for Asian elephant conservation in Laos.

It is important that key limitations of the paper are discussed here. It is impossible for the paper to investigate all villages and districts who live in, or adjacent to, the NNT NP due to the time and financial constraints. Therefore, the researcher has narrowed and selected only 490 villagers in the seven villages in two districts in Khammouane Province. Any future study on estimating local residents' Willingness to Pay (WTP) for conservation of the Asian elephant should be designed to include more respondents from city population from Khammouane Province as well as other provinces of Laos.

This paper is organised as follows. After a brief discussion of the method used

to calculate local residents' Willingness to Pay (WTP) for conservation of the Asian elephant in Nakai-Nam Theun National Park (NNT NP) in Laos, the findings and discussion of the analysis are presented. Finally, the conclusion and policy recommendations are given.

2. Method

2.1. Study Area

The study site was in the NNT NP, Bolikhamxay Province, Laos. This region represents the largest and most diverse natural and protected forest area in Laos. It has been suggested that the NNT NP contains one of the two largest elephant populations in the country (Duckworth & Hedges, 1999). In and around the NNT NP, elephants occur on the Nakai Plateau (1250 km²) and range into the NNT-Phou Hin Poun (NNTPHP) Corridor (738 km²) that links to the NNT NP and the Phou Hin Poun National Protected Area. This study site included seven villages located in two districts in the NNT NP.

The NNT NP was ranked among the highest priority of Lao protected areas for national and global biodiversity importance. It is one of the largest remaining contiguous forest blocks in Indochina. This status was well established through numerous field studies, including Timmins and Evans (1996), Kottelat (1998), Timmins and Duckworth (1999). Many of the elephants in Laos were killed by humans for their body parts for sale and as products for trade, such as tusks, trunks, feet, tails and skins, or in retaliation for crop raiding.

Over the past few decades, there are a number of economic researchers employing economic valuation as a management tool in conservation and management of endangered species (Bandara & Tisdell, 2002; Imamura et al., 2020; Bhattarai et al., 2021; Kassahun & Taw, 2022). This paper does not attempt to develop new theories or methodologies, but the key contribution of this technique is an innovative application of current economic evaluation given the environmental, social and political context in Laos. Several economic evaluations of elephants has been undertaken typically focused on economic issues involved in the conservation of the African elephant, while those for the Asian elephant have been surprisingly limited.

2.2. Data Collection

The data for this paper were collected using a self-administered questionnaire survey with closed and open-ended questions. The target population sample of this study was local people who live in, or adjacent to, the NNT NP in seven villages in two districts in Khammouane Province (Table 1). These seven villages feature rich natural forest resources, rivers and wildlife habitats, especially for elephants.

In order to determine appropriate sample size, the Cochran formula (Cochran, 1963) was used to estimate an ideal sample size with a level of precision of 5%, confidence level of 95%, and the estimated proportion of the attribute present in

the population ($p = 0.5$, referring a 50/50 split of users and non-users). By using the Cochran formula, the minimum size for the current analysis was estimated to be 384. A sample of 490 respondents after excluding a missing value of 10 respondents was interviewed in order to maximize the generalization of the findings.

All interviewees were willing to pay for Asian elephant conservation. Before the conduct of the interview, each respondent was briefed about the intent of the study and questionnaire. The general background information of the research was firstly introduced, followed by questions about on basic information about current status and issues in Asian elephant conservation in Laos and the study area. Respondents were assured that all information and data collected were confidential and would be utilized only for the study. The head of the family was chosen and considered suitable for making decisions on valuation of the WTP of Asian elephant conservation in the study area subject to their family's budget constraints.

The survey was conducted from October to December 2017 by visiting respondents in their homes. Based on the lists of households from the headmen of each village, a simple random sampling method (Abbott & McKinney, 2013; Sekaran & Bougie, 2016) was used to select the respondents, with a total of 490 respondents from a total seven villages picked (Table 1). Surveys were carried out in the evenings, when respondents had returned from their farmlands.

2.3. Data Analysis

This paper employed a descriptive statistical analysis in order to understand the characteristics of local people in the conservation of Asian elephants by estimating frequencies and percentages. Logit regression was used to model the relationship between the dichotomous dependent variables to respond to the given amount for WTP and the independent variables (respondents' characteristics,

Table 1. Sampling participants for data collection.

