

Willingness to Pay for Conservation of the Vietnamese Rhino

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TABLE OF CONTENTS

1. Introduction

- 1.1 The Problem
- 1.2 Research Objectives
- 1.3 Theoretical Considerations
- 1.4 Welfare Measure
 - 1.4.1 Non-parametric estimation of WTP
 - 1.4.2 Parametric estimation of WTP

2. Methodology

- 2.1 The Questionnaire
- 2.2 The Scenario
- 2.3 Payment Vehicle and Bid Levels
- 2.4 Survey Mode

3. Results

- 3.1 Respondents' Profile
- 3.2 Respondents' Prioritization of Issues Facing the Country
- 3.3 Attitude toward Endangered Species Conservation and Knowledge of the Vietnamese Rhino
- 3.4 Responses to the WTP question
 - 3.4.1 Reasons for Unwillingness to Pay
 - 3.4.2 Reasons for Willingness to Pay
- 3.5 Validity of Scenario Design
- 3.6 The Bid Function
- 3.7 WTP Estimates
 - 3.7.1 Adjustment for Certainty
 - 3.7.2 Adjustment for Protest Votes
- 3.8 Cost of and Potential Revenue for the Vietnamese Rhino Conservation Program

4. Concluding Remarks

References

Appendix: The Questionnaire (Survey on Economic and Environmental Problems in Selected Countries in Southeast Asia)

WILLINGNESS TO PAY FOR CONSERVATION OF THE VIETNAMESE RHINO

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Executive Summary

This paper is part of a bigger research project on Local Willingness to Pay (WTP) for the Conservation of Endangered Species in Southeast Asia. The research measures WTP using contingent valuation method for a conservation program for the Vietnamese Rhinoceros and a regional conservation program for sea turtles, which are now critically endangered. Five bid levels were used based on the results of a pretest of 120 questionnaires in Ho Chi Minh City. A drop-off survey of 800 households was done in two cities: Ho Chi Minh City and Hanoi; 690 households responded. The mean WTP was estimated at USD 2.50/household.

1. INTRODUCTION

1.1 The Problem

According to Vietnam's Biodiversity Action Plan, the extinction rate of the country's endangered species in the past decades has been higher than that of the world and 1,000 times higher than the natural extinction rate. The most dangerous threats to biodiversity are the expansion of economic (cultivation) activities, poaching, and deforestation. Among the more than 350 endangered species in Vietnam, the Vietnamese Rhinoceros is the most endangered. The number of Rhinos has decreased from 15-17 in 1970 to 5-7 today (Cat Tien National Park, 2005).

The rhinos and elephants are the two biggest animals on earth. Among the five species of rhinos in the world, three are found in Asia: Indian Rhino (the greater one-horned rhinoceros), Javan Rhino (the lesser one-horned rhinoceros), and Sumatran Rhino (Asian two-horned rhinoceros). Foose and Strien (1997) view them as "among the most remarkable animals on earth and are of great cultural importance in Asia."

The rarest among Asian rhinos, the Javan Rhino, is found in Indonesia and Vietnam. Its population is reported to be fewer than 75 (Foose and Strien, 1997). In Vietnam, only 5-7 Javan Rhinos remain. (The Vietnamese Rhino is a subspecies of the Javan Rhino.) They live in Cat Loc Rhino Conservation Area located in Cat Tien National Park, which has a total area of 30,635 ha. These rhinos are now under threat; the cultivation activities of a minor ethnic group living in the rainforest are impinging on the rhinos' area. Moreover, these people compete with the rhinos for the same source of food.

There had been many efforts to relocate this ethnic group from the conservation area, but these have been unsuccessful. For one, the group has historically lived in isolation, relying on the forest for its existence. The people are extremely poor, with a desperately low level of education and skills. Without a significant and sustained support, their chance of surviving in a new environment is slim. On the other hand, funds for moving and resettling them, which would be very large, are not available.

The Cat Loc Rhino Conservation Area was established with funding from the government of the Netherlands and Vietnam, as part of a bigger program to maintain the biodiversity of Cat Tien National Park. This program was coordinated by the World Wildlife Fund and ended in June 2004.

The Vietnamese Rhinos have been observed not to have breeding activities in recent years. As such, they could be extinct in the near future (Cat Tien National Park, 2005).

The situation calls for a program to protect the rhinos. However, such a program would require large funding because the cost of moving and resettling people currently living in the area is high. In addition, because the rhinos are too few, some breeding interventions are required, which also require a lot of money.

On the other hand, protecting the rhinos provides some benefits. In particular, the continued presence of the rhinos would contribute to biodiversity. It would also mean that forests would be available to serve as home to other species as well. Moreover, rhinos could provide some recreational value since Cat Tien National Park is now open to tourists. Rhinos are also of great cultural importance to Vietnamese; they are mentioned in many legends.

1.2 Research Objectives

Endangered species are non-marketable goods and there is a lack of information on their economic value and the mechanisms to capture non-market economic value. Thus, this research aims:

- To determine whether or not Vietnamese are willing to pay for the Vietnamese Rhino's conservation.
- To determine the Vietnamese's awareness of and attitudes toward the Rhino's conservation.
- To calculate the cost of a conservation program for the Vietnamese Rhino.
- To measure the economic value of and potential revenue from such a conservation program.
- To recommend funding mechanisms for the conservation program.
- To examine the determinants of the Vietnamese' willingness to pay.

