Willingness to Pay for Conservation of the Rong Por's Community Forest in Phayao Province

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Abstract: Rong Por community forest was declared to be included in the Doi Luang National Park since 1981, according to the Parliament, Act of 1961. It is the cause of conflict of interest related to government projects and possessory right of land ownership because the houses were in the Doi Luang National Park area. Moreover, the local people were accused of the invasion of forest lands from government officials cause people locals to express themselves as precedent residents the announcement of a national park clearly expressed was not invading. Therefore, the purposes of this research aimed to study on willingness to pay for conservation of the Rong Por's community forest and to analyze the factors affecting the willingness to pay for conservation of Rong Por's community forest located in Dongjen Sub-District, Phukamyao District, Phayao Province, Thailand. The primary data were collected by a questionnaire, a total of 400 sample sizes. The logistic regression with Maximum Likelihood Estimation (MLE) was theoretically employed to analyze what factors affecting the values of willingness to pay. The empirical results showed that the respondents are unwilling to pay for conservation because they were confirmed that they were not intruders. Moreover, the analysis from Logistic Regression depicted that the factors affecting the willingness to pay for forest conservation are more benefits to this research and can be used as the guidelines for the policy-maker in the local area to conserve the Rong Por's community forest.

Keywords: Willingness to pay, CVM's method, Community forest, Phayao Province, Thailand

Introduction

Forestry is a vital resource for human life. Currently, the population is increasing. The urban area is continuously expanding. The industry is rapidly opening, causing each year more forest encroachment, therefore, resulting in a reduced forest area and causing deterioration in natural resources. As a result of this problem, the Royal Forest Department has given importance to sustainable forest management by promoting and encouraging people to participate in the management of their local forests, allowing communities to play an important role in forest management. Together with the state in the form of "community forest" which allows communities to legally participate in forest resource management by establishing community forestry projects for approval from the Royal Forest Department and the government to provide knowledge and support to create an understanding of values of forests to the environment (Royal Forest Department, 2018).

The northern region has a total of 2,191,203 raisee （350,592.48 hectares) of the community forest, divided into four areas: the Forest Resources Management Office 1 (Chiang Mai, Lamphun) with an area of 481,917 raisee (77,106.72 hectares), the Forest Resources Management Office 2 (Phayao, Chiang Rai) has an area of 257,788 raise (41,246.08 hectares), the Forest Resources Management Office 3 (Lampang, Uttaradit) has an area of 802,267 raise (128,362.72 hectares) and the Forest Resources Management Office 4 (Kamphaeng Phet, Sukhothai, and Tak) has an area of 649,231 raisee (103,876.96 hectares) (Information and Communication Technology Center, Department of Forestry, 2019).

Ban Rong Por community Located in the Dong Jen Subdistrict area Phu Kam Yao District, Phayao Province, has a sloping area from a mountain. Some are flat areas. The majority of the population is agriculture and forestry, such as mushrooms, herbs, and shoots, etc. The population in the area uses the forest. In 1981, Rong Por's village was declared to be included in the Doi Luang National Park according to the Parliament, Act of 1961. Later, there was a conflict of interest related to government projects and land ownership rights because

the Ban Rong Por was located in Doi Luang National Park. Besides, local people have been accused of invading forest areas by government officials, causing local people to express their views as residents. And in 2004, Rong Por village was declared a community forest. With a total area of 310 raise In 2004, Rong Por village was declared as a community forest, with a total area of 310 raise (49.6 hectare) (Information and Communication Technology Center, Department of Forestry, 2019).

Objectives

The purposes of this research are to study the value of willingness to pay for conservation of the Rong Por's community forest, as well as to analyze the factors affecting the willingness to pay for conservation of Rong Por's community forest located in Dongjen Sub-District, Phukamyao District, Phayao Province, Thailand.

