The Non-use Value of the Bordering Five Forests Province of the Eastern Forest Complex

BCAMP
Biodiversity Conservation and Management of Protected Areas in ASEAN

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Printed and Published
ASEAN Centre for Biodiversity
D.M. Lantican Avenue, University of the Philippines Los Baños
Laguna, Philippines 4031
Phone: +6349 536-2865
Fax: +632 584-4210

For inquiries
ASEAN Centre for Biodiversity
cpa@aseanbiodiversity.org

or

Dr. Orapan Nabanchang
Sukhothai Thammathirat Open University
nabangchang_o@icloud.com

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Acronyms

CV	contingent valuation
CVM	contingent valuation method
EEC	Eastern Economic Corridor
EEPSEA	Environment and Economy Programme in Southeast Asia
EFCOM	Eastern Forest Complex
EIA	environmental impact assessment
FPBF	Five Provinces Bordering Forests
HEC	human-elephant conflict
KSHC-NP	Khao Sip Ha Chan National Park
MWWA	Metropolitan Water Works Authority
PA	protected area
PWWA	Provincial Water Works Authority
TEV	total economic value
WTR	Wang Tanod Reservoir

Introduction

The Eastern Forest Complex (EFCOM) is the watershed of the main rivers in the Eastern Region of Thailand; hence, it is vital to the industries located in the Eastern Region where the highest concentration of manufacturing industries in the country is located. The Five Provinces Bordering Forests (FPBF), which is part of EFCOM (FPBF-EFCOM), consists of three national parks, namely: Khao Chamao-Khao Wong National Park, Khao Kitchakud National Park, and Khao Sip Ha Chan National Park. In addition, two wildlife sanctuaries form part of the FPBF-EFCOM: the Khao Ang Rue Nai Wildlife Sanctuary and the Khao Soi Dao Wildlife Sanctuary, which cover a total area of 208,591 hectares or about 83 per cent of the total area of the FPBF-EFCOM.

Most of the FPBF-EFCOM is composed of dry evergreen forest. What makes the FPBF-EFCOM unique is the fact that 96,000 hectares (600,000 rai) of lowland forest with elevation between 55 and 330 metres above sea level still remain when almost all lowland forests in other parts of the country have been converted for agriculture (Figure 1). The area is also recognised as one of the most important wild elephant habitats in Thailand.

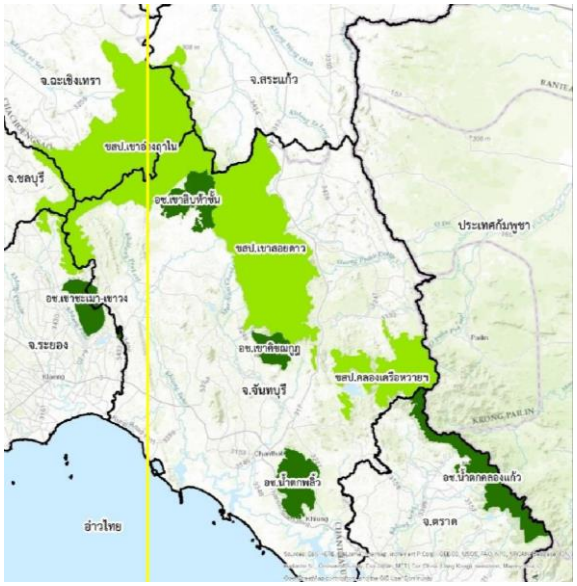

Figure 1. Location of the FPBF-EFCOM

The protected area status of forests in the FPBF-EFCOM should, by definition, protect the area from being converted into alternative land uses. However, the policy emphasis on promoting economic activities in the Eastern Economic Corridor (EEC) of Chachoengsao, Chonburi, and Rayong provinces means that the environmental condition of the provinces may be compromised.[1] One EEC development that directly affects EFCOM, particularly the FPBF-EFCOM, is the water demand and supply situation. Specifically, the projected population increase, the existing high demand for water in the agriculture sector, and the heightened intensity of both existing and new economic activities in the region will most likely further increase water needs. Although the physical characteristics of the Eastern Region have been assessed to be no longer feasible for building large reservoirs, there are nevertheless plans to construct 10 new reservoirs with a combined capacity of 208.72 million cubic metres. One such reservoir is the Wang Tanod

[1] The Eastern Economic Corridor (EEC) has its own EEC Law, passed in 2018, which allows EEC investments to be subject to less stringent/fast-tracked environmental impact assessment processes.

Reservoir (WTR), which will have a maximum holding capacity of 99.5 million cubic metres. Its construction was originally scheduled in 2022–2027.

The fundamental concern that has led to the conceptualisation of this study is the location of the planned WTR in Khao Sip Ha Chan National Park (KSHC-NP). With the construction of the WTR, around 1,116 hectares of forests will be flooded. This is indicated by the blue shaded area to the left of the national park in Figure 2. This will essentially segment the wild elephants' habitat in KSHC-NP into two sides — the left and the right — of the flooded area.

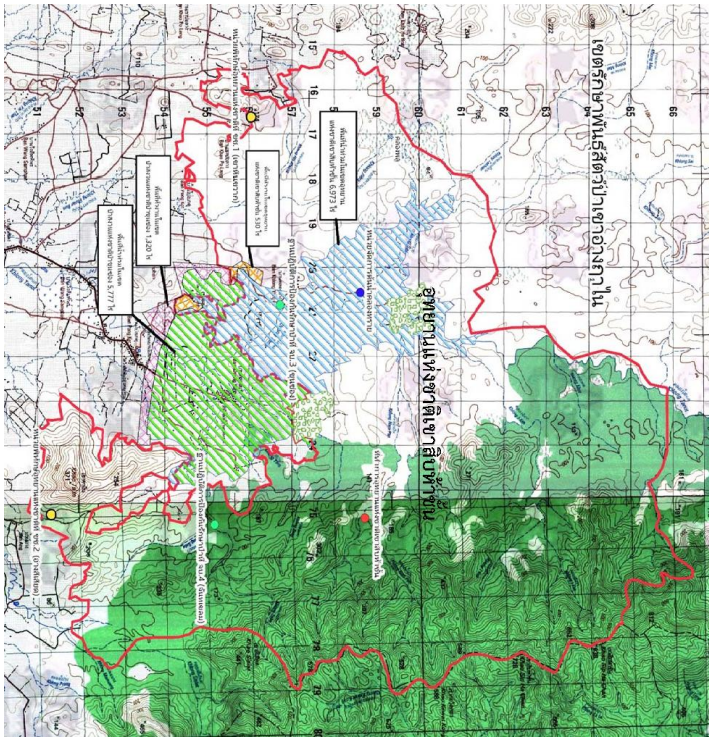

Figure 2. Flooded area due to the WTR construction

Elephants are an umbrella species; thus, the way they adjust to the changes in their habitat would result in changes in biodiversity and in the ecosystem services of the two segmented areas. Accordingly, the main focus of this study is the ecological function of the KSHC-NP as part of the FPBF-EFCOM's wild elephant habitat, considering this has been overlooked by both the original environ-mental impact assessment (EIA) and the revised EIA reports of the WTR construction (Nabang-chang, 2021). As such, the economic values of such a function have not yet been considered.

This study therefore aims to estimate the non-use value of wild elephants and their habitat. Should the decision to invest in the WTR be reconsidered, the resulting non-use values from this study could be incorporated into the economic analysis of the EIA reports. The values can represent the benefits gained from the ecosystem services of the KHSC if left undisturbed and the benefits forgone should the WTR is constructed. Such analysis will ensure that the costs and benefits of the investments reflect the gains and losses more accurately.

Literature Review

Ask a Thai person how important an elephant is, and what immediately comes to mind may vary — images of elephants working in the forests; elephants performing a number of tasks for the benefit of the tourists (e.g., giving rides, playing football, and dancing); or memories of elephants being adorned with elaborate robes and taking part in various cultural rituals. Although Thais may have some idea that wild elephants still live in whatever forests remain in the country, their knowledge and understanding will be on the benefits that humans derive from domesticated elephants. Little is known about the status of wild elephants and about the other dimensions of benefits beyond what environmental economists call the *use value*. What is not known is the *non-use value* or the value humans attach to wild elephants that is not conditioned by any present or future direct or indirect benefit. With this missing information, it can be said that the economic value of elephants, particularly wild elephants, is typically undervalued and misrepresented. As such, this bears the risk of making ill-informed decisions and can potentially misdirect any decisions that may adversely affect their well-being and their habitats.

As early as 25 years ago, researchers have already stressed the importance of understanding the total economic value (TEV) of elephants (Loomis and Larson, 1994; Oglethorpe and Miliadou, 2000). The TEV of wildlife species consists of both *recreational use* and *non-use* (existence and bequest) values, which can be measured by eliciting people's willingness–to–pay (WTP) for preserving a particular species (Richardson and Loomis, 2009). Non-use values are not something that can be traded in the market nor can they be attached with any preference observable by people. The only approach to estimate this value is to use people's responses to carefully constructed survey questions to analyse what these answers reveal about the values the respondents attach to the subject being valued (Bateman et al., 2002).

In a contingent valuation method (CVM) survey, a public good is described, then the respondents are asked questions to elicit their WTP for the public good through a payment vehicle (e.g., taxes or contributions to a trust fund) (Arrow et al., 1993; Bateman et al., 2002). Oftentimes, CVM as a tool has been downplayed to a method of simply asking what respondents will pay for a particular wildlife species (e.g., bald eagle, wolf, polar bear, etc.). As such, it is important to reiterate the point made by Carson, Flores, and Meade (2001), which is to present the good that is being valued and not the good in the abstract. Accordingly, this study does not focus on whether the respondents would be willing to pay a specified sum of money for a wild elephant in the FPBF-EFCOM; instead, it focuses on whether they are willing to pay to support measures that would restore the wild elephants' habitat within the KSHC-NP. This will then reduce the risk of elephant mortality due to natural causes (degradation of the habitat conditions) and human-induced activities.