1.3 Theoretical Considerations

Vietnamese Rhinos have mainly an existence value only. They have a strong sense of smell to be able to avoid people from long distance and so far nobody, not even the local people

and national park (NP) managers, can see them. According to Freeman III (2003), people are willing to pay for endangered species even if they do not expect to see them. The study measured this value using contingent valuation (CV) method.

Among CV questions, the discrete choice (or dichotomous) CV question is most widely adopted because the other types suffer the problem of incentive compatibility (Carson et al, 2001). It is analyzed using random utility model as given below.

As presented in Haab and McConnell (2002) and Bateman et al. (2002), the utility function of respondent j is:

$$u_{ij} = u_i(y_j, z_j, \varepsilon_{ij}) \quad (1)$$

where $i=0$ is the status quo, and $i=1$ is the condition where the environmental goods or services are supplied. Utility is a function of income y , a vector of the respondent's characteristics and attributes of the choice. ε_{ij} is the unobservable component.

Respondent will say "yes" to the payment t_j if the utility with the environmental improvements after the payment exceeds the utility of the status quo, or:

$$u_{1j} = u_1(y_j - t_j, z_j, \varepsilon_{1j}) > u_0(y_j, z_j, \varepsilon_{0j}) \quad (2)$$

Because of the unobservable component, one can only estimate the probability of "yes" or "no" response:

$$\Pr(\text{yes}_j) = \Pr(u_1(y_j - t_j, z_j, \varepsilon_{1j}) > u_0(y_j, z_j, \varepsilon_{0j})) \quad (3)$$

The utility function is assumed to be separable in deterministic and stochastic preference:

$$u_i(y_j, z_j, \varepsilon_{ij}) = v_i(y_j, z_j) + \varepsilon_{ij} \quad (4)$$

The probability statement then becomes:

$$\Pr(\text{yes}_j) = \Pr(v_1(y_j - t_j, z_j) + \varepsilon_{1j} > v_0(y_j, z_j) + \varepsilon_{0j}) \quad (5)$$

Assume the utility function is linear:

$$v_{1j}(y_j) = \sum_{k=1}^m \alpha_{1k} z_{jk} + \beta_1(y_j) \quad (6)$$

The deterministic part of utility from environmental improvements is:

$$v_{1j}(y_j - t_j) = \sum_{k=1}^m \alpha_{1k} z_{jk} + \beta_1 (y_j - t_j) \quad (7)$$

The status quo utility is:

$$v_{0j}(y_j) = \sum_{k=1}^m \alpha_{0k} z_{jk} + \beta_0 (y_j) \quad (8)$$

Change in deterministic utility is:

$$v_{1j} - v_{0j} = \sum_{k=1}^m (\alpha_{1k} - \alpha_{0k}) z_{jk} + \beta_1 (y_j - t_j) - \beta_0 y_j \quad (9)$$

Since marginal utility of income in the two situations is the same, $\beta_1 = \beta_0$, then:

$$v_{1j} - v_{0j} = \sum_{k=1}^m \alpha_k z_{jk} - \beta t_j \quad (10)$$

The probability statement becomes:

$$\Pr(\text{yes}_j) = \Pr\left(\sum_{k=1}^m \alpha_k z_{jk} - \beta t_j + \varepsilon_j > 0\right) \quad (11)$$

1.4 Welfare Measure

A single-bounded CV question was used. This section presents the welfare estimation for this type of data.

1.4.1 Non-parametric estimation of WTP

Let N denote the number of households in the sample and t_j the level of bid ($j=0$ to J , where J is the highest level of bid and t_0 is always zero). Let h_j be the number of households with WTP higher than or equal to t_j . The total number of households in the sample with WTP higher than or equal to t_j is:

$$n_j = \sum_{k=j+1}^J h_k \quad (12)$$

Then the survivor function will be:

$$\mathfrak{S}(t_j) = \frac{n_j}{N} \quad (13)$$

The mean WTP is calculated using:

$$MeanWTP = \sum_{j=0}^J \mathfrak{S}(t_j) [t_{j+1} - t_j] \quad (14)$$

1.4.2 Parametric estimation of WTP

From the above analysis:

$$\alpha_1 z_j + \beta(y_j - t_j) + \varepsilon_{j1} = \alpha_0 z_j + \beta y_j + \varepsilon_{j0} \quad (15)$$

Therefore:

$$WTP = \frac{\alpha z_j}{\beta} + \frac{\varepsilon_j}{\beta} \quad (15)$$

Assume that $\frac{\varepsilon_j}{\beta}$ has mean zero and variance $\frac{\sigma^2}{\beta^2}$, then mean WTP is:

$$MeanWTP = E(WTP | \alpha, \beta, z_j) = \frac{\alpha z_j}{\beta} \quad (16)$$

2. METHODOLOGY

Properly constructing the questionnaire is critical to obtaining the correct WTP value, especially the presentation of the scenario that provides information on the good being valued (Carson, 1999). In constructing the questionnaire, a series of discussions with National Park managers, key informant interviews, focus group discussions (FGDs), and pretest surveys were done.

