ECONOMIC VALUE ASSESMENT OF THE SUMATRAN TIGER: AN APPLICATION OF CONTINGENT VALUATION METHOD IN GUNUNG LEUSER NATIONAL PARK, INDONESIA

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SUMMARY

The Contingent Valuation Method (CVM) study is the way to get to know the economic value of species by their existence. It is also considering their presence for the future generation since they are non-use value. In reality, it is hard to identify their exact value, but from this kind of research, it would provide the economic consideration for conservation management. The objective of the research is to assess economic value of Sumatran tiger by evaluating the Willingness to Pay (WTP) of the people and assessing the factors influencing WTP of Sumatran Tiger conservation program. The scenario of the WTP assumes the consideration of respondent to contribute to the conservation program of Sumatran Tiger and mitigating the conflict on local people. The value of WTP on Sumatran tiger conservation is 67,512 IDR or equal to 4.82 USD. The results show that 61.33% of people are willing to pay, but 38.67% of respondents are not willing to pay for tiger conservation. The emperical data also shows that there are five factors are affecting significantly to people's decision through the bid level for the Sumatran Tiger WTP including Household size, Threatened, Believe, City1, and City2. As the people have desire for willing to pay for conservation Sumatran Tiger, it might be the potential funding raise as a strategy. Community-based conservation would be the mitigation strategy for improving the participatory conflict management.

Keywords: contingent valuation method (CVM), economic value, Sumatran Tiger, willingness to pay (WTP).

1. INTRODUCTION

Tigers are increasingly disappearing from the ecosystems where they evolved and the nation states in which they live. Especially in Indonesia once discovered by three of eight tiger subspecies in the world. Two of those subspecies, the Javan tiger (*Panthera tigris sondaica*) and the Bali tiger (*Panthera tigris balica*) were declared extinct in the 1940s and 1980s respectively (Wibisono, 2006). Only the Sumatran tiger remains, living in fragmented and isolated habitats exclusively on the island of Sumatra (WWW Indonesia, 2008). The Sumatran tiger has been categorized as critically endangeredin the Redlist IUCN since 1996 (IUCN, 2019). In 2015, the tiger population was recorded only 180 scattered throughout 12 Tiger Conservation Landscapes (TCLs) in Sumatra including five national parks. On the other hand natural resource values, including wildlife values, can be roughly grouped under the general headings of "use" and "intrinsic" values. "Use" are consumptive and non-consumptive value and intrinsic value consists of existence value and option value. In economic terms existence is a pure public good (Boyle & Bishop, 1987) so it is important to know the environmental valuation. One economic concept sometimes used to guide decisions by conservation managers is the total economic value (TEV) of species and ecological components. It would provide a framework for the assessment of economic aspects based on Willingness to Pay (WTP) of conservation program of endangered species (Barnes, 1996).

Most management of endangered species such as Sumatran Tiger (*Panthera tigris ssp. sumatrae*) has been based on ecological criteria in action plan. Though the condition of tiger conservation, it is possible to overview the economic aspects as an alternative solution in addition to raise the awareness of people inside and outside of conflict scope that have been gained disadvantage (victim) or nor. However, several researchers have emphasized the usefulness of economic valuation and WTP as a management tool in conservation and management of endangered species (Boyle & Bishop, 1987). Also there is a lack of

information in economic value in presence of Sumatran Tiger within conservation program overall in present. Government of Indonesia released the National Strategy and Action Plan (NSP) for the Conservation of Sumatran Tiger 2007–2017. However in the NSP has not been adding the economic consideration to engage the conservation program. And now, it is starting the national survey called "sumatra-wide tiger survey" to figure out the current distribution of Sumatran Tiger and also to formulate effective conservation strategies (Indonesian Ministry of Forestry, 2007).

Simultaneously, the research of economic aspects needs to conduct according to the gaps of regulation for economic value. Based on several research have been done in the related case in wildlife species; the WTP for Derby Eland and the African wild dog (Tsi, Ajaga, Wiegleb, & Mühlenberg, 2008), rhino (Thuy,

2007), Asian Elephant (Bandara & Tisdell, 2002) etc. The economic value of rare, threatened and endangered species to citizens is really important to know and find out another perspective as strategy in terms of economic (Loomis & White, 1996) for the resolution particularly in this case, man-tiger conflict. The objective of research is to assess economic value of Sumatran tiger by evaluating WTP of people and assessing the factors influencing WTP of Sumatran Tiger conservation program for man-tiger conflict resolution. The results of the research are usefull for proposing the strategies and solutions for man-tiger conflict based on social and economic aspects of Sumatran Tiger in Gunung Leuser National Park, Indonesia.