Despite the cultural and economic importance (relative to other wildlife) of elephants, not many valuation studies exist in Thailand on the economic value of elephants. One of the

few studies is the study funded by the Environment and Economy Programme in Southeast Asia (EEPSEA) with regard to the private contributions towards the provision of public goods in conserving Thailand's endangered species (Nabangchang, 2009). The main objective of this study was to develop an understanding of why people in Bangkok give money to wildlife charities, how much people value the conservation of animals, and the best way to collect money for wildlife protection. The study explored the general public's preference for six of Thailand's endangered species (i.e., tigers, elephants, dugongs, gibbons, marine turtles, and hornbills) by asking which of the six species they would recommend for the government's resource allocation. Apart from reminding that their answers might make a difference to the chances of survival of some at the expense of others, no additional information was provided on the animals such as their population size, comparative risks of extinction, and conservation measures already undertaken.

People's willingness to support conservation funds for endangered species can be influenced by their association of those species with various attributes. Thus, the 2009 EEPSEA study adopted the approach used by Czech and Krausman (1999); the respondents were asked to assess each of the six endangered species based on five attributes that might influence their perceived importance. The scale ranged from 1 for *least important* to 10 for *most important*. The attributes were *apparent ecological importance*; *cultural*, *historical*, and *sentimental value*; *monetary value*; *rarity or facing the threat of extinction*; and *physical attractiveness* (Czech and Krausman 1999) (Table 1).

Table 1. Perceived importance of wildlife by selected attributes and awareness of the risk of extinction

Attributes	Elephants	Dugongs	Tigers	Hornbills	Gibbons	Marine Turtles
Have apparent ecological importance	7.59	7.73	7.94	7.96	7.11	8.05
	(2.62)	(2.85)	(2.49)	(2.70)	(2.72)	(2.54)
Have cultural, historical, and sentimental value	8.93	6.15	6.77	6.24	5.83	6.35
	(1.73)	(2.96)	(2.63)	(2.87)	(2.60)	(2.79)
Have monetary value	6.79	6.07	7.79	6.75	5.66	6.88
	(2.66)	(3.01)	(2.56)	(2.85)	(2.78)	(2.77)
Are rare and near extinction	8.19	8.82	8.47	8.59	7.58	8.37
	(1.96)	(1.97)	(1.96)	(2.08)	(2.38)	(1.99)
Have physical attractiveness and are cute	8.68	7.14	6.50	7.41	7.55	6.70
	(3.66)	(2.78)	(2.75)	(2.59)	(2.31)	(2.68)
Average scores of the five attributes	8.03	7.19	7.50	7.40	6.76	7.29

Notes: Figures in parenthesis are standard deviation values.

Source: Nabangchang (2009)

Similar to the studies of Czech and Krausman (1999) and Tisdell and Wilson (2006), the respondents in the 2009 EEPSEA study were asked to assess whether their knowledge of a particular species was *poor*, *good*, or *very good*. The measurements under this exercise were arbitrary in the sense that the scores were based on the respondents' judgments and prior knowledge. The scores were then used in a qualitative manner and not as cardinal measures, as the latter measure would require high levels of precision. The main objective was to capture the general perceptions of the Bangkok population regarding the relative importance of the endangered wildlife species. This did not necessarily have to be in accord with the actual status; the information on what the general public knew or were aware of could be of value to policy makers. Accordingly, what is relevant to this current study is the people's perceptions of wild elephants.

Based on the average scores of all five attributes, elephants were considered to have the highest importance (score of 8). Comparing the ranking of each attribute revealed interesting variations. On the attribute *cultural, historical, and sentimental value*, elephants had the highest score. This supports the observation that ethics, morality, and social influences can contribute to the perceived likeability of a species (Tisdell and Wilson 2006).

Based on the perception of tradable economic value, elephants ranked third (score of 6.8) due to their charismatic and economic value in the tourism industry and to the rather profitable business of walking elephants in the streets of Bangkok and other urban residential areas.[2] In terms of the order of preferences for the government to allocate conservation finances, wild elephants came in third place following dugongs and hornbills (Nabangchang, 2009).

Several stated preference studies on both land and marine iconic species have been conducted in Thailand (Nabangchang, 2009, 2011, 2019a, 2019b; Nabangchang, Jarungrattanapong, and Srisawalak; Praisankul & Nabangchang-Sriwasawalak, 2016). In each study, the respondents were asked which among the six presented endangered species of Thailand should be the priority species to be allocated with public resources by the government. What is consistent in all these studies is that wild elephants were always ranked either in the first or second position.

Meanwhile, Bandara and Tisdell (2004) used CVM to assess urban residents' WTP for conserving Asian elephant to analyse whether this is sufficient to compensate farmers in the areas affected by human-elephant conflicts (HECs). The authors found that majority of the respondents' WTP for conserving wild elephants can be attributed to the non-use values of the elephants. Moreover, the differences in the relative importance can be explained by whether or not the respondents have visited national parks. The authors concluded that the non-consumptive use values of Sri Lanka's wild elephant are substantial and the survival of wild elephants is contingent upon policy makers recognising the importance of non-use value.

Blignaut (2008) reviewed case studies from Africa and broke down the economic value of elephants into consumptive uses (i.e., meat, ivory, trophy hunting) and non-consumptive

[2] In this tourism activity, well-intentioned urbanites buy bananas to feed the elephant such that *mahoots* (people who take care of the elephants) and elephant owners could make money.

uses (i.e., game viewing and elephant rides). The earlier case studies from African countries (i.e., Botswana, Namibia, and Zimbabwe) focused mainly on use values, such as value of culling and sales of ivory and dried and salted hides. Meanwhile, Blignaut (2008) noted that direct consumptive use values have effectively been reduced to zero in the present days (albeit with the exception of the value of illegal ivory trade). Based on the survey of literature, Blignaut (2008) observed that the consumptive benefits (e.g., ivory, trophy hunting) of the African elephant were much less than its non-consumptive (e.g., tourism) and non-use (e.g., existence, option, and bequest) values.

Indirect use value of the elephants' habitat refers to watershed services, forest carbon services, and nutrient cycling. Blignaut (2008) observed that some of these values have increasingly become exchange values. The study further described that the indirect use value of elephants stems from its ecosystem function of being a keystone species whose existence contribute to the survival of many other species. Two approaches were used in the study to value the indirect use value of wild elephants. One approach was to value wild elephants as an umbrella species, therefore incorporating a range of other values into their value. The other approach was to value wild elephants individually by considering its positive or negative role in the ecosystem. Wild elephants' role as an important habitat engineer can be considered as positive, whereas their large population size and large consumption needs that can lead to ecosystem degradation can be considered negative.

The main discussion on the non-use value of wild elephants focused on the market mechanisms that can be developed to harness these non-use values in conjunction with their direct and indirect use values. Blignaut (2008) further raised the issue of global concern for the continued existence of elephants, which are expressed in the form of donations to finance protection measures. The author noted that if wildlife policies are well-designed, then they could be conducive to both the conservation and the development of economic opportunities through markets. The WTP of the Swedish population (USD 57 million) for preserving the African elephant alone, for example, was only 28 per cent less than the high-end estimate for the value of the total ivory market (USD 77 million). This indicates that there could be a possible solution to solve HEC by tapping on the demand for conservation measures (as expressed by the WTP) to compensate farmers for the damages caused by elephant raids.

Overall, the implications that Blignaut (2008) cited that are relevant to the design of the current valuation study are that (1) space and context matter in economic valuation and (2) focusing on any particular value may skew the TEV. A more balanced approach would be to consider the suite of values as a package. For example, the loss of plausible consumptive use and nuisance values may be overlooked should the valuation focus on the non-consumptive value alone. The practicality of translating WTP in a hypothetical situation to actual payments would depend on the tangibility of the conservation measures to be financed by contributions, on the effectiveness of the conservation outcome, and on the trustworthiness of the institutional mechanisms put in place to manage the finances and implementation of the conservation efforts.

Muchapondwa, Carlsson, and Kohlin (2008) looked into the differences in attitudes of local communities living adjacent to national parks, game reserves, and safari areas in one of the districts in Zimbabwe. The respondents' attitudes towards elephants were reflected

on their higher mean willingness to pay should the respondents consider them as public goods and on the majority of the households who favour translocation. This study is relevant to the situation in Thailand; HEC should be viewed from the perspectives of local communities who live adjacent to elephant habitats as they are the ones who bear the immediate and direct impacts.

Although the meta-analysis study of Richardson and Loomis (2009) covered only threatened, endangered, and rare species in the United States, the study offers useful insights on the variables that might influence people's WTP to support conservation measures. These include change in the size of the species population, type of species, and whether or not the species is a 'charismatic megafauna'. The details of the fund mobilisation itself, such as payment frequency and the year the study was performed, are also relevant factors.

This last factor highlights an unavoidable limitation of this study as the household surveys were conducted during the middle of the COVID-19 pandemic. As much as possible, the research team gathered information on the impact of the pandemic on the economic situation of the household — the respondents might have experienced reduced income, they could already be spending money to support victims of the pandemic, or they could simply want to be more careful about their expenses, considering the uncertainty of when life could return to 'normal'. Thus, the current study acknowledges that whatever value can be estimated is most likely to be the lower-bound value.

Finally, Chami et al. (2020), in their study on elephants and whales, concluded that the value of forest elephants is USD 1.75 million per animal. Apart from its extremely high value, the principle of coming up with a value per animal goes against the principle of using stated preferences to estimate the non-use value of wildlife. Carson, Flores, and Meade (2001) pointed out that what is being valued is not the economic value of an individual wild elephant, but people's WTP to reduce the risks of extinction of the wildlife being valued. This would then depend on the validity of the conservation measures proposed, the extent to which these measures can reduce the pressures the wildlife faces, and how this could be linked to the risk of extinction. Much would also depend on the population size of the wildlife in question. In principle, the greater the risk of extinction and the smaller the population size, the more willing people would be to pay to support conservation measures after having considered all the trade-offs with alternative uses of money.