No.	Villages selected	Total number of households	No. of households sampled
1	PhonesaOn	238	70
2	Done	224	69
3	Konkaen	69	41
4	Oudomsouk	410	75
5	Thalang	298	75
6	Thongkong	505	83
7	Natheuth	333	77
	Total	2077	490

Source: Field investigation 2018.

such as age, income, education).

The dependent variable was established from the respondents for the main questions regarding payment. In the analysis, the “yes” response, representing the WTP for conservation of elephants, was coded as 1 and the “no” response, representing unwillingness to pay, as 0. This is expressed by a dependent variable, y_i for the i -th respondent.

The currency of WTP in Lao Kip was converted into United States Dollar (USD) based on the exchange rate 1 USD = 11,416 Kip (26 December 2017). The personal characteristic (PC) is an independent variable for the preliminary logit analysis. The variables in the analysis consisted of location, gender, occupation, education level, status, ethnicity and living period in the national park (**Table 2**). Household characteristics (HC) is another factor influencing the WTP or unwillingness to pay to support the conservation of the elephant, namely, number of

Table 2. Variables in the model and definitions.

Variable	Definition	Unit
Dependent Variable		
y_i	Response to willingness to pay	1 = Yes 0 = No
WTP	willingness to pay	USD
Independent Variable		
Gen	Gender	1 = Male 0 = Female
Age	Age	Year
Occ	Occupation	1 = Government staff 0 = Others
Edu	Education	Years
Stat	Status	1 = Married 0 = Others
Eth	Ethnicity	1 = Laoloum 0 = Others
HS	Household size	People
TI	Years of living	Years
Mceo	Used to participate in elephant conservation	1 = Used to 0 = Never
Inc	Household income per month	USD
Price	Price to pay for conservation	USD

β_0 : a constant parameter

β_i : the coefficient of the bid variable

ε_i : error

Source: Becker and Watslad, 1987.

household members, monthly household income, price willing to pay. Environmental characteristics (EC) determine the WTP for conservation of the elephants in the study area.

Model 1: Logit model based on Becker and Watslad (1987)

$$\begin{aligned} \text{Logit}(\text{chosen}) &= \alpha + \beta\text{PC} + \delta\text{HC} + \theta\text{EC} + \varepsilon_i \\ \text{Logit}(\text{chosen}) &= \ln\left(\frac{\text{probability}(\text{chosen} = 1)}{\text{probability}(\text{chosen} = 0)}\right) \\ &= \alpha + \beta_1\text{Gen} + \beta_2\text{Age} + \beta_3\text{Occ} + \beta_4\text{Edu} + \beta_5\text{Sta} + \beta_6\text{Eth} + \beta_7\text{HS} \\ &\quad + \beta_8\text{Tl} + \beta_9\text{Mceo} + \beta_{10}\text{Ln}(\text{Inc}) + \beta_{11}\text{price} + \varepsilon_i \end{aligned} \quad (1)$$

Model 2: OLS based on (Miccheal E. Porter, 1996)

$$\begin{aligned} \text{WTP} &= \alpha + \beta\text{PC} + \delta\text{HC} + \theta\text{EC} + \varepsilon_i \\ \text{WTP} &= \alpha + \beta_1\text{Gen} + \beta_2\text{Age} + \beta_3\text{Occ} + \beta_4\text{Edu} + \beta_5\text{Sta} + \beta_6\text{Eth} + \beta_7\text{HS} \\ &\quad + \beta_8\text{Tl} + \beta_9\text{Mceo} + \beta_{10}\text{Ln}(\text{Inc}) + \beta_{11}\text{Price} + \varepsilon_i \end{aligned} \quad (2)$$

Note that ε_i is an error term.

3. Results and Discussion

3.1. Characteristics of the Respondents

Of the 495 respondents, 52.65% were male, 34.49% were between 36 and 45 years-old, 87.96% were married, and 64.49% had either primary education or never attended education (**Table 3**).

Forty-five point nine-two percent (45.92%) of the respondents mentioned that they used to see the elephant population, 69.80% considered that the population had decreased and almost all respondents insisted that elephant habitat encroachment had increased. It was noticeable that 87.76% of the interviewees mentioned that it was very important to conserve the elephants in the study area and it was surprising that only 23.43% or 71 households said that they were willing to pay on average of USD 1.80 per year to conserve the elephants.