Literature Review
Valuation of Environmental Economics related to Waste Management

Panjma (1999) studied the willingness to pay waste management fees in Nakhon Pathom Province. The objectives of the study are (1) to study the socio-economic structure including the opinions of the people of Phra Prathon Subdistrict, Nakhon Pathom Province regarding the problems of pollution caused by solid waste and solid waste management (2) study of willingness to pay and the willingness to pay the waste management of the people in Phra Prathon Subdistrict, Nakhon Pathom Province, and (3) study the factors that influence the willingness to pay and the willingness to pay the waste management of the people in Phra Prathon Subdistrict, Nakhon Pathom Province In this study, data were collected from 565 sample households. Data were analyzed using the logit model. And the multiple regression model The results showed that the majority of people in the Phra Prathon Subdistrict, Nakhon Pathom Province were more willing to pay waste management fees than were not willing to pay. Wherein those willing to pay accounted for 82.8 percent of the total number of samples and the statistically significant factor about the willingness to pay was to receive information about waste pollution. Garbage disposal by hiring a municipal or private garbage truck to store And education levels have a positive relationship While the characteristics of housing ownership and income have a negative relationship.

Pennapa (2003) studied the willingness to pay fees for solid waste collection in Mae Jo Subdistrict Municipality, San Sai District, Chiang Mai Province. The objectives of the study are (1) studying the operation of the solid waste collection of Mae Jo Sub-district Municipality (2) studying factors affecting the willingness to pay fees for solid waste collection and (3) studying the value Willingness to Pay Fees for Garbage Collection of Households And samples of the business type of shops The data were collected from 374 households in the sample group of 211 households and shops in the sample group. This study used data analysis to find basic statistics. And multiple regression with SPSS for Windows computer program. The study found that the General household sample The value of the willingness to pay the waste collection fee is 34.41 baht/month/household. And the factor which has the most influence on the willingness to pay garbage collection fees is recyclable waste, followed by biodegradable waste, occupation, and gender respectively. For a sample of trades, The study found that Is worth the willingness to pay the garbage collection fee of 37.96 baht/month/shop And the factors that have the most influence on the willingness to pay garbage collection fees are incomes, followed by processing time. The results of the test of the willingness to pay the fees for solid waste collection of general households and store business samples were not significantly different.

Nitiwat (2004) studied the willingness to pay waste management fees in Chiang Mai municipality Its objectives are to (1) study the problems of solid waste management in Chiang Mai municipality (2) analyze the value of the willingness to pay the rate of solid waste collection fees and (3) analyze the factors that influence the Willing to pay for waste management Data used in the study were data collected from an accidental sampling of 388 households living in Chiang Mai Municipality, measured by the willingness to pay using the Bidding Games method and the analysis. The value of willingness to pay and the relationship between the value of willingness to pay and the influencing factors that use the regression analysis. The study found that From the sample households, they were willing to pay waste management fees at the price of 47.52 baht/month. The factor that had the most influence on the value of willingness to pay was the amount of waste that the household discarded in 1 day, followed by the level of study Average household income per month Number of people residing in the place And the awareness of information about solid waste From the estimation of willingness to pay waste management fees, it was found that The willingness to pay is greater than the current fee rate. Shows that Chiang Mai Municipality can adjust the rate of garbage collection fees to be higher than before Which is in line with the willingness of the households to pay in the Chiang Mai municipality.

Busakorn and Supawan (2013) did a research on the evaluation of willingness to pay for waste disposal from houses in Mueang District, Songkhla Province, has the objective to (1) study the value of willingness to pay for the 4 types of waste disposal, namely general/dry waste. Organic waste / wet waste Recyclable/recyclable waste And Hazardous Waste (2) Study the factors that affect the willingness to pay for waste disposal in 4 types which are general waste / dry waste Organic waste / wet waste Recyclable/recyclable waste And hazardous waste The study was conducted by collecting data from 400 households using contingent valuation method (CVM). The study found that Value of willingness to pay for waste disposal, general waste / dry waste is 30.70 baht/month, organic waste / wet waste is 26.91 baht/month, recyclable/recyclable waste is equal to 27.03 baht/month and hazardous waste is 37.38 baht / The factors affecting the willingness to pay for general waste / dry waste are gender and educational level. The types of organic waste / wet waste are gender and educational level. The types of recyclable or recyclable waste include sex and hazardous waste, such as household expenses and the distance of the house from the main road. Most households are willing to pay the 4 types of waste disposal. Therefore, the municipality can adjust the fees to be higher and collect according to the type of waste which is consistent with the willingness of the households.