Research Methodology

The CVM Design

This study estimated the non-use value of wild elephants in the FPBF-EFCOM using CVM. This section presents the key elements of the CVM design. Meanwhile, Section 3.2 describes the survey instrument and the hypothetical good that the respondents are being asked to pay for.

What is being valued: The hypothetical goods

Building the WTR would fragment the KSHC-NP, which is part of the larger wild elephant habitat of the FPBF-EFCOM. Preliminary studies have already been conducted on the movement of wild elephants after the two other reservoirs that form a part of the water supply sources for the EEC have been built. Accordingly, the studies showed the changes in the spatial roaming patterns of wild elephants towards locations where there are water and food supplies. Inevitably, they will be drawn to the nearby croplands, thus increasing the likelihood that existing HEC will intensify. In the studies, the respondents were asked whether they would support the WTR construction if this would mean fragmenting the wild elephants' habitat and possibly reducing their population size. Regardless of whether the respondents favoured the WTR, they were asked whether they will support a wild elephant habitat conservation program.

To explore what Blignaut (2008) observed about relevance of *space* and *context*, those respondents who were not willing to pay to support wild elephant habitat conservation in the FPBF-EFCOM were asked further if their decisions would be any different if they were asked to pay for the conservation of other wild elephant habitats in Thailand. This is because the FPBF-EFCOM is not the only location where there are HECs. It may be possible that although the respondents might be willing to contribute to solving HEC, they would prefer that their contribution be spent elsewhere.

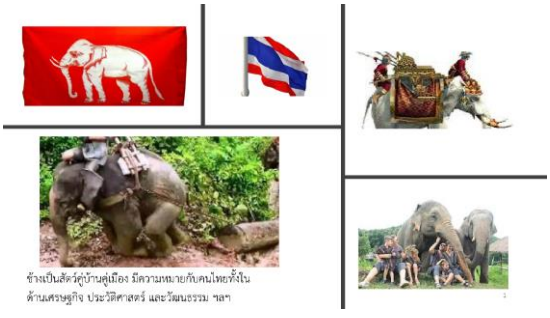

Figure 3. CV scenario 1: Elephants as an iconic species in Thailand

CVM is a valuation tool used in situations where there are no markets for the goods being valued, nor is there any consumer behaviour that can be observed to deduce preferences. In such conditions, it is necessary to use a hypothetical good to indicate the respondents' preferences by asking them to *state* whether they are willing to pay.

The contingent valuation (CV) scenarios described in the following paragraphs were the hypothetical goods presented to the respondents. It begins with information about the existing situation of elephants in Thailand. CV scenario 1 (Figure 3) describes

how elephants have always been considered an iconic species for the Thai people, having played cultural and social roles. It illustrates how, over the years, the economic roles of elephants have switched from logging to tourism activities.

CV scenario 2 (Figure 4) informs the respondents that the population of wild elephants in Thailand now ranges between 3,168 and 3,440. These are distributed in 69 national parks in various regions of the country, with the total forest area of the wild elephant habitats estimated to be 52,000 square kilometres. In these habitats, the group size can range from 10 to 300 wild elephants.

Figure 4. CV scenario 2: Population of wild elephants in Thailand

CV scenario 3 (Figure 5) describes the ecological importance of wild elephants (e.g., seed distribution), the benefits that other species get from the salt and mineral licks maintained by elephants, and the benefits that many insect species derive from elephant droppings.

Figure 5. CV scenario 3: Ecological importance of wild elephants

The ecological importance of wild elephants continues in CV scenario 4 (Figure 6); this time, it focuses on the carbon stored in the physical body of large mammals such as elephants. A recent study has described the benefit provided by wild elephants in reducing tree densities and the ratio of large to small trees in natural forests. Since larger trees have greater biomass, they also store higher carbon content in the trunks, roots, and leaves — an ecosystem service that has also been attributed to the presence of wild elephants.

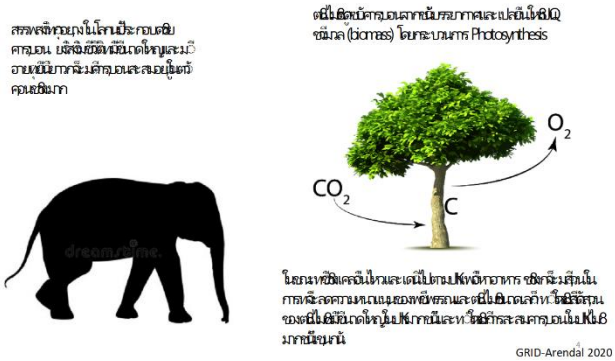

Figure 6. CV scenario 4: Carbon stored in the physical body of large mammals as one of the benefits provided by elephants

In CV scenario 5 (Figure 7), the script moves on to describe the threats that wild elephants face, and highlights the conflict between wild elephants and local communities living near

the natural forest. What the public are generally aware of are the incidents in which wild elephants come out of the protected areas to seek food and water. When this happens, the lives of local people and their crops and properties are put at risk.

Figure 7. CV scenario 5:
Threats wild elephants face

Figure 8. CV scenario 6:
EFCOM as one of the areas with high HEC

Figure 9. CV scenario 7:
WTR construction and its benefits to the EEC

benefit the development of the EEC.

The respondents are then informed that one of the causes of HECs is the deteriorating condition of many protected areas, which means lower food and water supply and diminishing areas for wild elephant habitats.[3] Moreover, wild elephant habitats have become increasingly fragmented due to the expansion of physical infrastructure network, such as construction of dams and large reservoirs. The enumerator then shows the map on the right, which indicates the distribution of the national parks, some of which are wild elephant habitats.

Using CV scenario 6 (Figure 8), the respondents are then informed that EFCOM is one of the areas with high HEC. The population of the FPBF-EFCOM's wild elephants is 427 individuals or around 13 per cent of the total wild elephant population in Thailand. The FPBF-EFCOM is also the habitat of at least one other iconic species, the pileated gibbon. In this slide, the respondents are also informed that the pressure on wild elephant habitats would likely increase due to the planned reservoir construction in the FPBF-EFCOM. The reservoir in question is the WTR shown in CV scenario 7 (Figure 9), which is going to be part of the water supply source and will be channelled into the Prasae Reservoir to

[3] Based on the information provided by Sawai Wanghongsa, former Chief of Chachoengsao Wildlife Research Center, about the interpretation that 36.63 per cent of the FPBF-EFCOM is suitable as wild elephants' habitat. There are both push and pull reasons.

In CV scenario 8 (Figure 10), however, the respondents are cautioned that every story has two sides. Although the reservoir will bring economic benefits, its construction will have adverse impacts on wildlife habitats. The respondents are guided to look at the map of KSHC-NP. The area inside the blue line indicates the flooded area that will overlap with the dark red area; the latter represents the existing wild elephant habitat. At this point, the respondents are informed that if the WTR reservoir is constructed, then KSHC-NP will be fragmented into two parts. Wild elephants will have to find alternative sources of water supply and habitat, which would likely increase HEC.

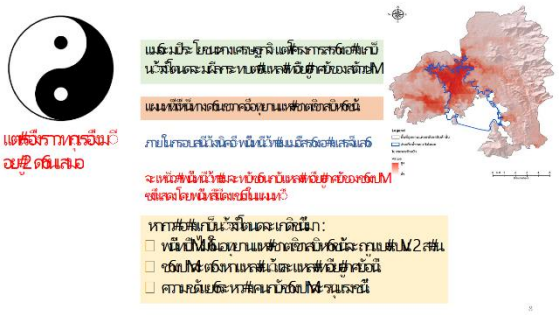

Figure 10. CV scenario 8: Adverse effects of WTR construction on wildlife habitat

Moving to CV scenario 9 (Figure 11), the main question here is whether or not to continue with the WTR construction. The enumerator reminds the respondents that even if the government does not build the WTR, it would not automatically resolve HEC in EFCOM. Addressing HEC requires investing in measures that would improve the wild elephant habitats, such that their need to come out of the protected areas would decrease.

Figure 11. CV scenario 9: To continue or not to continue with the WTR construction?

This is followed by CV scenario 10 (Figure 12), which lays out the proposed measures to improve the habitats of wild elephants as follows:

Figure 12. CV scenario 10: Proposed measures to improve the wild elephant habitats

- Increasing the number of water supply sources within the protected areas;
- Proper management of alien invasive species;
- Increasing food supply for wild elephants within the protected areas;
- Increasing the number of mineral salt licks within the protected areas; and
- Changing the type of crops planted along the border of the protected areas into crops that are not palatable to the elephants.

To provide a realistic view of the situation, the respondents are reminded that it is not enough to invest in measures to improve wild elephant habitats. When trying to reduce HEC, it is also necessary to consider the benefits that local communities living near the protected area can gain from improving wild elephant habitats. Some of these measures include the following:

- Compensating revenue loss from the damages to crops and properties caused by wild elephant raids; and
- Providing subsidies for the local communities living adjacent to the protected areas to help them earn revenue from alternative sources of income opportunities (e.g., homestays and wildlife-viewing ecotourism) in the medium- and long-term.

Figure 13. CV scenario 11: WTP to support conservation measures through monthly contributions to improve KSHC-NP ecosystem

Figure 14. CV scenario 12: Three interrelated issues to be considered when deciding whether or not to support conservation measures

Moving on, CV scenario 11 (Figure 13) informs the respondents that investing in the proposed measures will require more budget than what is currently available. This is why the survey is being conducted: to ask the respondents about their WTP to support conservation measures through monthly contributions in the form of a water fee surcharge for a period of one year. The money collected from the contributions would be established as the *FPBF-EFCOM Wild Elephants Home Trust Fund*, which will be used for restoring the conditions of the FPBF-EFCOM. The trust fund will be jointly managed by KSHC-NP, the Chantaburi Provincial Administration Organization, and the local communities living adjacent to KSHC-NP.

In CV scenario 12 (Figure 14), the respondents are reminded that making such a decision would involve considering three inter-related issues:

1. The economic benefit of constructing the WTR reservoir;
2. The impact of such investment would cause, primarily the fragmentation of wild elephants' habitat into two parts, which will deteriorate the ecosystem; and
3. The cost and benefits of the local communities that live adjacent to KSHC-NP.