2. RESEARCH METHODOLOGY
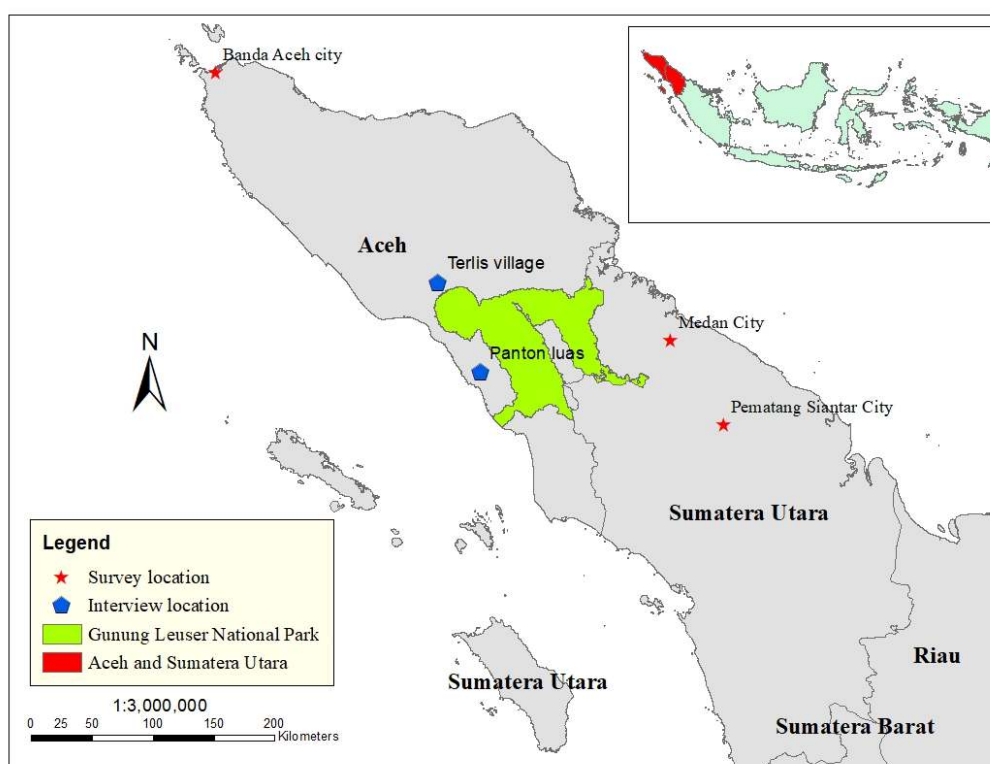### The study site location

Figure 1. Location of study site

The research was conducted in several locations, consists of the area has been affected by conflict with the Sumatran Tiger and the area without human-tiger conflict with 3 cities are the capital of province where the Gunung Leuser National Park located and two cities are

the capital city of the provinces where the National park is located, Nanggroe Aceh Darussalam Province and North Sumatra Province, namely Medan city and Banda Aceh city. The three cities were selected for assessing WTP and the pretest survey has been conducted

in Medan City in order to determine the bid level, to test the questionnaire and also to identify potential problems.

Study methodology

The approach, sample and survey design

The approach used in this study to estimate WTP for Sumatran Tiger conservation is the contingent valuation method (CVM). CVM is the most common and more reliable approach to estimate the non-use values, and in particular, the existence value of public goods (Mitchell & Carson, 2013; Pearce & Moran, 2013; Stevens et al., 1991). Since the estimation of the existence value of Sumatran Tiger or others critical endangered species is still in its infancy particularly in Indonesia, it was decided to train the simple framework which is well-established as the CVM scenario. In this study total questionnaire has been completely collecting is 300 and distributed in 3 big cities. This research has been conducting data by interview the citizen in each city using prepared questionnaire. It was applied the purposive stratified random sampling which is the stratum would be chosen in 2 sub-district in each city. In addition, the study randomly selected respondents in each stratum. Respondents are citizen who is living in the capital and far away from the Gunung Leuser National Park and have no personal conflict with Sumatran Tiger.