From the aforementioned research, it is found that the aforementioned research has a very similar issue, which is to study the willingness to pay for waste management. By focusing on the study of the value of willingness to pay for waste management And factors influencing the willingness to pay fees for waste management and the research mentioned above will have different issues in the environment, society and economy.

Valuation of Environmental Economics in Other Relevant Cases

Kriangkrai (2012) studied the satisfaction and willingness of the people of Saraphi District towards the conservation of rubber trees along the Chiang Mai-Lamphun Road. The objectives are (1) to know the satisfaction and willingness of the people of Saraphi District. Chiang Mai Province (2) Comparison of satisfaction and willingness to pay for the conservation of rubber trees between people in Saraphi District And the general public. (3) Know the opinions and recommendations of the people in the area. For the conservation of rubber trees By collecting data from random sampling The information obtained will be diverse. From the study of satisfaction with the conservation of rubber trees, they are separated according to the benefits and harms. Found that the most satisfying benefit was the beauty of the rubber trees Peace with the surrounding people as well as those who use this thoroughfare. And the important thing is Is an outstanding feature of Saraphi District for a long time As for the penalty that caused the most resentment was the breaking down of the rubber tree branches to the ground Damage to life and property of people both inside and outside the area. As for the willingness to pay for the conservation of rubber trees, households in the Saraphi district are willing to pay up to 90 percent. The most willing to pay is 50 baht/year, while those outside the area are willing to pay at 76.7 percent. The most willing to pay is 100 baht/year. It can be said that most households would like to continue to preserve the rubber trees.

Thanachai and Paweena (2014) studied the willingness to pay for wastewater treatment in Huai Tong Environment Warin Chamrap District Ubon Ratchathani Which aims to study the willingness to pay fees for wastewater management in the environment Warin Chamrap District Ubon Ratchathani And study the factors that influence the willingness to pay fees to manage wastewater in Huai Tong Environment Warin Chamrap District Ubon Ratchathani. The study was conducted from 378 people living in Huay Tong Environmental Community. The statistics used for data analysis were percentage, mean, standard deviation. Moreover, the logistic regression analysis found that the value of willingness to pay is 56,970.01 baht/month. The average willingness to pay is 24.77 baht/month/household. And factors influencing the willingness to pay fees for treating wastewater in Huay Tong Environment include gender, primary education High school or vocational certificate And employees of private companies. From both of the above studies found that the research is different in the area of study. In the first research conducted a study of the satisfaction and willingness of the people of Saraphi District towards the conservation of rubber trees along with the Chiang Mai - Lamphun road. Conducted a study of the willingness to pay for wastewater treatment in Huai Tong Environment Warin Chamrap District Ubon Ratchathani Both studies have similar objectives. Which is a study to assess the economic environment that can be used in this study?

Valuation of the Economic Environment related to Foreign Solid Waste Management

Weisheng (2015) studied the willingness to pay the stakeholders for the improvement of construction waste

management in Hong Kong. This aims to examine the willingness to pay the Stakeholders (WTP) for the improvement of waste management from construction. Surveyed by questionnaires in the form of payment cards for key CWM stakeholders in Hong Kong. The results show that there are no statistically significant changes in the WTP shown by different stakeholder groups. The average willingness to pay for construction waste and demolition (C&D) is HK $ 232 / ton. The average willingness to pay for off-site sorting (OSF) is HK $. 186 / ton and the average willingness to pay for public disposal (PFRF) is HK $ 120 / ton. Not only is the scientific basis for the ongoing debate about the change of Hong Kong's CWDCS, but also a valuable reference for other countries that face the challenge of developing charging plans for dealing with construction waste.