Payment vehicle

The payment vehicle is a monthly water surcharge that will be collected over a period of one year; this is the duration it would take to implement the habitat conservation measures described in CV scenario 10. The water surcharge is a logical choice of payment considering that the FPBF-EFCOM serve as a watershed of the two main rivers supplying water to the Eastern Region *with* or *without* the planned reservoirs. The bid that each respondent is asked to pay would technically be the water surcharge that is added to their monthly water bills. For example, if a respondent's water bill is THB 300 per month on the average, and he or she voluntarily pays THB 10 to support conservation measures, then his or her water bill would become THB 310. The Metropolitan Water Works Authority (MWWA) or the Provincial Water Works Authority (PWWA) would then channel the THB 10 from this respondent to the Conservation Trust Fund to support his/her specified habitat restoration measures.

Elicitation method

The WTP question is posed as a single-bound dichotomous choice, followed by an open-ended question if the respondent is not willing to pay the specified sum. The five bids used were THB 10 per month, THB 20 per month, THB 50 per month, THB 70 per month, and THB 100 per month.

The five bids were determined from the three pre-tests that had been previously conducted. In pre-test round 1, the respondents were given a table that indicated the sum of money to pay per month for a period of one year, e.g., from THB 5 per month to THB 10, 20, 30…100, 200, 300, and so forth. For the sum that they were *definitely willing to pay*, they were asked to indicate with a '□'.□For the sum that they were *definitely not willing to pay*, they were asked to indicate with an 'x'. For the sum that they were uncertain whether they will be willing to pay or not, they were asked to leave it blank.

The result of round 1 pre-test provided information on the *range of values* that the respondents were most likely to pay. This was used to set the bids for the 2nd and 3rd rounds of pre-test to come up with the lowest bids. The lowest bid is the value that majority of the respondents would be willing to pay, whereas the highest bid refers to the amount that only less than 10 per cent of the respondents would be willing to pay.

Identifying protest voters

Among the respondents will be those who can be categorised as *protest voters*. By definition, they are those who do not believe in the information provided on the existing situation or the proposed conservation measures they are being asked to help support, and those people who responded that they are willing to pay because it is a hypothetical situation and whatever decisions they make are not binding.

Failing to exclude protest voters (if there are many) would misrepresent the actual number of respondents who would be willing to pay. Thus, among the answers included in the question on the reasons why respondents are willing to pay was, 'It will be a long time

before I am really expected to pay because there are more urgent things that need to be addressed during this period of the COVID-19 pandemic'. Any respondent choosing this answer as his or her reason for his or her willingness to pay would be excluded from the data set in the logit regression analysis.

Addressing hypothetical bias and certainty of response to the WTP question

One of the criticisms about the CVM is the occurrence of hypothetical bias. To reduce this in this study, the CV scenarios include a *Cheap Talk* script (Cummings and Taylor 1999), which reminds the respondents that they should decide only after having considered the trade-offs of the alternative uses of money.

As is required of the standard CVM protocol, the respondents are then asked about the level of certainty in their responses regardless of whether they said they are willing to pay (Champ et al., 1997). The respondents are asked how certain they are — from *very certain*, *somewhat certain*, *certain*, *somewhat uncertain*, and *not certain at all*. If the respondents are willing to pay but are *somewhat uncertain* and *not certain at all*, then the WTP variable would be recoded as '0' rather than '1'. This is assuming that if they are already uncertain while in a 'hypothetical' situation, it would be most unlikely that they would actually pay in a 'real' situation.

Pre-tests and Household Surveys

With the 3rd wave of COVID-19 taking place in July and intensifying all throughout August, it was not possible for the research team to conduct face-to-face surveys until the beginning of September 2021. Three rounds of pre-tests were conducted during the first two weeks of September for the purpose of setting the bids and refining the CV scenario.

The actual survey was administered in the third and fourth weeks of September 2021 and was not completed until the second week of October. A total of 400 respondents were interviewed: 90 respondents were interviewed for the pre-test, 155 respondents were interviewed in Bangkok, and 155 respondents were interviewed in Chantaburi.

The Questionnaire and Additional Information in the CV Scenario to Support Decision Making

The questionnaire

According to the standard research protocol, the interview can be conducted only if the randomly selected respondents agree to sign the consent form included on the last page of the questionnaire. Part 1 contained questions that allowed the analyst to understand the profile of respondents: (1) where the problems related to the environment and endangered species stood vis-a-vis other problems the country is facing, (2) where problems of endangered species stood in relation to other environmental problems, and (3) which

among the eight endangered species would be the top priority for resource allocation to support conservation measures.

Section 1 also contained a list of statements that were read out loud. For each one, the respondents were asked whether they *strongly agreed*, *agreed*, *had no opinion one way or another*, *disagreed,* or *strongly disagreed*. The final questions in Section 1 were some basic questions that allowed the analyst to assess the respondent's level of knowledge about wild elephants in Thailand, their familiarity with national parks and wildlife sanctuaries, and whether or not they have heard about the EEC.

The enumerators started to ask the questions in Section 2 by reading out loud the information on the slides containing the CV scenarios. To keep the respondents' engaged, they were handed with a separate folder with the slides, such that they could follow what was being said. Once this was read out loud, the respondents were asked if they would be willing to pay a specified sum of money as a surcharge to the monthly water bills for a period of 12 months. This was then followed by questions on the reasons why they were *willing* or *not willing to pay*, and by questions about the certainty of their decision.

The respondents were also asked to prioritise the measures for reducing the risk of extinction of Thailand's wild elephants; the organisation they thought most appropriate to look after the Conservation Trust Fund; whether or not prior to the interview they knew about the threats faced by wild elephants; and whether they believed in the information that was provided in the CV scenarios. The final section of the questionnaire were questions on the socio-economic status of the respondents. The information gathered from this section were used to analyse which variables influenced the respondents' decision to pay or not to pay.

Additional information in the CV scenarios to support decision making

After informing the respondents about the current status of wild elephants, the threats they face, and the proposed conservation measures, the enumerators presented CV scenario 13 (Figure 15), which outlined the steps in decision making. The first decision that the respondents had to make was whether or not they thought the government should proceed with the planned investment to construct the WTR. In principle, such a decision should be guided by the information about what would happen with and without the WTR construction, as provided in CV scenarios 8 and 12 (Figures 10 and 14). If the respondent decides not to support the WTR construction, then he or she has to decide whether or not they would be willing to finance the conservation measures proposed.

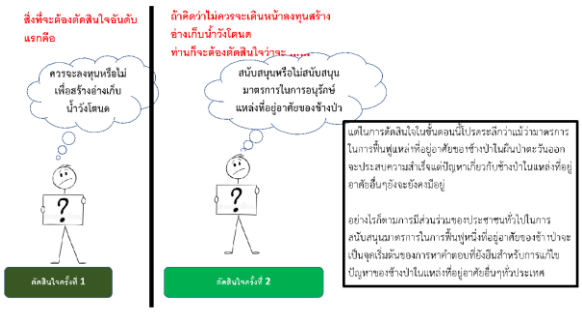

Figure 15. CV scenario 13: Steps in decision making

As required by the CVM protocol, the respondents should be informed of the uncertainty of the outcome. The script in this CV scenario, therefore, reminded the respondents that

even if the measures to restore wild elephants' habitat in the FPBF-EFCOM is successful, the problems related to the wild elephants in other areas in Thailand will still remain. However, the participation and involvement of the general public in supporting the restoration measures will be a meaningful start in finding a workable solution to address the problem of wild elephants in other areas of the country.

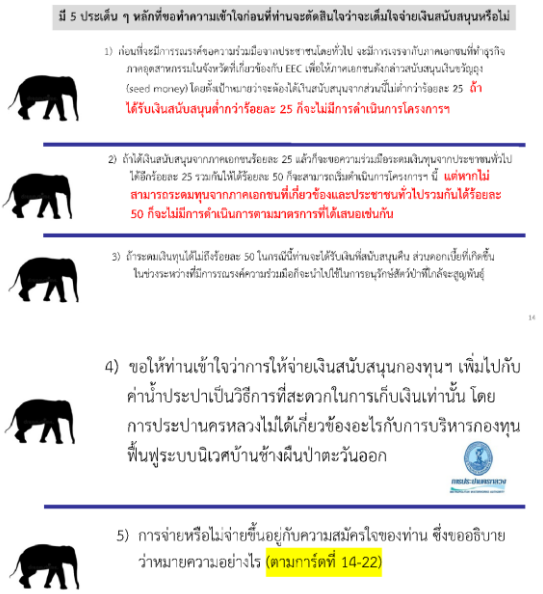

Figure 16. CV scenario 15: Conditions of the voluntary contribution

CV scenario 14 (Figure 16) also followed the standard CVM protocol, especially when the voluntary payment mechanism is adopted. It provided the respondents with the conditions of the voluntary contribution as follows:

- Before mobilising contributions from the public, the proponents will negotiate with the private sector groups that directly benefit from the water supply provided by the WTR. In the negotiation, the private sector groups will be asked to provide seed money equivalent to 25 per cent of the total sum needed to invest in the proposed conservation measures. If 25 per cent of the needed sum cannot be mobilised from the private sector, the proposed conservation program will not happen. Fund mobilisation efforts would not be done.
- If the negotiation is successful, then the resource mobilisation initiative from the public will proceed. If less than 50 per cent of the required funds can be mobilised, then the proposed conservation measures will not take place. Fund mobilisation will stop, and the contribution of each person will be returned. Moreover, during the fund mobilisation, the money would be put into the Trust Fund, presumably in a kind of savings account that generates interest. If fund mobilisation will stop, then the interest generated will be used to finance conservation measures for endangered species in Thailand.
- The respondents are informed that the money paid as monthly water surcharge is only a convenient way to collect money from the public. The MWWA and the PWWA will not, in any way, be involved in managing the conservation trust fund.
- Lastly, whether or not the respondent decides to pay is his or her own individual decision.