Based on the pre-test results, the draft questionnaire was revised and adjust in order to get the worth level of WTP. Then a second survey was conducted on a sample of 420 respondents randomly distributed in 3 cities in Aceh and North Sumatra province in May 2019. The survey mode was used drop-off survey. The researcher and team were conducting the survey in the resident area through the alleyways and come over to the household that would be able to do the survey. The 3 cities were stratified by sub district of the city. There was delivered 140 questionnaires in each cities but the total questionnaire after collecting was 320 questionnaires then the completed questionnaire was 300. Still the enumerators have chosen the households, introduce about the research and objectives of the survey, asking the telephone number, and leave the questionnaires.

The questionnaire and scenario of WTP

The objective of a CVM questionnaire is to elicit preferences in monetary terms, more specifically the maximum WTP for changes in the quantity or quality of a good or service from a random sample of respondents. These changes may refer to a hypothetical or an actual good or service. The process of devising a convincing CV scenario involves several elements. The first step is to devise a hypothetical market for the environmental good in question with respondents being requested to make decisions as consumers in the framework of a hypothetical market. The market prices for the conservation of endangered wildlife species rarely exist. Therefore, in a typical CVM study, individuals are presented with the hypothetical market scenario for a given public good and are then asked about their willingness to pay (or willingness to accept compensation) for its use or protection (or both).

This research was presented 4 sections in the questionnaire consists of:

Section 1: General questions to figure out the knowledge and priorities of the public about the problems faced by country;

Section 2: Attitudinal and knowledge questions on endangered species conservation and some general questions about Sumatran Tiger;

Section 3: A conservation plan for Sumatran Tiger in Gunung Leuser National Park, the payment method and some debriefing questions;

Section 4: Some socio-economic questions on the respondents.

Data analyzing

Data analyzing was using dichotomous choice data. It means the data gained from the questionnaire willingness to pay scenario. Based on question whether people willing to pay for the Sumatran Tiger conservation from the bid amount, I would get the 2 kind of

response, (0) no response, (1) yes response; however the analyzing was using Parametric analyzing for Mean of the WTP also have calculated the Probability in logistic function. The suitable method to analyzing this dichotomous variable in this research is Binary Logit Model in STATA 14.2. Then the factor influences to the WTP would have analyzed by Multivariate Probit Model in STATA 14.2.

In the present study, a non-linear logit regression model was constructed for the respondents' response to the WTP elicitation questions. However logistic regression is used to predict a dichotomous variable from a set of predictor variables. Logistic regression is often chosen if the predictor variables are a mix of continuous and categorical variables and/or if they are not nicely distributed. Logistic regression has been especially popular related case in wildlife species about the economic value to elicit their willingness to pay for the conservation of rare, threatened and endangered species; the WTP for Derby Eland and the African wild dog (Tsi et al., 2008), rhino (Thuy, 2007), Asian Elephant (Bandara & Tisdell, 2002) Whale shark (Indab, 2016), Black-faced spoonbill conservation (Jianjun, 2006) etc.

In this research, logistic analysis with dichotomous choice structure consists of dependent variable which is can be formulated from the respondents' responses for the payment principle questions. In this process, the 'yes' responses are coded as one and 'no' responses as zero. And independent variables are social economic characteristic (Gender, Status, age, education level, city, household size, and income), Knowledge of people concern to Sumatran Tiger (well-managed and other Tiger Value) and awareness people to Tiger Conservation (Tiger is threatening and Believe on Conservation Action). The choice of these variables need based on several previous CVM studies (Catalano, Florio, & Giffoni, 2016; Thuy, 2007; Whitehead, 1992).

3. RESULTS AND DISCUSSION
3.1. Respondent's Willingness to Pay

The reseach have been asking directly about people's WTP for Sumatran Tiger conservation. It applied through a questionnaire survey with assuming that they will be implemented by giving the scenario of the program and the payment system. The survey has done in 3 locations surrounding the Gunung Leuser National Park, Medan city, Pematang Siantar city and Banda Aceh city. All of the locations are big city which is developing faster in those provinces. The number of respondent was designed uniform from each city, 100 respondents per city so the total of completed questionnaire was 300. The location has been chosen because the researcher assumes that the people are much known and familiar with the Tiger itself since the distance of city to the Sumatran Tiger habitat is close. This implies that the people would have awareness to the biodiversity especially endangered species nearby. However the value of the specific animals tends to be unconscious value.