The discussions with Natural Park managers provided the information used for developing a feasible Vietnamese Rhino conservation program. The key informant interviews and FGDs helped identify the institutions that should be involved in the program, the payment vehicle, and timing of payment. The social feasibility of the program was also verified during this stage.

Several pre-testing surveys were conducted in Ho Chi Minh City (HCMC) to validate the wording of the questionnaire and identify potential problems. The questionnaire was revised after each pretest.

A total of 800 questionnaires were distributed, 50 percent in HCMC and 50 percent in Hanoi. The implementation of the survey follows the suggestions of Whittington (2002).

2.1 The Questionnaire

Following the common structure of a good CV survey as suggested by Carson (1999), the questionnaire consists of four sections:

Section 1 - Common problems facing the country

Section 2 - Knowledge and attitude

Section 3 - The scenario and WTP questions

- description, situation, threats, proposed program, and WTP questions
- debriefing questions

Section 4 - Household's socioeconomic information

Section 1 examines the respondents' priority vis-a-vis environmental concerns, and determines if endangered species is among their priorities. Section 2 gathers information on whether they view the Vietnamese Rhino "worth protecting" compared with other endangered species, and determines their attitude toward the rhino's existence value and protection and contributing to protect the rhino. Section 3 provides information on the proposed conservation plan as well as the payment vehicle, timing and provision rule. Follow-up and debriefing questions are included in this section. Finally, section 4 collects some socioeconomic information of respondents.

2.2 The Scenario

The scenario is constructed following the suggestions of Mitchell (2002) and Boyle (2002). The scenario starts with a description of the current threats faced by the Vietnamese Rhino,

including its decreasing habitat area and slash-and-burn cultivation done by the people living in the national park. A conservation plan is then presented, whose activities include: protecting the rhino from poaching, protecting the habitats, reforestation, raising awareness, research on alternatives of reforestation and habitat area expansion, and captive breeding. Next, the institutional arrangements are described, indicating that the surcharge will be collected by the electricity company and that the fund will be administered by the Vietnamese Rhino Conservation Fund. The provision rule is presented, indicating that the conservation program would be implemented only if the majority of Vietnamese vote for it.

As mentioned previously, the study used single-bounded dichotomous elicitation questions. Given a bid level, the respondents were asked to decide whether or not she/he would vote for the program.

Cheap talk was also included to explain that there is no connection between rhino conservation and electricity, but that the electricity bill is the most efficient way to collect the contributions.

The WTP question is then stated:

“Would you vote in favor of a surcharge of VND <bid> that would be added to the electricity bills of your household and of other households in our country? Remember the surcharge is a one-time payment and would be added to your electricity bill next month. The money raised would go to the Vietnamese Rhino Conservation Program described above.”

Color pictures are used in the questionnaire as recommended by the NOAA panel (Arrow et al, 1993).

2.3 Payment Vehicle and Bid Levels

A mandatory one-time payment through the electricity bill was used. Electricity bill was seen as the most efficient way to collect money since electricity is provided in all districts in Vietnam and almost all households are connected. The focus group discussions (FGDs) and key informant interviews confirmed this assumption. Other options were proposed: water bill, land tax, national defense fee, and solid waste collection fee. Water bill was rejected because even in big cities, many households are not connected to piped water; the situation is worse in rural areas. Land tax appears to be weakly enforced for there are many illegally built houses where land tax cannot be collected. The national defense fee, which is collected

quarterly, is quite difficult to collect. On the other hand, the solid waste collection system is operated by the private sector, which the people do not trust.

Because the Vietnamese Rhino is already critically endangered, a one-time payment was proposed so that the amount that could be raised immediately could be known and made available.

After several FGDs and pretests, the five bid levels were set at VND 1,000; 10,000; 25,000; 50,000 and 300,000 (equivalent to USD 0.0625; 0.625; 1.5625; 3.125; 18.75). The bid levels were set so that the highest level “should be rejected by 90-95 percent of the respondents.” (Whittington, 1998, p.24).

2.4 Survey Mode

The drop-off survey method was used. The enumerators went to the chosen households, introduced the objective of the survey, left the questionnaires with the households, and collected them after 2-3 days. The drop-off method allows time for respondents to think and discuss the questions with the other household members. It also helps avoid enumerator bias.

To reduce the non-response rate, incentives were given. For both surveyed cities (Hanoi and Ho Chi Minh), the respondents had the chance to win one of the three prizes worth USD 100, 25, and 12.

A total of 800 questionnaires were distributed to 800 households, stratified (using population) by districts of the cities. The households from each city were selected differently. In Ho Chi Minh City (HCMC), a list of addresses to be chosen was obtained first. Then the enumerators went to the address specified. In Hanoi, points and routes were specified on the map. Enumerators went to the starting points as specified and followed the routes, selecting every fifth household. Commercial and industrial buildings were not included.

Of the 800 questionnaires distributed, 723 were collected, of which 690 were completed (357 in Hanoi and 333 in HCMC). Table 1 shows the number of questionnaires collected by bid levels and city. Note that for each cell, a total of 80 questionnaires were delivered.