3.2. Factors that Determine the WTP for Conservation of the Elephants

Table 4 presents the descriptive statistics of the main variables used (mean, sd, min, max and number of observations) as well as Chi-square for socio-economic variables. The analysis reveals that the average bid price is USD5.35 with the standard deviation of USD2.51, the maximum value (USD8.76), and the minimum value (USD1.75).

The data gathered from the household survey in NNT NP were analysed to determine factors affecting local residents' WTP behaviour. Results of the Logit analysis showed that 60% of independent variables were found to have statistically significant effect over respondents' WTP behaviour (**Table 4**).

These outcomes were significant, taking account of the socio-economic characteristics of respondents and their preferences for Asian elephant conservation

Table 3. Characteristics of the respondents in HH survey in the study area.

Variable	Frequency (<i>f</i>)	Percentage (%)
Male	258	52.65
Age 36 - 45 years	169	34.49
Married	431	87.96
Primary school/no education	316	64.49
Farmers	326	66.53
Laoloum	216	44.08
Household heads or wife	423	86.33
Years of living 21 - 30 years	129	26.33
Household members of at least 5 persons	114	23.27
Household labour of at least 2 persons	168	34.29
Male household member of at least 2 persons	179	36.53
Never participated in environmental conservation	421	85.92
Agricultural income source	272	55.51
Monthly income between USD 44 and 88	178	36.33
Monthly expenditure at USD 44	254	51.84
Saving between USD 22 and 35	222	45.31
Awareness of elephants	329	67.14
Used to see Asian elephants	225	45.92
Trend of elephant population	342	69.80
Increasing rate of elephant habitat encroachment	484	98.78
It is very important to conserve the elephants	430	87.76
Interested to participate in a conservation of elephant project	299	61.02
Willingness to pay at USD 1.80 per year (average WTP)	71	23.43

Source: Estimated from field data, 2018.

Table 4. Chi-square for socio-economic variables

Variable	Obs	Mean	Std.Dev	Min	Max	Adds Ratio	P-value
Gender	490	0.489	0.50	0	1	1.396108	0.120 ^{ns}
Age	490	42.3	10.88	17	75	1.024515	0.014***
Job	490	0.29	0.45	0	1	0.626196	0.045**
Edu	490	7.07	3.23	5	18	1.293758	0.000***
Status	490	0.90	0.29	0	1	1.899123	0.062*
Ethnic	490	0.44	0.49	0	1	1.414683	0.099*

Continued

HS	490	5.37	1.63	1	10	0.963100	0.553 ^{ns}
MCEO	490	0.37	0.48	0	1	1.394470	0.001 ^{***}
Ln(Incom)	490	1.25	1.14	0.1	7.2	1.525270	0.001 ^{***}
Price	490	5.35	2.51	1.75	8.76	0.999987	0.001 ^{***}

Source: Estimated from field data, 2018. Number of obs: 490; $\text{Chi}^2 = 85.31$; $\text{Prob} > \text{Chi}^2 = 0.0000$. “***, **, *” Confident level 99%, 95% and 90% respectively. “ns” non-significant 99%, 95% and 90% respectively.

in NNT NP. It is noticeable that six independent variables—viz. Age, Job, Edu, MCEO, Income, and Price were found to be statistically significant. Adds ratio of Age was 1.0245, indicating a positive relationship with their preferences for Asian elephant conservation and implying when residents’ age increased one more year that they were likely to pay 1.0245 times more than the younger group, at the confidence level of 99%. This is because elder respondents were more concerned in conserving the Asian elephants. Similarly, Adds ratio of Ethnic was 1.4147, having a positive relationship with their preferences for Asian elephant conservation. This implies that when surveying households that were Laoloum, a household had a likelihood of paying 1.4147 times more than other ethnic groups. Furthermore, analysis revealed that Income and Edu were found to be positively related with residents’ WTP responses, implying that if monthly household income and education of the respondent increases, the likelihood of contributing more to the conservation of the elephants would also increase.