There were providing the 5 bid levels ranging 10,000 IDR (0.71 USD) to 100,000 (7.14 USD) for once payment for conserve the Sumatran Tiger. It has been offered to all the respondent with the CVM scenario. It is about 87% respondent reported that they would pay 1000 IDR for conservation program of Sumatran Tiger. While only 27% of the Indonesian was willing to pay 100,000 (7.14 USD) for once payment. Generally, there is the downward trend of percentage of Indonesian who is willing to pay for different bid levels. It shows the economic theory of demand that the higher price leads to lower demand or in this case less donating for good and services of Sumatran Tiger.

However overall result shows 61.33% Indonesian people willing to pay for Sumatran Tiger conservation and around 38.67% Indonesian wouldn't have desire to pay for Tiger conservation. It means the people's interest on Sumatran Tiger is slightly high. Especially, the people have been asked is located quietly close to the Sumatran Tiger

natural habitat. It could show that people have emotion to this species and all the sample was knew about Sumatran Tiger presence in the National Park nearby. So the knowledge and attitudes toward endangered species like Sumatran Tiger would possibly effect to the people response in terms of conservation.
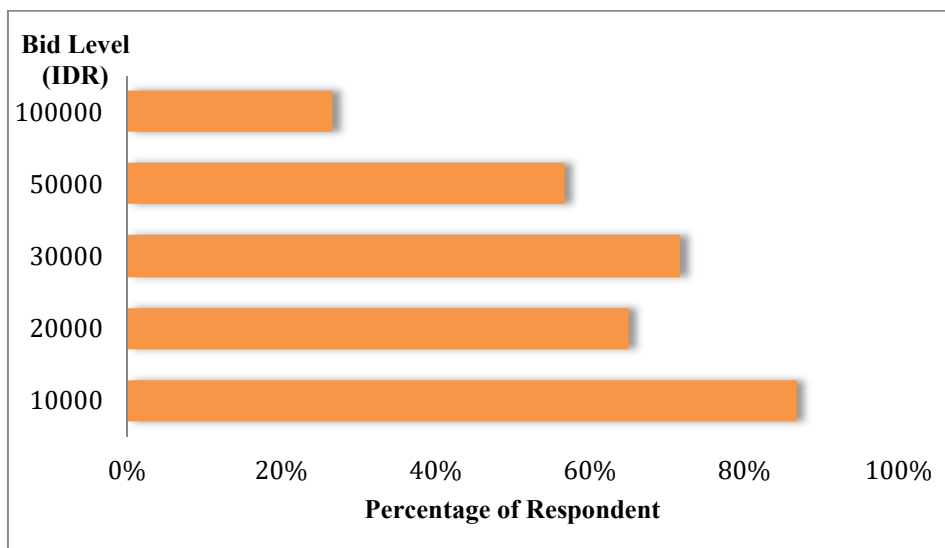

Figure 2. Percentage of Respondent to say "Yes" in each bid level (N=300)

Source: Results of survey

Instead the bid level is showing the difference percentage of respondent who is willing to pay for each bid level. Obviously, people are prefer and willing to pay for the smallest bid, 10,000 IDR (0.71 USD). It has 86.67% respondents are willing to pay for that amount. So it is very important to determine the lower limit of the bid. Also 65% people are willing to pay for the second bid which is 20,000 IDR (1.41 USD). It is only slightly difference to the third and fourth bid level which are about 30,000 IDR in 71.67% and 50,000 IDR reach 56.67% of respondent are willing to pay. And the last bid has been offered to people 100,000 IDR, 26.67% people also wanted to pay for the contribution to Sumatran Tiger conservation with some various amount of money.