Table 1. Questionnaires collected by bid levels and city.

Bid Level (USD)	Hanoi	Ho Chi Minh City	Total
0.0625	69	64	133
0.625	71	67	138
1.5625	71	69	140
3.125	70	67	137
18.75	76	66	142
Total	357	333	690

Most of the questionnaires were collected after two days. At day 4, the probability of losing the questionnaire becomes very high. In a few cases, the drop-off method does not work, especially in households with low schooling years as their respondents would may not be able to read and answer the questionnaires by themselves.

Thirty-two percent of the household sample reported that they discussed the questionnaire with the other household members to give the best household's judgment. Table 2 shows the discussion time. Of 690 respondents, 211 discussed with their family members how to answer the questionnaire. Most of them (63%) discussed for 15 minutes or less. Thirty-two percent is not high, but remarkable for a valid WTP response.

Table 2. Discussion time in answering the questionnaire.

Time	Frequency	Percent
Less than 5 minutes	65	31%
6 - 15 minutes	68	32%
16 - 30 minutes	45	21%
31 - 60 minutes	21	10%
More than 60 minutes	12	6%
Total	211	100%

3. RESULTS

3.1 Respondents' Profile

The survey required that the respondents should be the household head or a working member. The respondents aged 18-82 years, averaging 39 years. Their average schooling years was 12.15 years, higher than that of the country. Household size was 4.7 persons on the average (Table 3).

The monthly household income of HCMC respondents was USD 222, slightly higher than the Hanoi respondents' (USD 204). The average income of both survey groups was USD 213, of which USD 15.2 was spent on electricity.

Table 3. Respondents' profile.

Variable	Mean	Standard deviation	Range
Age	38.85	14.1	18-82
Education	12.15	3.77	0-27
Household size	4.7	2.25	1-25
Monthly HH Income (USD)	212.8	160.31	31.25-937.50
Monthly electricity bill (USD)	15.2	14.93	0.625-125

3.2 Respondents' Prioritization of Issues Facing the Country

Seventy-seven percent of the respondents said that Vietnam does not properly take care of its environment. However, only 10 percent viewed environment as the most important issue. Most of the respondents indicated poverty, economic problem, and education as the three most important problems (Figure 1).

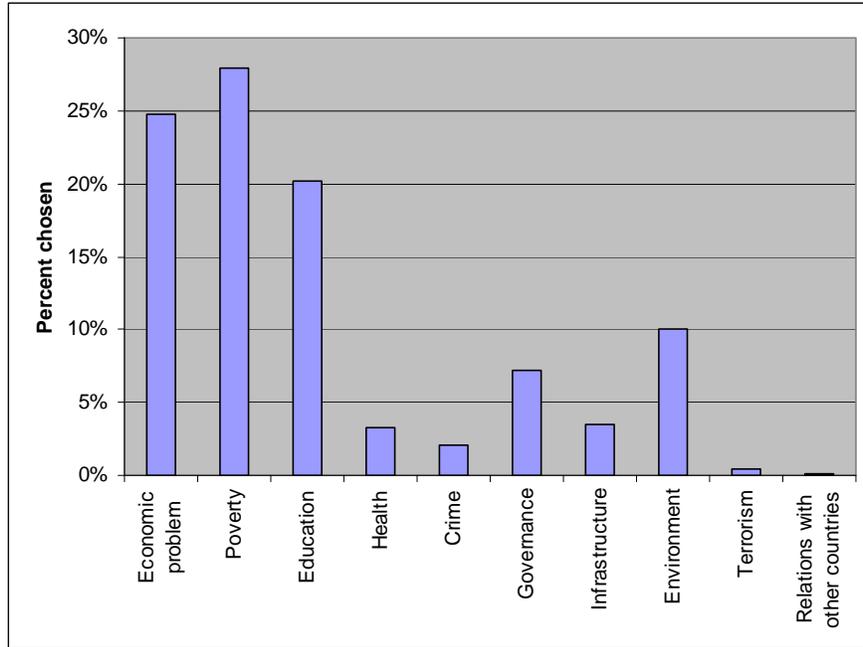


Figure 1. Issued facing the country.

Among the environmental issues, the most important for them are air and water pollution, deforestation, and solid waste management. Endangered species was of high priority to only 6 percent of the respondents (Figure 2).