Basanta (2015) studied willingness to pay for waste management in Dhaka, Bangladesh. The socio-economic analysis aims to find the relationship between Willingness to pay and household income Survey primary data at random from 120 households through a comprehensive questionnaire. The results show that there is a positive relationship between household income and the willingness to pay for waste management, in which residents have expressed concerns about waste management and the negative impact on accumulation. Waste to the environment and residents are willing to pay more for better waste management. This higher payment can be used to improve existing waste management systems in a clean environment. And more hygienic in Dhaka
Muniyandi (2018) explores the willingness of households to pay for improved waste management services. In India, This research addresses two important points. First, there is no economic analysis of India. And the second part, most studies focus on waste management in India using the willingness of households to pay with valuation methods that are made for improved waste management in the amount of 150 Households in a suburb in Madurai, India. The study found that household respondents are willing to pay for a clean environment Rs 24 (the US $ 0.34) and found that more than 95% of household respondents are willing to pay for waste management. The results of this study can be used to design waste management plans suitable for collection, transportation, disposal, and waste separation in the semi-urban area of India.

From the studies, related research will find that there are similar issues in the research, which are the questionnaire collection method to collect data. To study the willingness to pay the waste management fee And study the factors that affect the willingness to pay the waste management fee which all the research mentioned above, found that people are willing to pay the waste management fees As for the factors affecting the willingness to pay the waste management fees, there will be different, as the case study. The other different part is the environment, society, economy which each research study. Methods used to analyze data that are consistent with the data collected In which the data analysis methods are chosen that are suitable for the data collected for each research Since the present waste problem is a significant problem affecting the environment both, directly and indirectly, It is a problem that should be addressed to have an appropriate management system concerning public participation. Which is why the researcher decided to choose to do this study

Expected Benefits

The results of the study from the analysis were beneficial for the staff and related agencies to be used in the formulation of guidelines for forest conservation management in the community forest of Rong Por to be proper for people in the area and can use the information or results of the study that has been used to plan for better forest management.

Related Theory
Contingent Valuation Method (CVM)

CVM method is a technique that can be used to evaluate or benefit and can be used with the assessment of environmental quality. The questions used in CVM methods are made in the willingness to accept.

The contingent valuation method (CVM) is used to estimate economic values for all kinds of environmental goods and services. Can be used to estimate both use and non-use values. CVM is the most widely used method for estimating non-use values. CVM is also the most controversial of the non-market valuation methods.

Logistic Regression Analysis

Binary logistic regression analysis in the case of more than one independent variable to predict the likelihood of occurring events.

Logistic Regression Analysis is showed as an equation (1)

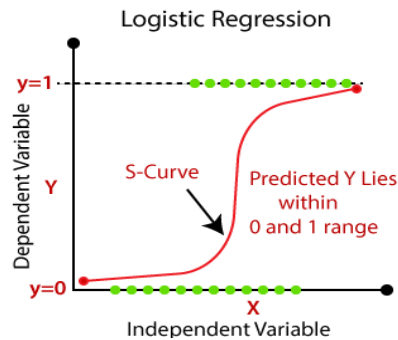$$\text{Log(odds)} = \beta_0 + \beta_1 X_1 + ... + \beta_P X_P \qquad (1)$$

Figure 1. Linear Regression and Logistic Regression

For the estimation, Y is an estimate of the P (event occurrence), the Maximum Likelihood Estimation is used to analyze the regression. In the general regression equation use the Least Square method to estimate the value β_0, $\beta_1, ..., \beta_P$.

Dwivedi R. (2020)

The variable for this Logistic Regression Model.

Dependent Variable (Y)
: Willingness to Pay (Yes/No)
Independent Variables (X)
: Gender (X1)   : Direct Use Benefits (X3)
: Time Consuming for Forest Conservation (X2)   : Local Forest Policy (X4)
Analyzed using SPSS.To analyze the factors affecting a willingness to pay for conservation of the Rong Por community forest located along Doi Luang National Park in Phayao Province, Thailand.