Table 1. Reasons to say "Yes" to WTP of the respondents (N=300)

Reasons to say "Yes" to WTP	Frequency	Percentage
The Tiger is a special animal and should be protected	144	30%
I like the idea that we could get matching funds from international organization as long as we can provide counterpart funding	72	15%
It is high time that people in Indonesia do something concrete about protecting the Tiger	133	28%
This initiative can lead to more protection efforts for other endangered species in the country	120	25%
Other such as solving the conflict impacts	11	2%

Source: Results of survey

The fact number of people who is willing to contribute for Sumatran Tiger conservation is quite high but it also has opposite idea that people would not willing to pay because of some reason. In the questionnaire has been provided the reason as well, but some of people also gave many suggestion due to effective conservation action that need to do. There are some Yes and No reason of Indonesian has been surveyed (see Table 1 and Table 2).

Based on the survey result, it has identified the interest of people who are willing to pay

because of the value of Sumatran Tiger. Whereas people have clear understanding for kind of special species have to be conserved and protected for the future generation. It has 30% of respondent has chosen the reason that the Tiger is a special animal and should be protected. Then it continued with the reason that it is high time that people in Indonesia do something concrete about protecting the Tiger and it is about 28%. Moreover people would consider another reason that the scenario was an initiative that can lead to more protection efforts for other endangered species in the country in 25%. But only 15% of people would have agreed to the idea of the scenario. Then the last reason has been 11% raised by people who think

further about conflict impacts for human being and solution for it. Overall the observation from the reason has clarified the people tend to involve for the Sumatran Tiger conservation by being aware of the Tiger existence. People understood the value of the Tiger as endangered species and it needs to protect from threats. Since this research bring up the valuable information concern to the Sumatran Tiger, so the people may have initiative to know more about the Tiger status.

Despite, there are many number of respondents have not agreed for the idea and they would not willing to pay. The list of the reason is showing below:

Table 2. Reason to say "No" to WTP of the respondents (N=300)

Reason to say "No" to WTP	Frequency	Percentage
I cannot afford that amount	33	13%
I do not think conservation of Tiger is worth doing	20	8%
I do not believe that the money I pay will actually be used for Sumatran Tiger Conservation	56	22%
I do not like adding the amount to my electricity bill	48	19%
Only people who will directly benefit from Tiger conservation should pay for this	19	7%
I think that other species are more important than Tiger.	12	5%
Majority of the poor will be affected	15	6%
Only those from higher income groups should pay for this	28	11%
I prefer giving money to humanitarian cause instead	23	9%
Others	5	2%

Source: Results of survey

The reason of people was indicated variously why they did not want to pay for Sumatran Tiger conservation. There is no significant reason that people have answered due to the scenario. However the fourth highest reason is about people do not believe that the money they pay will actually be used for Sumatran Tiger Conservation about 22%, and also people do not like adding the amount to their electricity bill is about 19%, some of people cannot afford that amount is about 13%, and the idea that only those from higher income groups should pay for this is about 11%. Basically, from the percentage of the people who is not willing to pay because of the doubt to the program and the payment scheme of the scenario itself. Since the scenario was offering the adding amount of donation by electricity bill. Several people also

stated that they can't afford that bid level amount. And many other reasons have been raised from respondent. Thus the complete information has been provided in the questionnaire about Sumatran Tiger. It would show that the people will always have different interest for charity things. The fact that Indonesian have many charity program in order to support human being as well for instance the religion program surrounding their living place. The people obviously would join to at least one community group and they may think this program would be adding cost for them.

3.2. Factors affecting to level of willingness to pay

This study was estimated the factors influence the people's decision for level of willingness to pay on Sumatran Tiger

conservation program. The theoretical model was hypothesized 11 explanatory variables regarding to the people's social economic characteristic and awareness of the people (See Table 3). However, this explanatory variables defined after the correlation analyzing for the empirical model. In addition, this analyzing also has been applied the robust standard error procedure to address the heteroskedasticity of the model. The dependent variable represents for people's decision to the bid level and it has binary outcomes (0, 1). The log pseudo-likelihood (-108.13898) is highly significant

(Prob>X^2 = 0.0005). it means that there was an overall significant relationship between eleven explanatory variables considered and the probability of decision on WTP at 5%. The value of Pseudo R^2 (0.4598) is also highly significant (Prob>X^2 = 0.0005). It means the eleven explanatory variables explained significantly 45.98% of changing the dependent variable of the model. Among the variables, Household size, Threatened, Believe, City1, and City2 were factors influenced to the people's decision for level of willingness to pay in Gunung Leuser National Park, Indonesia.