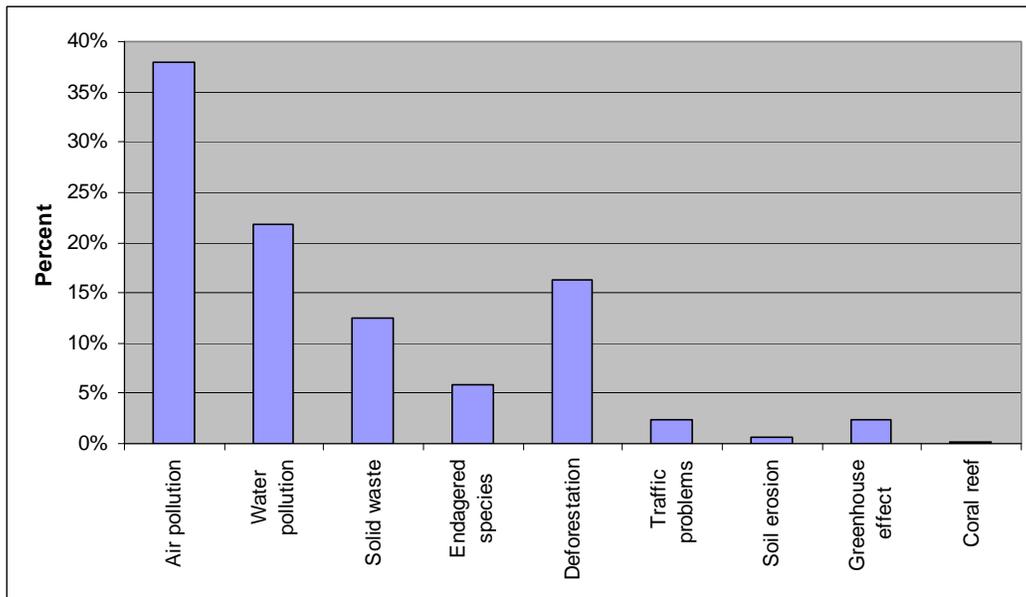


Figure 2. Priority for environmental problems.

The Vietnamese Rhino was identified as the endangered species most deserving of protection (Figure 3). However, this result could be biased as some respondents could have read through the questionnaire before answering it. This is one shortcoming of the drop-off survey method.

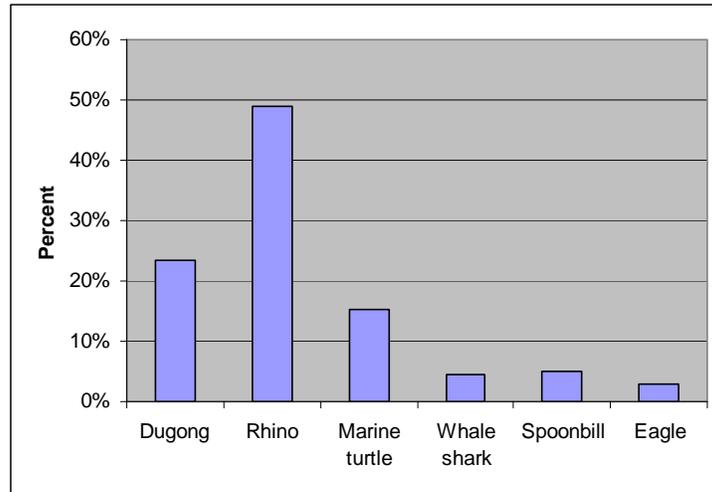


Figure 3. Priority over endangered species.

3.3 Attitude toward Endangered Species Conservation and Knowledge of the Vietnamese Rhino

The survey showed that people put some value on endangered species conservation. More than half of the respondents strongly agreed that poaching of wildlife species should be punished by law; 16.5 percent strongly agreed and 49 percent agreed that endangered species are important even if they don't get to see or interact with them. When asked about bequest value, 29 percent strongly agreed and 47.5 percent agreed that it is everyone's duty to ensure that plants and animals as we know them today will exist for mankind in the future. In brief, existence and bequest value are important to most respondents.

While the majority of respondents agreed or strongly agreed that endangered species should be a priority concern of the government, most of them thought there are more important problems than endangered species. Moreover, 63 percent said there are more important environmental concerns than endangered species conservation; while 66 percent believed the government should invest in helping people before it spends money on endangered species. This is consistent with the respondents' prioritization of issues facing the country.

Although the majority of respondents put value on endangered species conservation, not as many agreed when that money should be devoted to endangered species conservation. Ten percent strongly agreed and 34 percent agreed that the government should raise more funds for the country's environmental programs. Seven percent strongly agreed and 36 percent agreed that citizens should contribute to endangered species conservation by making cash donations to this cause. On the other hand, 7 percent strongly agreed and 24 percent agreed that government should raise taxes to pay for more endangered species protection.

With regards the respondents' knowledge of the Vietnamese Rhino, 19 percent reported that they have seen a live rhino. This could be over-reported for no one can see Vietnamese Rhino. It is possible that they have seen a rhino in other countries.

Only 53.7 percent correctly answered that rhinos come in different sizes, shapes, and colors; 8 percent answered incorrectly and 38.3 percent indicated "don't know."

The majority (70.4%) indicated that some communities could still obtain some benefits from rhinos without hunting them such as through tourism.

3.4 Responses to the WTP question

Figure 4 shows the responses to different bid levels: 81 percent voted for the program at the lowest level of bid and 8 percent at the highest level. This indicates a well-behaved survivor function with most of the respondents voting at the lowest bid level and most of the respondents rejecting the highest bid level. Intuitively, the majority of respondents would vote for the program at USD 1.50.