Method
Data Collection

The primary data were collected through questionnaires and interviewing people in Rong Por's village, Dongjen Sub-District, Phukamyao District, Phayao Province.

The secondary data were collected through the research from theory, academic articles, documents, and information from government officials.

Results

Information was collected through questionnaires and interviews from 400 sample groups on economic, social, utilization of forest, and willingness to pay for conservation in Doi Luang National Park.

Most populations are male, age ranges between 51-60 years old, marital status, the most population completed a bachelor's degree and most occupation of the population is trade or self-employed.

In terms of economics, the monthly income of most respondents is between 8,000-12,000 Thai Baht per month per person and the monthly expenses are 0.000-5,000 Thai Baht per month per household.

The willingness to pay for the sample population is unwilling. The reasons are needless to pay 35.1 percent,

many families expense 29.7 percent, activity groups have participated 10.8 percent, and other reasons 24.3 percent such as antipathy with the work of the forestry staff, affirmative they are not intruders.

Information was collected through Logistic Regression Analysis by the SPSS program to analyze the factors affected willingness to pay for conservation of the Rong Por community forest located along Doi Luang National Park.

Table 1. The Results of Correlation Analysis

		Gender	Time	Benefit	Local Policy	WTP
Gender	Pearson Correlation	1	-0.245	-0.113	0.062	-0.053
	Sig. (2-tailed)		0.101	0.435	0.669	0.714
	N	400	400	400	400	400
Time	Pearson Correlation	-0.245	1	0.092	-0.031	0.168
	Sig. (2-tailed)	0.101		0.544	0.840	0.266
	N	400	400	400	400	400
Benefit	Pearson Correlation	-0.113	0.092	1	0.153	0.299
	Sig. (2-tailed)	.435	0.544		0.290	0.035
	N	400	400	400	400	400
Local Policy	Pearson Correlation	0.062	-0.031	0.153	1	0.141
	Sig. (2-tailed)	0.669	0.840	0.290		0.329
	N	400	400	400	400	400
WTP	Pearson Correlation	-0.053	0.168	0.299	0.141	1
	Sig. (2-tailed)	0.714	0.266	0.035	0.329	
	N	400	400	400	400	400

*Correlation is significant at the 0.05 level (2-tailed).

Source: SPSS program

Table 2. The Results of Logistic Regression Analysis

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Gender	0.785	0.751	1.095	1	0.295	2.193
	Time	0.023**	0.018	1.648	1	0.199	1.024
	Benefits	1.387	0.705	3.866	1	0.049	4.002
	Local Policy	0.704	0.418	2.832	1	0.092	2.021
	Constant	-5.210	2.104	6.132	1	0.013	0.005

a=Variable(s) entered on step 1: Gender, Time, Benefit, Forest Policy

$\log(WTP) = \beta_0 + \beta_1 (Gender) + \beta_2 (Time) + \beta_3 (Benefit) + \beta_4 (Local Policy)$
        For the estimation

$\log(WTP) = -5.210 + 0.785\ Gender + 0.023\ Time** + 1.387\ Benefit + 0.704\ Local Policy$
        Nagelkerke R Square = 0.261 or the equation can be explained 26.1 percent

Conclusions

The concept of the contingent valuation method showed that there is necessary to utilize a willingness to pay for conservation of the Rong Por's Community Forest in Dongjen Sub-District, Phayao Province, Thailand.Based on the finding results, the respondents are unwilling to pay for conservation because they were confirmed that they were not intruders of the Rong Por's Community Forest in Phayao Province.

The analysis from Logistic Regression Model showed that the factor of can significantly affect the willingness to pay for forest conservation of the Rong Por's Community Forest in Phayao Province at the 95 significant level.

Therefore, forest conservation has significant welfare costs that require compensation. Protected areas may impose local welfare costs through the enforcement of use restrictions.

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