Table 3. Factor effecting people's decision of level of willingness to pay for the conservation of Sumatran Tiger program

Variables	Coefficients	P-Value	Marginal Effect	P-Value
Income	-0.0004631[ns]	0.648	-0.0004631[ns]	0.647
Education year	2.972.727[ns]	0.970	2.972.727[ns]	0.970
Age	-1.259.105[ns]	0.479	-1.259.105[ns]	0.478
Gender	-2.949.456[ns]	0.408	-2.949.456[ns]	0.407
Household Size	-1.982.741*	0.030	-1.982.741*	0.029
Status	-2.417.123[ns]	0.617	-2.417.123[ns]	0.617
Organization	8.915.755[ns]	0.920	8.915.755[ns]	0.920
Threatened	-11454.09*	0.016	-11454.09*	0.015
Believe	9.958.451*	0.041	9.958.451*	0.040
City1	34874.23*	0.000	34874.23*	0.000
City2	13721.31*	0.002	13721.31*	0.001
_cons	42371.44*	0.005		
Log pseudolikelihood	-108.13898			
Wald X^2(15)	35.01			
Prob > X^2	0.0005			
Pseudo R^2	0.4598			
Number of obs	300			

* is significant at 99%; ns is non-significant

Results of empirical model in Table 3 shows that five factors (Household size, Threatened, Believe, City1 and City2) are affecting significantly to people's decision through the level of willingness to pay for the Sumatran Tiger. Firstly the most significant factor showed City1 and City2. The location of the study site was significant to the decision of the people's for the level of willingness to pay that has been offered. The location of City1 and City2 are around the national park. Gunung Leuser National Park is located in the north part of Sumatra Island and the location of study site was the big city in the north part of Sumatra. So,

it means the population of the people would familiar with that National Park. Since this national park also inhabitant for many endangered species, the people would consider the worth level of willingness to pay on specific endangered species as long they were willing to pay for it in the nearby national park.

However some of the respondent also had personal experience to visit the national park, so the people would be aware to the condition of the species or the national park. It is also show significantly and positively, the probability of the people to the amount of level of willingness to pay on City1 and City2 are 34874.23 and

13721.31 respectively. When the bid amount is increase, the probability of people in city 1 and city 2 will be increase to say yes for specific amount of level of willingness to pay. It implies that location would be effected to the people's decision of level of willingness to pay. For instance the location of study would be move to another province and might be far away from the Gunung Leuser National Park. It would probably have different response of the people's decision of level of willingness to pay for conservation program of Sumatran Tiger.

Secondly, the Household size has been shown significantly affected to the level of willingness to pay for Sumatran Tiger. The explanatory variable; household, is the number of people in the household family that live together. It would be family or relatives that the respondent has been living together and using the spending source of income for the family needs. Based on the analysis, the household size can be affected to the decision of people's on the level of willingness to pay. It is also show the negative direction which is mean when the number of people in the respondent family is increase, and then the probability to say yes on the higher bid amount would be decreased with the probability value -1.982.741. Because of the family would have more expense for the member of family, so the probability of higher level of willingness to pay that people's would pay for Sumatran Tiger conservation will be less.

As follows the significant variables affected to the amount of level of willingness to pay, the awareness of the people would also influences to the people's decision in specific amount. For the Threatened variable, it shows significantly influenced to the amount of level of willingness to pay. The people who is thinking that the Sumatran Tiger is threatened by many factors such as poaching, habitat loss and conflict would also affecting to the amount of money that they are willing to pay for the conservation program. It is logically true that Sumatran Tiger is facing the risk of extinction because of those conditions. However this study figured out the

scenario that would potentially applicable in the urgent situation. In the scenario, it has been provided some solutions to conserve Sumatran Tiger. It assumes that the core of conservation and balancing the human-tiger conflict need some amount of money to do. So, based on the situation provided in the questionnaire, the respondent can understand the threats on Sumatran Tiger nowadays. Thus this threatening is still going on the tigers, this study has been found out the threatening would get attention of the people to get involve.

Meanwhile the probability value of respondent by threatening variables shows -11454.09 and it has negative direction which mean the more threatened Sumatran Tiger would be, the people would has desire and willing to pay less. In fact, that people can see clearly of the source of problem of declining population of Sumatran Tiger and habitat loss for Sumatran tiger is coming from other stakeholder especially, plantation, land use changing and trapping the tiger. It expected that the stakeholder who is related to the threats could be more carefully to and take consideration to reduce the destruction directly or indirectly to the Sumatran Tiger and their habitat.