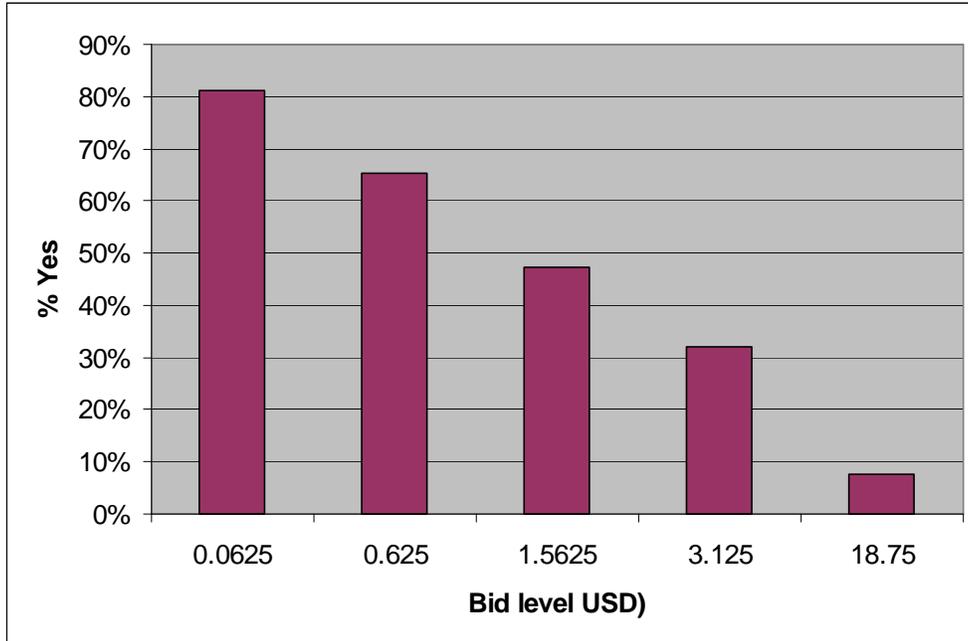


Figure 4. The survivor function.

No significant difference was detected in the WTP responses of the two cities. Slightly more Hanoi respondents voted for the program at all bid levels, except at USD 0.625, than did HCMC respondents (Figure 5).

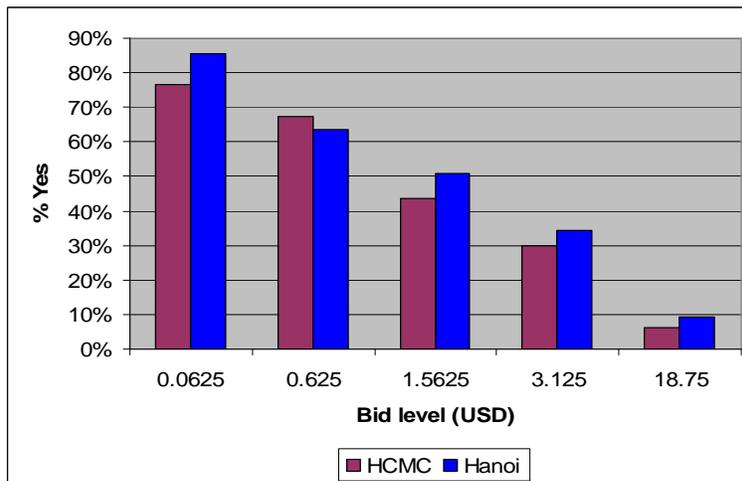


Figure 5. Responses to WTP questions by city.

3.4.1 Reasons for Unwillingness to Pay

Of those who were not willing to pay for the conservation program, the top reason was affordability (Table 4). Forty-one percent of those who said “no” to the program indicated that they could not afford the payment: 20 percent of those who were unwilling to pay said so at the lowest bid level and 64 percent at the highest level.

The second top most reason is that the respondents did not believe their payment will be actually used for rhino conservation. For the third reason, 23 percent indicated that they do not like adding the payment to their electricity bill.

Table 4. Reasons for voting “no” to the WTP question.

Reason	Frequency	%
I cannot afford that amount.	148	41
I do not think conservation of the Rhino is worth doing.	27	7
I do not believe that the money I pay will actually be used for Rhino conservation.	137	38
I do not like adding the amount to my electricity bill.	82	23
Only people who will directly benefit from the Rhino conservation should pay for this.	41	11
I think that other species are more important than the Rhino.	34	9
The majority of the poor will be affected.	101	28
Only those from higher income groups should pay for this.	84	23
I prefer giving money to humanitarian causes instead.	60	16
Others	35	10

Respondents indicated concern for equity; nearly one-third said that the majority of the poor will be affected by the proposal and 23 percent wanted only those from higher income groups to pay for the conservation program. Bid levels do not affect these responses.

3.4.2 Reasons for Willingness to Pay

Two-thirds of the respondents said that the rhino is a special species that needs to be protected; 40 percent said it is high time for Vietnamese to protect the rhino. Only one-third chose the reason that the program would be able to attract counterpart funding. On the other hand, more than half believed that the program could lead to more protection efforts

for other endangered species in Vietnam. This indicates a high potential for collecting payments for conserving the rhino as well as other endangered species in Vietnam, which has never been done before.

Table 5: Reasons for willingness to pay.