CV scenario 17 (Figure 17) followed the standard CVM protocol and reminded the respondents that the purpose of the survey was merely to ask them about their WTP for a set of measures; money will not be actually collected. They were told then that based on past studies, although the respondents have said that they were willing to pay, they then declined to pay when the actual situation arises. This means that decisions made in hypothetical situation differ from 'real' decision making. Among the reasons for this discrepancy could be because the respondents wanted to create a good impression on the enumerators. It could also be because the respondents thought that they can decide on hypothetical situations since these situations are not binding; thus, they would not really have to pay.

Figure 17. CV scenario 17: Script to eliminate hypothetical bias

Because of this hypothetical bias, the respondents were asked to make decisions as though they were in a real situation. At the same time, they were reminded that when they say they are willing to pay a certain sum of money, that same amount of money would not be available for other uses such as buying things they need, going on trips, or donating to other social causes (e.g., donating to help old people, children, or the handicapped).

The Findings

General Profile of the Respondents

A total of 400 respondents were interviewed. The respondents consisted of 90 respondents from Bangkok for the pre-test, and 155 respondents were also from Bangkok for the actual surveys. To explore whether the perceptions of Bangkok respondents would differ from those living in the province where the WTR will be constructed, a total of 155 respondents were also interviewed in Chantaburi province.

Over 70 per cent of the respondents in both provinces were over 40 years old. The average ages of respondents in Bangkok and Chantaburi were 48 years. Around 52 per cent were female, and nearly 70 per cent were married. The average family size was four members. Large families with over seven or more members were not common in both groups (Table 2).

Table 2. Socio-economic profile of the respondents

Parameter	Bangkok (n = 245)*	Chantaburi (n = 155)	All (n = 400)
Average age of respondents	49.50	46.20	47.90
	(13.61)	(13.25)	(13.51)
% female	145.00	64.00	209.00
	(59.20)	(41.30)	(52.30)
% married	165.00	112.00	277.00
	(67.30)	(72.30)	(69.30)
Average family size	4.00	4.00	4.00
Compulsory education	101.00	45.00	146.00
	(41.00)	(29.00)	(37.00)
High school	51.00	46.00	97.00
	(21.00)	(30.00)	(24.00)
Senior high school/ Vocational certificate	48.00	39.00	87.00
	(20.00)	(25.00)	(22.00)
Vocational college/ Bachelor's degree	44.00	24.00	68.00
	(18.00)	(15.00)	(17.00)
Master's degree	1.00	1.00	2.00
	(0.40)	(0.60)	(1.00)
Average income before COVID-19	17,258.00	11,580.00	14,419.35
	(9,486.72)	(5,337.77)	(8,193.75)
Average income during COVID-19	12,483.00	10,862.07	11,683.67
	(6617.55)	(4577.45)	(5751.27)
Household monthly expense (THB/week)	1,650.86	1,694.95	1,675.58
	(836.14)	(560.33)	(709.92)
Received benefit from economic stimulus package	229.00	130.00	359.00
	(93.50)	(83.90)	(89.80)
Donated to help in COVID-19-related caused	57.00	22.00	79.00
	(23.30)	(14.20)	(19.80)

Notes: (1) * The descriptive statistics for Bangkok include the 155 respondents from the survey and information from the 90 respondents interviewed during the pre-test.

(2) Figures in parenthesis are standard deviations.

The average incomes of both Bangkok and Chantaburi respondents before the COVID-19 pandemic were THB 17,258 per month and THB 11,580 per month, respectively. About 42 per cent of the Bangkok respondents said that they had experienced reduced income as compared to that before the pandemic. Chantaburi respondents who reported income reduction, on the other hand, were less than 1 per cent. The average incomes of Bangkok and Cantaburi respondents during the pandemic were THB 12,483 per month and THB 10,862 per month, respectively. Although the decision to pay or not pay to support the conservation measures was made on an individual basis, it could be that the financial situation of the household may influence their decision making. To this end, the respondents were asked whether, in addition to themselves, there were other members of the family who had income. About 86 per cent of the Bangkok respondents said that there were also other members of the household who were also revenue earners. For Chantaburi, all the respondents said that they were not the only revenue earner of the household.

During the pandemic, the government initiated several economic stimulus packages. Whatever real or perceived changes in the income status of the respondents occurred during the pandemic, benefiting from the economic stimulus package might result in cushioning the loss, and hence affect WTP decisions. Around 94 per cent of the respondents said that they had benefited from these economic stimulus packages. The percentage is somewhat lower in Chantaburi, with only 84 per cent of the respondents reporting that they benefited.

A respondent's WTP decision may also depend on whether he or she has already donated some money or made some contribution to help those in need during this period of pandemic. When asked if they have contributed either in cash or in kind to COVID-related causes, around 23 per cent of Bangkok respondents and 14 per cent of Chantaburi respondents said they had. Of the 400 respondents interviewed, only two respondents in Bangkok said they were members of some environmental organisation.

To understand the profile of respondents better, the enumerators showed a set of problems, and asked the respondents to select the top three problems in Thailand that they deem to be the most important. Not surprisingly, the respondents selected the economic problems related to the COVID-19 pandemic and problems related to how COVID-19 is controlled. In relation to this particular study, wildlife extinction was more or less at the bottom of the list. Both respondent groups had more or less similar responses (Table 3).

When asked which of Thailand's endangered species they would choose for the government to prioritise given the budget constraints, by far on top of the list was wild elephants among the Bangkok respondents (28 per cent). In second and third places were the hornbills and the black panthers. What was contrary to expectation was that wild elephant was not among the top three for Chantaburi respondents — the black panther was clearly leading.

This was a clear evidence of the power of the news. There was a surge of interest in the black panther when a business tycoon had killed one in a wildlife sanctuary in the Western Forest Complex. The iconic species of the Western Forest Complex, incidentally, was not the black panther, but the Indo-China tiger which, although sharing the same habitat, were not ranked among the top three among the Chantaburi respondents (Table 4).

Table 3. Ranking problems that Thailand was facing

Problems	% of Respondents Who Chose the Selected Problems among the Top Three		
	Bangkok n = 245	Chantaburi n = 155	All n = 400
Economic problems related to the COVID-19 pandemic	22.8	35.8	27.6
Poverty	25.9	17.7	22.8
Problems related to how COVID-19 is controlled	14.5	33.8	22.0
Way the government manages things	9.0	5.7	7.7
Drugs trafficking	6.2	3.5	5.2
Education*	7.3	0.4	4.7
Political conflict	6.4	1.3	4.5
Crimes	5.8	1.3	4.1
Environmental problems (i.e., air and water pollution, global warming, coastal erosion, deforestation)	1.0	0.3	0.7
The three border provinces**	0.4	0.0	0.2
Wildlife extinction because of hunting and illegal trading	0.3	0.1	0.2
Physical infrastructure (e.g., roads, water supplies, electricity)	0.1	0.1	0.1
Others (e.g., corruption in both public and private sectors)	0.3	0.0	0.2

Notes: * This pertains to generic problems concerning education (e.g., quality of services, inequality of access, etc.)
** This refers to Islam separatist movement in the three southernmost provinces of Thailand, which has been a long-standing concern.

Table 4. Perceptions over wildlife to prioritise for conservation measures

Unit: % of Respondents

Thailand's Wildlife	Bangkok n = 245	Chantaburi n = 155	All n = 400
Wild elephants	28.2	9.9	21.1
Black panther	13.7	32.1	21.0
Hornbills	14.1	18.8	15.9
Dugongs	16.5	8.9	13.5
Pileated gibbon	8.0	18.5	12.1
Dolphins	9.3	2.4	6.6
Tigers	4.6	6.1	5.2
Bryde whale	5.6	3.3	4.7

To better understand the perceptions of the respondents towards wild elephants and habitat conservation, the enumerators read out loud a list of statements. In each one, the respondents were asked whether they *strongly agreed*, *agreed*, *neither agreed or disagreed*, *disagreed*, and *strongly disagreed*. Majority of both Bangkok and Chantaburi respondents said that wildlife habitat management was not a priority as compared to what they perceived to be other environmental problems (Table 5).

Table 5. Perceptions on the roles and responsibilities towards wild elephant habitat conservation

Unit: % Who 'Strongly Agree' and 'Agree'

Perception	Bangkok n = 245	Chantaburi n = 155	Pooled n = 400
Thailand faces other environmental problems that are more important than managing wildlife sanctuaries/national parks.	63.27	87.09	72.5
All Thai people should contribute some of their income towards managing wild elephant habitats.	46.12	10.97	32.5
All Thai people should contribute some of their income towards conservation of wild elephant to benefit future generations.	47.35	12.26	33.75
Everyone should be involved in supporting wild elephant conservation to reduce risk of extinction regardless of whether they will have the opportunities to see wild elephants.	68.98	59.35	65.25
Both the central and local budgets should be allocated to addressing problems related to COVID-19 prior to being used to protect and conserve wild elephant habitats and HECs.	84.9	83.23	84.25
Investments in conservation of wild elephant habitats in EFFOM should be the responsibility of the government and should not involve the public.	56.32	78.07	64.75
Degradation of wild elephant habitat in EFCOM should be the responsibility of the people in the Eastern Region.	31.02	42.57	35.50

However, a sizeable proportion of Bangkok respondents agreed that 'All Thai people should contribute some of their income towards managing wild elephant habitats' and that they should 'contribute some of their income towards conservation of wild elephants to benefit future generations'. However, these sentiments were not shared by Chantaburi respondents, with only around 11–12 per cent agreeing with these two statements.

On the statement reflecting the presence of existence value, the Bangkok respondents showed consistency, with around 69 per cent responding either *strongly agree* or *agree*. Nearly 60 per cent of the Chantaburi respondents agreed to this statement, albeit the responses to the two preceding statements were somewhat inconsistent. Nevertheless, the concern for immediate welfare took precedent in both respondent groups. An overwhelming majority agreed that 'Both the central and the local budgets should be allocated to addressing problems related to COVID-19 prior to being used to protect and conserve wild elephant habitats and human-elephant conflicts.'