Correspondingly to the Threatening variable, the Believe variable comes to show significantly will be affected to the amount of level of willingness to pay. In this case, as an explanation in Table 3, Believe explanatory variable would be the people's believing to the description of the situation scenario described including the threats, solution, and payment vehicle for the program in the scenario. The believe factor shows the positive and significantly affect to the people's decision to pay for higher amount of money. It explains that the more people's believe to the scenario provided to pursue the goal of conservation program itself, the more people want to pay with the higher level of willingness to pay. It can be seen that the scenario has been provided would be a consideration of the people to say

yes and willing to pay for conservation program of Sumatran Tiger. People would be willing to pay if the goal of the program can be more clear, reasonable and effective and aldo the payment vehicle could be more convenience and easier to do.

3.3. Empirical result of WTP estimation

Furthermore the estimation has calculated the mean WTP of people for Sumatran Tiger conservation in Gunung Leuser National Park. It has done based on estimated coefficient of the empirical binary logit model by using the formula estimation in STATA software. The result show that the mean WTP of people estimated 67,512 IDR or equal to 4.82 USD for one-time payment. People could pay the highest value is about 184,327 IDR (13.16 USD) and the lowest value for conservation program is about 12,159 IDR (0.86 USD).

Similar to the result, there are some research has been done for specifically wildlife. While the CVM study spread out through the interest of people due to natural resource for use and non-use value. It could show the difference of willingness to pay of people towards wildlife conservation. There is various finding result for WTP of the people and based on the result they also have been figured out the attitude of the people (Table 4). The CVM study for existence value of special endangered species would imply that some people in the current generation may place a positive monetary value on the preservation of the species even though they never plan on having any personal use for it. In terms of monetary value, this study approaches that referendum of individual uses to reveal of state his or her WTP for protection of a specific in a particular location (Loomis & White, 1996).

Boyle and Bishop (Boyle & Bishop, 1987) noticed a similar situation in relation to non-use value of endangered species in a CVM study carried out in Wisconsin. In this study, they also noted the weakness of the existing narrow valuation framework of wildlife resources. The authors further argued that this is because much of the empirical work on the valuation of wildlife resources has focused on consumptive uses with little or sometimes no attention being given for the non-consumptive use value. Thus such narrowly defined valuation framework would overlook the monetary values that members of the society might place on the preservation of endangered species. In addition, the non-use values of the most endangered species of wildlife like the tiger are relatively obscure in the usual market places. However, it is necessary to look beyond this type of value if one is to fully consider the total value of a wildlife species. Particularly for studies examining endangered species of wildlife, since current consumptive uses do not exist.

The WTP of Sumatran Tiger would have difference with WTP others species; it can be affected for many reasons such as country's priority species, people economic, awareness, attitude, and even the condition of scenario of the CVM survey. Assuming that the endangered species like tiger could show the non-use value in amount, then it would imply the conservation action program and further policy and management have to consider their economic value. In terms of monetary, the economic the value of WTP would be value of Sumatran Tiger. It is very interesting to figure out that the mean WTP of Indonesian would willing to pay for the specific endangered species conservation. In fact, most of people described Tiger as a dangerous animal which also would bring many conflict causes to the local people. In this research, it has been built up the scenario with the consideration of overcoming the conflict incident to the local people. We presented the number of destruction to people's livestock caused by Tiger in the scenario as well. So it also would be assumed that awareness of people towards social aspects. Unfortunately, in the study site also was found that some type of wildlife species involved/reported in human wildlife conflict in Gunung Leuser National Park such as elephant and rhino.