Reason	Frequency	%
The rhino is a special animal and should be protected.	320	68
I like the idea that we could get matching funds from international organization as long as we can provide counterpart funding.	157	33
It is high time that people in Vietnam do something concrete about protecting the rhino - since this is the center of illegal trade in the world.	190	40
This initiative can lead to more protection efforts for other endangered species in the country.	245	52
Others	30	6

3.5 Validity of Scenario Design

The scenario design appeared to be credible to the respondents. The majority of them accepted the description of the current situation of the Vietnamese Rhino (86%); half preferred the electricity surcharge as payment vehicle. Two-thirds of them believed the Electricity Company (EC) would agree to collect fund. Moreover, 69 percent believed the proposed conservation program would be effective in saving the rhino.

The main reasons for rejecting the proposals were corruption (41% of those who were not willing to pay), the EC is not bound by law to do the collection (50%), and there is no connection between the rhino and electricity (60%).

Also, 73 percent of the respondents who were unwilling to pay did not want the collection to be mandatory. The respondents likewise expressed worry that with the electricity bill always increasing, the mandatory contribution to the conservation program would increase also, and that because not all households have electricity connection, payments could not be collected from all the households.

3.6 The Bid Function

The following variables were subjected to a regression analysis:

- Bid levels (USD)
- City (dummy, Hanoi = 1)
- Last month electricity bill (USD)
- Monthly household income (USD/month)
- Schooling years (year)
- Age (year)
- Gender (male = 1)
- Households size (total number of household members)
- Marital status (married = 1)
- Member: a dummy variable to identify whether or not the respondent is member of an environmental organization (yes = 1). It is noted that only 3 percent of the sample were members of some environmental organizations.

Table 6 shows the regression results; the bid levels, as expected, statistically affected the respondents' willingness to pay.

Table 6. Logit regression results.

Dependent Variable	Coefficient	Standard Error
Bid (USD) (*)	-0.20	0.024
City (Hanoi=1)	0.17	0.192
Electricity bill (USD)	0.004	0.007
Income (USD)	0.0002	0.001
Schooling year	0.02	0.026
Age	-0.01	0.008
Gender (male=1)	0.27	0.182
Household size	0.03	0.043
Marriage (married=1) (*)	-0.43	0.258
Member	0.06	0.528
Constant	0.21	0.565
Log likelihood	-363	
Pseudo R-square	0.17	

(*) Significant at 10%.

Except bid level and marriage, no other variables statistically affected WTP. The result implies that married respondents tended to be less willing to pay for the rhino's conservation.

The variable "City" is insignificant, indicating that the WTP values of respondents in the two cities do not differ. This is consistent with the above analysis.

Income does not affect WTP, indicating that respondents from both the lower and higher income groups have the same preference regarding the rhino's conservation. Similar findings were observed regarding age, gender, and household size.

3.7 WTP Estimates

Applying equation (14) for a non-parametric WTP estimate, the mean and median WTP of USD 2.57/household (HH) was obtained. The estimate is slightly higher for Hanoi (USD 2.86) than HCMC (USD 2.25).

Using the bid function and applying equation (16) for a parametric WTP estimate, a WTP of USD 2.88/HH was obtained, which is slightly higher than the non-parametric estimate. It is noted that using the bid function with bid only results in a WTP of USD 2.84/HH.

The WTP of USD 2.50/HH, the lowest estimated value, is low but considerable since it is equivalent to 1.2 percent of the household monthly income.

3.7.1 Adjustment for Certainty

The questionnaire included a follow-up question on certainty in answering the WTP question. After responding to the WTP question, the respondents were asked how certain they were of their vote. For a conservative WTP estimate, those who said "yes" to the program, but then expressed uncertainty about their answers were classified as "no" respondents.

Figure 6 shows the survivor function, which indicates the probability of voting for the conservation plan at each bid level, before and after adjustment for certainty. The probability of voting for the program is lower after adjustment, especially at the two highest bid levels.

The non-parametric WTP estimate after adjustment becomes USD 1.84/HH.