These outcomes collaborate with well-known the Contingent Valuation Method (CVM) theories and similar types of outcomes stated by others in CVM research (e.g. [Bhatt et al., 2014](#); [Zambrano-Monserrate, 2020](#); [Bhat et al., 2021](#)). As expected, the coefficient of household monthly income was found positive, indicating that the likelihood of WTP for conservation of elephant attributes increases with increase in income.

3.3. WTP for Conservation of Asian Elephants in NNT NP

Table 5 shows the calculation of the WTP for the conservation of the Asian elephant in NNT NP from the Logit model. The analysis showed that the variable ‘bid value’ has an expected negative sign, implying an inverse relationship between respondents’ WTP and bid value.

The results of the gender factor estimation showed that the male sample was more willing to pay for the conservation of wild elephants in NNT NP than the female sample at USD 1.20, in accordance with the initial assumption, with a confidence level of 90%. This is similar to findings by [White et al. \(1997\)](#) and [Manyama & Roskaft \(2014\)](#) in that in most rural life it is largely traditional culture handed down from ancestors, with the males who, as heads of families, have the sole authority to decide family issues. Male groups were more likely to be willing to pay for the conservation of wild elephants in the study area.

Table 5. Logit regression model of variables influencing responses to the WTP question.

Variable (X)	Coefficient (β_i)	Mean (\bar{x}_i)	Coefficient * Mean ($\beta_i \bar{x}_i$)	WTP ($\beta_i \bar{x}_i / \beta_{bid}$)
Bid	-0.0000133			
Gender	0.3809	0.4898	0.1866	1.2
Age	0.0240	42.3061	1.0153	6.7
Job	-0.4494	0.2939	-0.1321	-0.9
Edu	0.2707	7.0714	1.9142	12.6
Status	0.5844	0.9041	0.5284	3.5
Ethnic	0.3685	0.4429	0.1632	1.1
HS	-0.0314	5.3714	-0.1687	-1.1
MCEO	0.3511	0.3776	0.1326	0.9
Incom	0.00000019	110	0.2393	1.6
Total			3.8789	25.5

Source: Estimated from field data, 2018.

The results of the estimation of the age factor of the sample group also showed that the older sample group was more willing to pay for the conservation of wild elephants in the NNT NP than the younger sample group at USD 6.70, in accordance with the initial assumption, with 99% confidence level. This finding aligns with research findings by Kamri (2013) and Manyama & Roskaft (2014). Because older people are more inclined to be more environmentally friendly.

The sample group with jobs as civil servants were more willing to pay for the conservation of wild elephants in the NNT NP than the sample group working in business, trade etc., at USD 0.87. This is similar to Manyama and Roskaft (2014), in that the sample were employed as government employees who worked in various state institutions and had a better understanding of the natural conservation of wildlife.

The results showed that the higher level of education sample group was willing to pay for the conservation of elephants in the NNT NP at USD 12.60 more than the lower level of education sample group. This is a similar finding to Kyophilavong and Bennett (2011) and Manyama and Roskaft (2014). Because most highly educated people are more knowledgeable about the laws of wildlife conservation, these sample groups are more environmentally conscious, have higher incomes.

The results of the estimation of the status factor (Status) of the sample group found that the group who were married and had a family were willing to pay for the conservation of wild elephants in the NNT NP at USD 3.40 more than compared to other groups with the same status as the original 90%. Kamri (2013) and Manyama and Roskaft (2014) reported a similar finding in that families with a married status were more capable of paying more than those with other statuses.

The results of the estimation of the ethnic factors (Ethnic) of the sample found that the Lao ethnic group was willing to pay for the conservation of wild elephants in the NNT NP at USD 1.0 more compared to other ethnic groups, which is in accordance with other studies by Kamri (2013) and Manyama and Roskaft (2014). Because this ethnic group accounts for a large proportion of the population, with permanent settlements and occupations, and less hunting activity than other ethnic groups, they are more inclined to pay for elephant conservation.

It is not surprising that the high-income sample was willing to pay more for elephant conservation in the NNT NP at USD 1.60 compared to the lower-income sample, based on the 99% confidence level. This finding is similar to Truong Dang Thuy (2007), Kamri (2013) and Manyama and Roskaft (2014) in that the high-income sample is more likely to be willing to pay for the conservation of wild elephants in the NNT NP.

4. Conclusion

This study provides first-hand data that were used to estimate residents' WTP for the conservation of Asian elephants in NNT NP in Laos using the CVM and to identify the factors' affecting WTP.