Table 4. Comparison of WTP for the Wildlife Species Conservation

Wildlife Species Conservation	WTP (USD)	Condition	Source
This Study, Sumatran Tiger in Indonesia	4.82	One-time Payment	
Asian Elephant in Sri Lanka	7.32	One-time Payment	(Bandara & Tisdell, 2002)
Rhino in Vietnam	2.88	One-time Payment	(Thuy, 2007)
Derby Eland and African Wild Dog in North Cameroon	1	Per month	(Tsi et al., 2008)
Sea Turtle in Florida	42	Per Year	(Hamed et al., 2016)
Whale Shark in Philippines	0.92	Per Month	(Indab, 2016)
Philippine's Eagle	0.58	Per Month	(Harder et al., 2006)
Black-faced spoonbill in Macao	1.17	Per Month	(Jianjun, 2006)

The endangered species in Gunung Leuser National Park, such as Sumatran Elephant, Rhino, and Tiger are highly priority. But they are also the higher risk of conflict with the local people. It implies that those species has more potential to be conserved with their economic value consideration. In this study, it has been figured out the value of the Tiger in monetary terms. Then it would lead to the better understanding to dig the potential funding that we could rise similar to the scenario or even the new scenario for implementation itself. The payment vehicle in one-time payment could be applicable because of people tend to put it in the donation terms rather than the compulsory payment per month.

3.4. Policy implications for tiger conservation

It is important to look out the solutions of human-tiger conflict with the wide view from government (such as policy, patrolling, monitoring, rehabilitation, etc) and from community side (modification of grazing habit and build up the tiger proof enclosure). However the fund and awareness activities would propose the specific solutions for mitigating the conflict in social-economic point of view. The result of total economic value would possibly rise to the building capacity of local people by community group to gain compensation for mitigation step such us build up the tiger proof enclosure and invest to the potential business for self-sustain of the community group. For instance the land cultivation for potential crops in the village per each group in several neighborhood village or cattle farm on the group tiger proof enclosure.

It is also better to identify the economic value of the Sumatran Tiger for all the Tiger conservation landscape. Study case of 1 national park as an example to know the value of endangered species in terms of monetary. However there are so many endangered species have been classified in IUCN red list in Indonesia. The application of research on Sumatran Tiger all over the landscape is needed to be conducted. Also linearly with that, the research on other endangered species is important to do. Particularly, the CVM study is the way to get to know the economic value of species by their existence. It is also considering their presence for the future generation since they are non-use value. It is hard to identify their exact value, but from this kind of research, it would provide the economic consideration for conservation management.

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ƯỚC LƯỢNG GIÁ TRỊ KINH TẾ CỦA HỔ SUMATRA: ỨNG DỤNG PHƯƠNG PHÁP ĐỊNH GIÁ NGẪU NHIÊN TẠI VƯỜN QUỐC GIA GUNUNG LEUSER, INDONESIA

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TÓM TẮT

Phương pháp định giá ngẫu nhiên (CVM) được sử dụng để đánh giá giá trị kinh tế của một loài dựa vào sự tồn tại của chúng. Phương pháp này cũng xem xét sự hiện diện của chúng cho thế hệ tương lai vì trong hiện tại chúng không có giá trị sử dụng. Trong thực tế rất khó để xác định giá trị chính xác của chúng, nhưng các kết quả từ nghiên cứu sẽ cung cấp những cân nhắc về khía cạnh kinh tế cho công tác bảo tồn tài nguyên thiên nhiên. Mục tiêu của nghiên cứu là đánh giá giá trị kinh tế của Hổ Sumatra thông qua ước lượng mức sẵn lòng chi trả (WTP) của người dân và các yếu tố ảnh hưởng đến WTP cho chương trình bảo tồn Hổ Sumatra. Kịch bản của WTP giả định rằng người được hỏi có đóng góp vào chương trình bảo tồn Hổ Sumatra và giảm thiểu xung đột đối với người dân địa phương hay không. Kết quả nghiên cứu cho thấy, giá trị của WTP đối với việc bảo tồn Hổ Sumatra là 67.512 IDR hoặc bằng 4,82 USD với 61,33% số người sẵn sàng trả tiền và 38,67% người được hỏi không sẵn sàng chi trả cho việc bảo tồn hổ. Khi người dân mong muốn sẵn sàng chi trả cho việc bảo tồn Hổ Sumatra, đó có thể là một chiến lược gây quỹ tiềm năng và thực hiện các hoạt động bảo tồn dựa vào cộng đồng nhằm cải thiện chiến lược quản lý xung đột có sự tham gia của người dân.

Từ khoá: giá trị kinh tế, Hổ Sumatra, mức sẵn lòng chi trả (WTP), phương pháp định giá ngẫu nhiên (CVM).