Although majority of the respondents also agreed that 'Investments in wild elephant habitats in the FPBF-EFCOM should be the responsibility of the government and should not involve the public', the percentage of those who agreed with this statement is notably higher in Chantaburi. Finally, there is also a sizeable proportion of the respondents who

agreed that the people in the Eastern Region should be the ones responsible for addressing problems of degradation of wild elephant habitat in the FPBF-EFCOM.

To test whether these perceptions had any bearing on the decision to support conservation measures proposed in the scenario, the statements italicised in the Table 5 are also included in the logit regression. At this point, however, an overall impression that can be drawn from these results is that the perceptions of the Bangkok respondents are slightly more pro-environment than those of the Chantaburi respondents, which was somewhat contrary to what was expected.

The results in Table 6 show the respondents' familiarity with wild elephants, which are not contrary to what was expected. There was not much difference between the two groups of respondents, i.e., almost all of the respondents did not know about the Red List of the International Union for Conservation of Nature, were not aware that wild elephants are endangered, and have never visited national parks or wildlife sanctuaries before the start of the pandemic.

Although majority of the respondents have heard news about HECs, the percentage who have come across this type of news was notably greater for the Bangkok respondents despite the fact that the PAs located in Chantaburi are one of the locations with high concentration of wild elephants and incidents of HEC. Among those who said they have heard or have come across news about HEC, what is revealed about the contents of the news can be said to be very 'pro-human' information.

Table 6. Familiarity with wild elephants, national parks, and wildlife sanctuaries

Unit: % of Respondents

Question	Bangkok (n = 245)	Chantaburi (n = 145)	All (n = 400)
% who do not know about the IUCN Red List	97.6	99.4	98.2
% who do not know that Thailand's wild elephants has been classified as endangered-EN	63.7	100.0	77.8
% who do not know about the approximate number of wild elephants in Thailand	97.1	93.5	95.8
% who have heard news of HECs	75.1	57.4	68.3
% who are aware of the approximate size of Thailand's wild elephant population	2.9	6.5	4.2
% who have visited national parks or wildlife sanctuary before the start of the pandemic	27.3	49.0	116.0
% who have seen wild elephants in their natural habitat	*74.6*	*16.3*	*50.0*
% who know about Khao Sip Ha Chan National Park*	–	19.4	–
% who have visited Khao Sip Ha Chan National Park*	–	10.0	–
% who know about the EEC	14.7	1.3	9.5

Note: * These questions were asked only for Chantaburi respondents.

From the 400 respondents, over half (221) said the news was about how wild elephants destroy crops and properties, and even fatally harm humans. Most of the news featured groups of wild elephants crossing the roads, particularly around the Khao Yai National Park (15 respondents). Only few mentioned the other side of the story, i.e., news about wild elephants being killed because of electric fence villagers put up or killed for ivory (10 respondents), and elephants being exploited by humans (4 respondents). Only seven respondents said they came across news about the declining natural habitat and news about encroachment of forests areas, which infringe upon wild elephant habitats.

The Wang Tanod Reservoir Construction: To Continue or to Discontinue?

After listening to the scenarios, the respondents were asked whether the construction of the WTR should still continue. The results show that a number of respondents said that it should still be built. Unexpectedly, a high percentage of Chantaburi respondents cited affirmatively. The expectation is that Chantaburi respondents would not want the WTR since it is Chantaburi that will be affected while the benefits will be channelled to somewhere else (Figure 18).

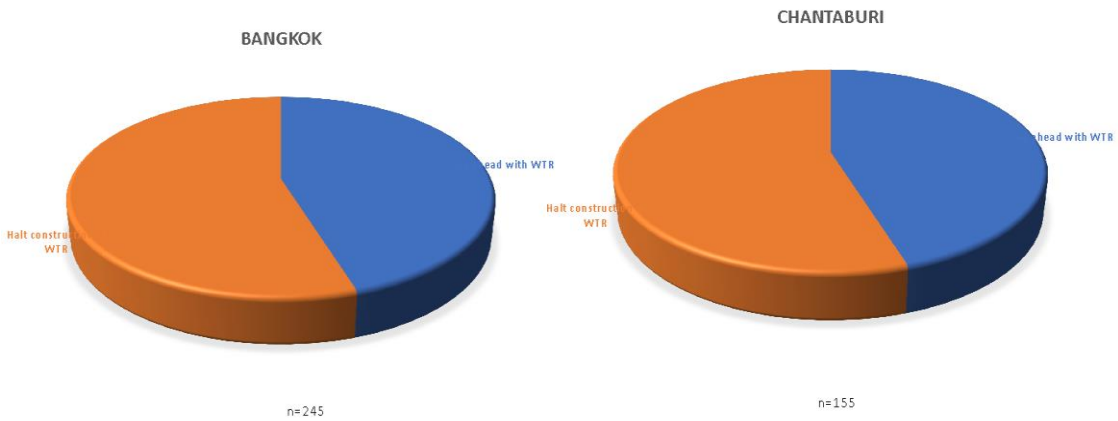

Figure 18. The divided opinion on whether or not the WTR construction should continue

Reasons why the WTR construction should be continued

The respondents' most common reason for wanting to continue with the WTR construction was the water shortage during the dry season (33 respondents). Others cited that the WTR would benefit the farmers (23 respondents). Some believed that the WTR would benefit the local community or even society in general (7 respondents). Such responses reflect that the Chantaburi respondents were not aware that the water would be channelled to Rayong province to meet the water demands of the industry sector.

Among the Bangkok respondents, the most common reason for supporting the investment in WTR was the perception that it would be good for the economy (41

respondents). A number of Bangkok respondents also thought that the WTR would be good for the local community or for the common good. A few thought that having a reservoir would reduce the risk of water shortage during the dry season. Two respondents answered that having the reservoir would be good for both humans and wild elephants.

Reasons why the WTR construction should be discontinued

The Bangkok respondents who thought that the WTR should no longer be built (120 respondents) said that the investment would result in more forest degradation, thereby upsetting the ecological balance. Likewise, they said that these forests are the habitat of wild elephant, and should thus be kept as it is. Other wildlife would also be adversely affected. Some respondents felt that there were more important things to do than building more reservoirs, such as problems related to the COVID-19 pandemic (14 respondents). Others were concerned that this could potentially increase HECs as it would mean that wild elephants will come out and destroy crops (9 respondents). A few (3 respondents) also said that the adverse impacts would outweigh the benefits.

Among the Chantaburi respondents who thought that the WTR should no longer be built, their main reasons were that the construction would destroy wild elephant habitat and would destroy the forests, which would negatively impact the environment (73 respondents). Some said that they were against the idea of building the reservoir because the adverse impacts would outweigh the benefits. It could mean that wild elephant raids will increase. Another reason cited was there was no need to build another reservoir and that the environmental impacts should be re-studied.

Willingness to Pay to Support the FPBF-EFCOM's Wild Elephants and Habitat Conservation

Regardless of the respondents' opinion on the WTR construction, all respondents were asked about their WTP to support the conservation measures to restore the FPBF-EFCOM's wildlife habitat. The overall results show the expected pattern of WTP — it is inversely related to the bid price that the respondents were asked to pay for (Table 7 and Figure 19).

Table 7. WTP to support the FPBF-EFCOM's wild elephant conservation

Unit: % of respondents WTP for each bid

Bid (THB per Month)	Bangkok	Chantaburi	Pooled Sample
10	90%	87%	89%
20	81%	87%	84%
50	10%	6%	8%
70	19%	0%	10%
100	26%	6%	16%

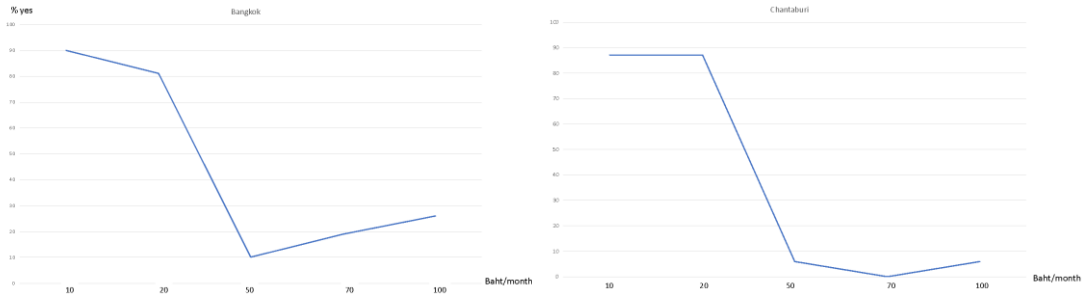

Figure 19. WTP to support the FPBF-EFCOM's wild elephant conservation across bids

Why respondents are willing to pay

The main reason why Bangkok respondents were willing to support the conservation measures was that elephants have always been part of the Thai history and culture (25 per cent). The second reason more or less reflects the bequest value. That is, 12.5 per cent of those willing to pay said that they wanted to help wild elephants if this would help to ensure that there would still be wild elephants in Thailand for the benefit of future generations. The third most common reason reflect some cultural/religious Thai values, rather than any concerns with wild elephants per se. About 11.3 per cent of those willing to pay said the 'contributing is like making merit'

Similar to the Bangkok respondents, 22.7 per cent of the Chantaburi respondents said that they were willing to pay because 'elephants have always been part of the Thai history and culture and so would like to be involved in conservation measure'. However, the same number of respondents said that they were willing to pay either because 'The sum requested is not high and is affordable' or they 'Never knew before that Thailand's wild elephants were endangered'. One of the Chantaburi respondents can be considered as a 'protest voter' or those saying that they were willing to pay when in actual fact, they have no intention to pay. This is the respondent who answered, 'It will be a long time before payment has to be made because now we're still in the pandemic which is a more urgent problem' (Table 8).