The mean willingness to pay for the conservation of the Asian elephant was USD 8 per household per year. Approximately 62% (303 local people) of the respondents were willing to pay for the conservation of the Asian elephant.

Income and education were the most significant predictors of the residents' WTP ($p < 0.01$). "Price" and "Used to participate" in elephant conservation were also significant predictors of the residents' WTP ($p < 0.01$). This implies that it is very important to provide outreach and education programmes with local populations as well as providing extension services and financial support to local populations to improve their livelihoods so that they will not encroach national protected areas and instead conserve the elephants.

To date, there are very few studies on evaluating household WTP for biodiversity conservation in Laos. Therefore, it is necessary to scale up the present study to other national protected areas. It is also very important to carry out extensive research to estimate biodiversity conservation effects in regional protected areas as the research findings will be useful input for effective and efficient policy-oriented research that can guide better management and conservation of Asian elephants.

It is recommended that relevant institutions should establish a key priority to develop a National Asian Elephant Conservation Plan under the leadership of the Ministry of Agriculture and Forest, which supports the overall national goal to "increase the number of breeding populations of elephants at a source site, Nam Et-Phou Louey, to ensure connectivity between all elephant landscapes".

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- Abbott, M., & McKinney, J. (2013). *Understanding and Applying Research Design*. John Wiley & Sons, Inc.
- Ahlering, M. A., Hedges, S., Johnson, A., Tyson, M., Schuttler, S. G., & Eggert, L. S. (2011). Genetic Diversity, Social Structure, and Conservation Value of the Elephants of the Nakai Plateau, Lao PDR, Based on Non-Invasive Sampling. *Conservation Genetics*, *12*, 413-422. <https://doi.org/10.1007/s10592-010-0148-y>
- Bandara, R., & Tisdell, C. (2002). *Willingness to Pay for Conservation of the Asian Elephant in Sri Lanka: A Contingent Valuation Study*. Working Paper No. 67, School of Economics, University of Queensland.
- Bhat, M. Y., & Sofi, A. A. (2021). Willingness to Pay for Biodiversity Conservation in Dachigam National Park, India. *Journal for Nature Conservation*, *62*, Article ID: 126022. <https://doi.org/10.1016/j.jnc.2021.126022>
- Bhatt, M. S., Shah, S. A., & Abdullah, A. (2014). Willingness to Pay for Preserving Wetland Biodiversity: A Case Study. *International Journal of Ecological Economics and Statistics*, *35*, 85-99.
- Bhattarai, B. R., Morgan, D., & Wright, W. (2021). Equitable Sharing of Benefits from Tiger Conservation: Beneficiaries' Willingness to Pay to Offset the Costs of Tiger Conservation. *Journal of Environmental Management*, *284*, Article ID: 112018. <https://doi.org/10.1016/j.jenvman.2021.112018>
- Boonratana, R. (2000). *Wildlife Movements/Seasonal Migration Study and Staff Training*. IUCN.
- Campos-Arceiz, A., & Blake, S. (2011). Megagardeners of the Forest—The Role of Elephants in Seed Dispersal. *Acta Oecologica*, *37*, 542-553. <https://doi.org/10.1016/j.actao.2011.01.014>
- Cochran, W. G. (1963). *Sampling Technique* (2nd ed.). John Wiley and Sons, Inc.
- Duckworth, W., & Hedges, S. (1999). *Tracking Tigers: A Review of the Status of Tiger, Asian Elephant, Gaur, and Banteng in Vietnam, Laos, Cambodia, and Yunnan (China), with Recommendations for Future Conservation Action*. WWF Indochina Programme. <https://doi.org/10.5962/bhl.title.104747>
- Han, S. Y., & Lee, C. K. (2008). Estimating the Value of Preserving the Manchurian Black Bear Using the Contingent Valuation Method. *Scandinavian Journal of Forest Research*, *23*, 458-465. <https://doi.org/10.1080/02827580802400562>
- Imamura, K., Takano, K. T., Kumagai, N. H., Yoshida, Y., Yamano, H., Fujii, M. et al. (2020). Valuation of Coral Reefs in Japan: Willingness to Pay for Conservation and the Effect of Information. *Ecosystem Services*, *46*, Article ID: 101166. <https://doi.org/10.1016/j.ecoser.2020.101166>
- 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. <https://doi.org/10.1016/j.sbspro.2013.07.224>