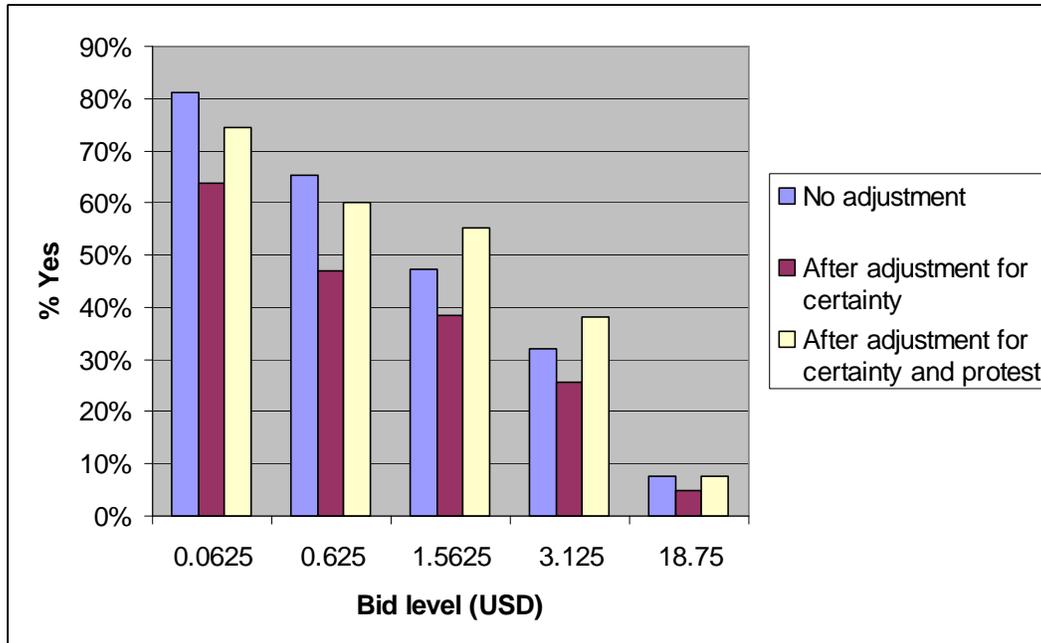


Figure 6. Survivor function before and after adjustment.

3.7.2 Adjustment for Protest Votes

Those who put some value on the rhino’s conservation but said “no” to the WTP question could be considered protest voters. This is because they do not believe in the conservation program or some of its features. Protest voters could be identified through the debriefing questions. The following two reasons for not voting for the program could be considered as protests:

- I do not believe that the money I pay will actually be used for Rhino Conservation. (This indicates that the respondents do not trust the institution that is implementing the program.)
- I do not like adding the amount to my electricity bill. (This indicates that the respondents do not like the payment vehicle.)

Figure 6 presents the survivor function before and after adjustment for certainty and protest. While adjustment for certainty lowers the probability of the “yes” vote, adjustment for protest increases it. At the third and fourth bid levels, the probability becomes even higher than that with no adjustment.

The non-parametric WTP estimate after adjustment for certainty and protest is USD 2.69/HH.

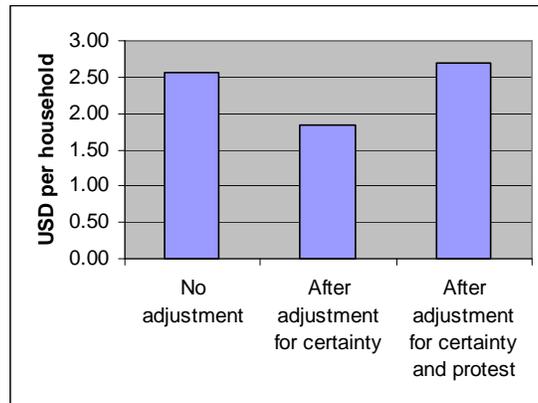


Figure 7. Estimated WTP.

3.8 Cost of and Potential Revenue for the Vietnamese Rhino Conservation Program

The managers of Cat Tien National Park estimated the total cost of the rhino conservation program at USD 3.75 million as initial investment (mainly for moving and resettling the minor ethnic group living in the NP) and USD 60,000 annual operating cost (Cat Tien NP, 2005 and Institute of Ecology and Biological Resources & Department of Forestry, 1998). This amount would cover all the activities described in the scenario, except captive breeding. On the other hand, using the lowest estimated WTP of USD 2.50/HH, the total potential revenue from both Hanoi and HCMC is USD 5.8 million.

The potential revenue is not much higher than the costs and may not pass a sensitivity test. On the other hand, some positive aspects have been noted. Most important of these is the finding that people put value on rhino conservation and are willing to pay a non-zero amount for it, even if this is quite a new thing in Vietnam. The estimated total potential revenue considered two cities only; Vietnam has other big cities that could contribute to the Vietnamese Rhino Conservation Program. The potential of obtaining counterpart funding from international organizations or other countries should not be discounted also.

4. CONCLUDING REMARKS

This study applied the Contingent Valuation Method to measure willingness to pay for the conservation of the Vietnamese Rhino. The country's two biggest cities - Hanoi and Ho Chi Minh City – were surveyed; 800 questionnaires were distributed. Although payment for environmental goods, especially endangered species, is quite new to Vietnamese, the respondents were willing to pay at least USD 2.50/HH for rhino conservation.

The study found that the potential revenue is higher than the estimated cost of conservation. In collecting the payment, using the electricity bill appears to be the most efficient way. Although some respondents said that there is no connection between the rhino and electricity and thus collecting payment for rhino conservation through the electricity bill is strange, the majority of respondents agreed that this is the cheapest way to collect since almost the entire country is connected to the electricity service.

The socioeconomic characteristics have no statistically significant effect on WTP, indicating that different groups might have the same preference regarding rhino conservation.

The study also showed that although people are willing to pay some amount for rhino conservation, endangered species conservation is not high in their priority list of environmental problems. Similarly, the environment is not in their top three important problems of the country. However, this might change when the country's income increases, given that the environment is a "luxury good" (Freeman, 2003). But by the time income becomes high enough to foster the demand for environmental goods and services, it could be too late to protect the environment, particularly the Vietnamese Rhino.

With regards the research method, the drop-off survey worked well in the two cities. Most of the questionnaires were collected after two days. However, there were a few cases where respondents with low education could not answer the questionnaire by themselves. This implies that the drop-off method may not work well in the rural areas.

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