Table 8. Reasons why respondents are willing to pay

Unit: % of Respondents Who are Willing to Pay

Reasons Respondents are Willing to Pay	Bangkok		Chantaburi		Total	
	Number	%	Number	%	Number	%
Elephants have always been part of the Thai history and culture; thus, I would like to be involved in the conservation efforts.	20	25.0	15	22.7	35	24.0
The sum requested is not high and is affordable.	7	8.7	15	22.7	22	15.1
I never knew before that Thailand's wild elephants were endangered.	3	3.7	15	22.7	18	12.3
Contributing is like making merit.	9	11.3	4	6.1	13	8.9

Table 8 (continued)

Reasons Respondents are Willing to Pay	Bangkok		Chantaburi		Total	
	Number	%	Number	%	Number	%
I want to help wild elephants if this would help to ensure that there will still be wild elephants in Thailand to benefit future generations.	10	12.5	3	4.6	13	8.9
It should be the responsibility of all Thai people to help protect and conserve natural resources.	4	5.0	3	4.6	7	4.8
Such initiative may lead to other efforts to protect other endangered wildlife.	5	6.3	2	3.0	7	4.8
EFCOM is not only wild elephants' habitat but also other wildlife's.	7	8.8	0	0.0	7	4.8
I want to take part in the solution to address problems related to wild elephants even if it's not a lot of money and even if there may never be an opportunity to see wild elephants.	3	3.7	3	4.6	6	4.1
I don't want investment in the reservoir to destroy wild elephant habitat.	4	5.0	2	3.0	6	4.1
Wild elephants play a role in keeping ecosystem balance.	3	3.7	2	3.0	5	3.4
HEC is an urgent problem that must be solved because local communities are affected and their crops are being damaged.	1	1.3	1	1.5	2	1.4
It will be a long time before payment have to be made because now we're still in the pandemic, which is a more urgent problem.	0	0.0	1	1.5	1	0.7
It is already good enough to know that these measures will help to reduce the problems related to wild elephants and to reduce their risk of extinction.	1	1.3	0	0.0	1	0.7
If this can help to save the wild elephant habitat of EFCOM, then this will also amount to saving the habitat of other wildlife sharing this habitat.	3	3.7	0	0.0	3	2.0

Why respondents are not willing to pay

The main reason why the respondents were not willing to pay was 'It should be the government's responsibility and should not be the responsibility of the people since they have already paid taxes.' This was the most commonly cited reason (77.6 per cent) by the Chantaburi respondents. Among the Bangkok respondents, however, a number of respondents (37.4per cent) said that they could not afford to pay, and that they already had too many other expenses (Table 9).

Table 9. Reasons why respondents are not willing to pay

Unit: % of Respondents Who are not Willing to Pay

Reason	Bangkok		Chantaburi		Total	
	Number	%	Number	%	Number	%
It should be the government's responsibility and should not be the responsibility of the people since they have already paid taxes.	33	44.0	69	77.6	102	62.3
I cannot afford to pay/already too many other expenses	28	37.4	2	2.2	30	18.3
If it's really urgent, then there would have already been budget allocated to solve the problem.	4	5.3	8	9.0	12	7.3
COVID-19 is more important than restoring wild elephant habitats in EFCOM. I would have been willing to pay if it's something related to COVID-19.	2	2.7	6	6.7	8	4.9
I don't believe that conservation of wild elephant habitat in EFCOM could really be done.	3	4.0	1	1.1	4	2.4
I don't believe that the money contributed would really go to the Wild Elephant Habitat Restoration Trust Fund.	1	1.3	3	3.4	4	2.4
I think that whatever happens, the government would go ahead with it.	4	5.3	0	0.0	4	2.4

The majority of both respondent groups had not known about the threats wild elephants were facing prior to listening to the scenarios. Although most respondents believed in the information provided in the CV scenarios, Bangkok respondents appear to be less confident in the outcome of the proposed measures.

When asked why they were uncertain about the measures to restore the FPBF-EFCOM, the most common reasons were related to uncertainties over the management of the Trust Fund and the reliability of the implementing agency (30 respondents). The second group of answers generally reflects uncertainty of the current economic situation and the future in general (19 respondents). Some felt that the measures were unlikely to stop the wild elephants from coming out or that even if some results could be expected, it was unlikely to happen for a long time (22 respondents). Others reasoned that they were uncertain because they either have only heard of such information from this survey or that there was not enough information (14 respondents) (Table 10).

Table 10. Credibility attached to the information provided in the scenario

Unit: Number of respondents

Criteria	Bangkok	Chantaburi	Total
I did not know about the threats faced by wild elephants.	92.0 (59.4)	113.0 (72.9)	205.0 (66.1)
I believe in the scenarios presented.	133.0 (85.8)	152.0 (98.1)	285.0 (91.9)
I am confident that the measures proposed to restore EFCOM would help to reduce the risks that wild elephants face and improve their 'endangered' status.	64.0 (41.3)	150.0 (96.7)	214.0 (69.0)
There are possible ways to increase support for the Conservation Trust Fund.			
I need more information about the threats to wild elephants.	25.3	31.0	28.1
I need more information about the institutions that will be responsible for managing the measures that will be undertaken.	22.8	27.3	25.1
There is a need to ensure that there is transparency and credibility in the way the funds are going to be mobilised and used.	28.6	20.6	24.5
The concerned agencies should provide more information to the public about what they are doing (by using celebrities or well recognised people).	11.6	15.7	13.7
The government should make it convenient to donate money.	11.4	5.4	8.4
Other reasons, e.g., if the economy improves, then there would be more money to donate.	0.3	0.0	0.2
Agencies best suited to take the lead in managing the Conservation Trust Fund			
Department of National Park, Wildlife and Plant Conservation	53.5	50.3	51.9
Local Governments	28.4	44.6	36.5
NGOs working on wildlife conservation	8.4	4.5	6.5
International agencies working with wildlife conservation	5.8	0.6	3.2
No opinion	3.9	0.0	1.9

Factors Influencing Decision Making

To understand the factors that influenced the respondents' decision making, this study used selected variables to run multivariate logit regression. Table 11 lists the factors that could influence the dependent variable (i.e., WTP), with their corresponding description and the values used. The expected coefficient signs in the last column are the expected relationship of each variable to the probability that the respondent might be willing to pay. For the *Bid* variable, for example, the expected coefficient sign is negative; this indicates that the probability that a respondent would be willing to pay is inversely related to the bid price they were asked to pay. The expected coefficient signs for the demographic variables (e.g., *age*, *education*, and *expenditure*) are expected to be positive, assuming that the probability that respondents would be willing to pay would be higher for older respondents, for those who have more years of education, and for those with higher level of income as reflected by the weekly expenditures or reported income. If the respondents were married or came

from larger households however, then the coefficient sign is expected to be negative, assuming that married people and larger families would have higher family related expenses, and thus would unlikely be willing to pay.

Table 11. Variables in the multivariate logit regression analysis

Variables Included	Variable Description	Value	Expected Coefficient Sign
Bid	The value of the bid the respondent was asked to pay	THB 10 per month THB 20 per month THB 50 per month THB 70 per month THB 100 per month	−
Province		Bangkok =1 Chantaburi = 2	?
knowEEC	Whether or not respondents knew about the EEC	1 = yes; 0 if otherwise	?
age	Age of respondent	actual age reported	+
gender	Respondent's gender	1 = male; 0 if otherwise	?
married	Marital status of respondents	1 = married; 0 if otherwise	−
familymembers	Number of people in the household	Number of family members reported	−
education	Educational level of the respondents		+
YestoWTR	Whether they thought the WTR construction should continue	1 = yes 2 = no	−
Believeinmeasures	Whether or not the respondents were confident in the measures that will help solve problems related to wild elephants and habitats	1 = not confident at all 2 = not confident 3 = not so confident 4 = confident 5 = very confident	+
Prioritisedendangered	Whether or not the respondents included the problems of endangered species among the top three problems	Ranking score 1, 2, or 3 if endangered species was prioritised; 0 if otherwise	+
Choseelephant	Whether or not the respondents chose wild elephants among the top three that should be prioritised	Ranking score 1, 2, or 3 if wild elephants were prioritised; 0 if otherwise	+
Expenditure	Weekly expenditure	Reported value THB per week	+
Donate	Whether or not the respondents have donated to help others during the pandemic either in cash or in kind	1= yes; 0 if otherwise	+
att1	All Thai people should contribute some of their income towards managing wild elephant habitats	Scores 1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree	+

Table 11 (continued)

Variables Included	Variable Description	Value	Expected Coefficient Sign
att2	All Thai people should contribute some of their income towards conserving wild elephant for the benefit of future generations.	Scores 1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree	+
att3	Everyone should be involved in supporting wild elephant conservation to reduce the risk of extinction regardless of whether they will have the opportunities to see wild elephants.	Scores 1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree	+
att4	Investment in conservation of wild elephant habitats in EFFOM should be the responsibility of the government and should not involve the general public.	Scores 1= strongly disagree' 2 = disagree 3 = neutral 4 = agree 5 = strongly agree	−
att5	Degradation of wild elephant habitat in EFCOM should be the responsibility of the people in the Eastern Region.	Scores 1 = strongly disagree 2 = disagree 3 = neutral 4 = agree 5 = strongly agree	?

The independent variables (i.e., *Province* and *gender*) have no *a priori* assumptions — whether there is higher probability that Bangkok respondents would be willing to pay than Chantaburi respondents or vice versa. Similarly, no *a priori* assumptions have been made as to whether there would be higher probability for either men or women to be willing to pay.

The multivariate logit regression also includes some profile and attitudinal variables as follows:

- *knowEEC*: For the variable *knowEEC*, there is no *a priori* expectation whether the coefficient would be negative or positive. A person who knows about the EEC could be positive, negative, or neutral to the planned development. This, in turn, would influence their perceptions of conservation of wild elephant habitats in different ways.
- *YestoWTR*: For the variable *YestoWTR*, (whether they thought investment in the WTR should continue), the expected coefficient sign is negative. This is based on the expectation that the probability respondents who think that the WTR construction should be discontinued would be lower.
- *Believeinmeasure:* If respondents believe that the measures proposed could help solve the problems of wild elephants and habitats, if they prioritise problems of

endangered species among the top three, and if they choose wild elephants among the top three wildlife that should receive scarce conservation funds, then the expectation is that the probability that they would be willing to pay would be higher; hence, the expected positive coefficient sign.