- Kassahun, E., & Taw, T. B. (2022). Willingness to Pay for Conservation of African Baobab Tree in Ethiopia (A Case Study of Abergele Woreda): Contingent Valuation Approach. *Journal of Sustainable Forestry*, 41, 212-222. <https://doi.org/10.1080/10549811.2021.1903931>
- Khamkhoun, K. (2002). *Conservation Biology*. Kunming Institute of Zoology.
- Kottelat, M. (1998). Fishes of the NamTheun and Xe Bangfai basins, Laos, with Diagnoses of Twenty-Two New Species (Teleostei: Cyprinidae, Balitoridae, Cobitidae, Coiidae and Odontobutidae). *Ichthyological Exploration of Freshwater*, 9, No. 1
- Kyophilavong, P., & Bennett, J. (2011). Willingness to Pay for Cleaning up Road Dust in Vientiane. *International Business and Management*, 3, 12-18.
- Manyama, F., & Roskaft, E. (2014). Factors Affecting Attitudes of Local People toward the Red-Billed Quelea (*Quelea quelea*) in Kondao District, Tanzania. *International Journal of Biodiversity and Conservation*, 6, 138-147.
- Ministry of Agriculture and Forestry (2009). *National Elephant Management Action Plan: Lao PDR*.
- Phimmavong, S., Ozarska, B., Midgley, S., & Keenan, R. (2009). Forest and Plantation Development in Laos: History, Development and Impact for Rural Communities. *International Forestry Review*, 11, 501-513. <https://doi.org/10.1505/ifor.11.4.501>
- Poufoun, J. N., Abildtrup, J., Sonwa, D. J., & Delacote, P. (2016). The Value of Endangered Forest Elephants to Local Communities in a Transboundary Conservation Landscape. *Ecological Economics, Elsevier*, 126, 70-86. <https://doi.org/10.1016/j.ecolecon.2016.04.004>
- Santiapillai, C., & Jackson, P. (1990). *The Asian Elephant: An Action Plan for Its Conservation*. World Conservation Union/Species Survival Commission Asian Elephant Specialist Group, Gland, Switzerland.
- Schutgens, M., Hanson, J., Baral, N., & Ale, S. (2019). Visitors' Willingness to Pay for Snow Leopard *Panthera uncia* Conservation in the Annapurna Conservation Area, Nepal. *Oryx*, 53, 633-642. <https://doi.org/10.1017/S0030605317001636>
- Sekaran, U., & Bougie, R. (2016). *Research Methods for Business: A Skill Building Approach* (7th ed.). John Wiley & Sons.
- Smith, H., Kanowski, P., Keenan, R. J., & Phimmavong, S. (2021). Lao Plantation Policy: Prospects for Change. *Forests*, 12, Article No. 1132. <https://doi.org/10.3390/f12081132>
- Thuy, T. D. (2007). *Willingness to Pay for Conservation of the Vietnamese Rhino*. Ho Chi Minh City, Report to EEPSEA, 1-27.
- Timmins, R. J., & Evans, T. D. (1996). *Wildlife and Habitat Survey of the Nakai-Nam Theun National Biodiversity Conservation Area*. Wildlife Conservation Society, 59 p.
- Timmins, R. J., & Duckworth, J. W. (1999). Status and Conservation of Douc Langurs (*Pygathrix nemaeus*) in Laos. *International Journal of Primatology*, 20, 469-489. <https://doi.org/10.1023/A:1020382421821>
- White, P. C. L., Gregory, K. W., Lindley, P. J., & Richards, G. (1997). Economic Values of Threatened Mammals in Britain: A Case Study of the Otter *Lutra lutra* and the Water Vole *Arvicola terrestris*. *Biological Conservation*, 82, 345-354. [https://doi.org/10.1016/S0006-3207\(97\)00036-0](https://doi.org/10.1016/S0006-3207(97)00036-0)
- Zambrano-Monserrate, M. A. (2020). The Economic Value of the Andean Condor: The National Symbol of South America. *Journal for Nature Conservation*, 54, Article ID: 125796. <https://doi.org/10.1016/j.jnc.2020.125796>