- For *att1, att2, and att3*, which are pro-conservation statements, the expected coefficient sign is positive. For *att4,* if the respondent believes that 'Investing in the conservation of wild elephant habitats in EFCOM should be the responsibility of the government and should not involve the public', then the probability that they would be willing to pay would be lower. If this variable is statistically significant, then the coefficient sign is expected to be negative.

The coefficient sign for *att5* could be different for the two respondent groups. If Bangkok respondents agree with the statement, 'Degradation of wild elephant habitat in EFCOM should be the responsibility of the people in the Eastern Region', then there is a higher probability that they would not be willing to pay as compared to those who disagreed with the statement. For Bangkok respondents, the coefficient is therefore expected to be negative. In contrast, if the Chantaburi respondents agree with the statement, then the coefficient sign is expected to be positive.

The results for the three multivariate logit regression models are shown in Table 12 for the pooled sample, which means that it includes both Bangkok and Chantaburi respondents. Table 13 shows the results for the Bangkok respondents, while Table 14 shows those for the Chantaburi respondents.

In the pooled sample, nine variables are statistically significant. *Bid* is significant at 99 per cent level of confidence with the expected coefficient signs. The two statistically significant demographic variables are *expenditure* (at 95 per cent level of confidence) and *education* (at 90 per cent level of confidence). The *expenditure* coefficient signs of both variables conform to *a priori* expectations that the probability that respondents with longer years of education and with higher income (as proxied by the higher weekly expenditures) would be willing to pay were higher. The results also show that there is a higher probability that those who knew about the EEC and those who were confident in the outcome of the proposed measures would be more willing to pay.

The variables *att3, att4*, and *att5* are also statistically significant. The variables a*tt3* and a*tt5* have the expected coefficient signs. Although *att4* is significant at 95 per cent level of confidence, it warrants explanation as to why those who thought that 'Investing in the conservation of wild elephant habitats in FPBF-EFFOM should be the responsibility of the government and should not involve the public' should also have higher probability of being willing to pay.

Table 12. Results of the multivariate logit regression: Pooled sample

Logistic regression — Number of obs = 303.0000
LR chi^2 (19) = 144.7400
Prob > chi^2 = 0.0000
Log likelihood = −112.80531 — Pseudo R^2 = 0.3908

WTPforWTR	Coef.	Std. Err.	z	P > |z|	[95% Conf.	Interval]
Bid	−0.0463275	0.007024	−6.60	0.000	−0.060095	−0.0325190
Province	−0.6700972	0.486614	−1.38	0.168	−1.623843	0.2836486
knowEEC	−0.9864964	0.599850	1.64	0.100	−0.189189	2.1621810
age	0.0100604	0.016414	0.61	0.540	−0.022110	0.4223080
gender	0.3521795	0.353340	1.00	0.319	−0.340354	1.0447130
married	−0.0021705	0.001498	−1.45	0.147	−0.005106	0.0007649
familymembers	0.0085534	0.015018	0.57	0.569	−0.020882	0.0379890
education	0.2614193	0.153752	1.65	0.100	−0.049729	0.5725674
yestoWTR	0.3836742	0.368078	1.04	0.297	−0.337746	1.1050950
believeinmeasures	1.1886890	0.289745	4.10	0.000	0.620799	1.7565790
prioritisedendangered	0.3232749	0.212575	1.52	0.128	−0.093366	0.7399157
choseelephant	−0.1768212	0.214522	−0.82	0.410	−0.597276	0.2436334
expenditureREVISED	0.0005233	0.000277	1.89	0.059	−0.000012	0.0010664
donate	0.8061269	0.424067	1.90	0.057	−0.025029	1.6372820
att1	0.1863799	0.249802	0.75	0.057	−0.303222	0.6759821
att2	−0.0047413	0.298348	−0.02	0.987	−0.589493	0.5800105
att3	1.2744350	0.344425	3.70	0.000	0.599374	1.9494970
att4	0.4971390	0.205185	2.42	0.015	0.094984	0.8992949
att5	−0.5984750	0.214719	−2.79	0.005	−1.019316	−0.1776338
_cons	−9.6160360	2.097703	−4.59	0.000	−13.726130	−5.5059380

Table 13. Results of the multivariate logit regression: Bangkok respondents

Logistic regression — Number of obs = 150.0000
LR chi^2 (19) = 82.3900
Prob > chi^2 = 0.0000
Log likelihood = −54.279993 — Pseudo R^2 = 0.4315

WTPforWTR	Coef.	Std. Err.	z	P > |z|	[95% Conf.	Interval]
Bid	−0.0372523	0.0093802	−3.97	0.000	−0.0556371	−0.0188675
Province	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
knowEEC	1.1483920	0.6677205	1.72	0.085	−0.1603160	2.4571000
age	0.0051332	0.0227831	0.23	0.822	−0.0395208	0.4978720
gender	−0.0868830	0.5721867	−0.15	0.879	−1.2083480	1.0345820
married	−0.0013523	0.0014785	−0.91	0.360	−0.0042502	0.0015456
familymembers	0.0250120	0.1357256	0.19	0.849	−0.2401160	0.2919184
education	0.1906958	0.2308957	0.83	0.409	−0.1618515	0.6432431
yestoWTR	0.4243785	0.5785154	0.73	0.463	−0.7094909	1.5582480
believeinmeasures	1.3410920	0.3645369	3.68	0.000	0.6266127	2.0555710
prioritisedendangered	1.1715740	0.7757666	1.51	0.131	−0.3489003	2.6920490
choseelephant	−0.3751061	0.3142268	−1.19	0.233	−0.9909793	0.2407670
expenditureREVISED	0.0008065	0.0003522	2.29	0.022	0.0001162	0.0014968
donate	1.4908980	0.6219445	2.40	0.017	0.2719088	2.7098860
att1	0.7169046	0.3518113	2.04	0.042	0.2736710	1.4064420
att2	−0.1412361	0.3315041	−0.43	0.670	−0.7909723	0.5085001
att3	1.0620480	0.3953163	2.60	0.009	0.2512424	1.8008540
att4	0.3150070	0.2324750	1.36	0.175	−0.1406353	0.7706496
att5	−0.4822774	0.3176547	−1.52	0.129	−1.1048690	0.1403145
_cons	−11.624460	2.9504900	−3.94	0.000	−17.4073200	−5.8416070

Table 14. Results of the multivariate logit regression: Chantaburi respondents

Logistic regression — Number of obs = 151.0000

		LR chi^2 (19) =	90.8100
		Prob > chi^2 =	0.0000
Log likelihood = −42.892505		Pseudo R^2 =	0.5142

WTPforWTR	Coef.	Std. Err.	z	P > |z|	[95% Conf. Interval]	
Bid	−0.0815191	0.172807	−4.74	0.000	−0.1152474	−0.0477907
Province	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
knowEEC	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)	(omitted)
age	0.0419345	0.0336991	1.24	0.213	−0.0241145	0.1079835
gender	0.7535190	0.6537633	1.26	0.246	−0.5230005	2.0397040
married	−1.2802420	0.8293681	−1.54	0.123	−2.9057740	0.3452894
familymembers	−0.1423406	0.2490771	−0.57	0.568	−0.6305228	0.3458416
education	0.5835969	0.3401627	1.72	0.086	−0.0831098	1.2503040
yestoWTR	0.8762054	0.6479750	1.35	0.176	−0.3938023	2.1462130
believeinmeasures	0.5187932	0.7151722	0.73	0.468	−0.8829185	1.9205050
prioritisedendangered	0.4316990	0.3288288	1.31	0.189	−0.2127936	1.0761920
choseelephant	−0.1450826	0.4051894	−0.36	0.720	−0.9392392	0.6490740
expenditureREVISED	−0.0000400	0.0000525	−0.76	0.446	−0.0001430	0.0000630
donate	0.4945839	0.9546401	0.52	0.604	−1.3764760	2.3656440
att1	−1.0997720	0.6143731	−1.79	0.073	−2.3039220	0.1043768
att2	0.1680400	0.8233106	0.20	0.838	−1.4456190	1.7216990
att3	1.8345400	0.9574002	1.92	0.055	−0.0419300	3.7110100
att4	1.2569090	0.6283065	2.00	0.045	0.0254507	2.4883670
att5	−0.7593416	0.3792823	−2.00	0.045	−1.5027210	−0.0159620
_cons	−6.0892150	4.2511389	−1.43	0.152	−14.4217800	2.2433540

The results of the multivariate logit regression for the Bangkok split sample show that *Bid* is significant at 99 per cent level of confidence with the expected coefficient sign. The only demographic variable that is statistically significant at 95 per cent level of confidence is *expenditure* with the expected positive coefficient sign. The variable *donate* is significant at 99 per cent level of confidence. *KnowEEC* is significant at 90 per cent level of confidence with a positive coefficient sign. The two attitudinal variables *att1* and *att3* are both statistically significant at 95 per cent and 99 per cent levels of confidence, respectively, both with expected positive coefficient signs. Similar to the pooled sample, there was a higher probability that those who were already donating to help with COVID-related causes would be willing to pay. This variable is significant at 95 per cent level of confidence.

The results of the multivariate logit regression for the Chantaburi split sample, meanwhile, show that *Bid* is significant at 99 per cent level of confidence with the expected coefficient sign. The *KnowEEC* variable is omitted because only two Chantaburi respondents said they knew about the EEC. The only demographic variable that is statistically significant at 90 per cent level of confidence is *education* with expected positive coefficient sign. Unlike in the pooled samples and in the Bangkok split sample, the variable *donate* is not statistically significant, implying that whether or not the respondents have donated to COVID-related causes are not a predictor of their decisions to support the conservation measures proposed in the scenario.

Four attitudinal variables are significant. The pro-conservation attitudinal variables *att1* and *att4* both have expected positive coefficient signs. As mentioned earlier, the results that deviate from the expectation that those respondents who believed that the general public should not be involved in the investments to conserve wild elephant habitats in the FPBF-

EFFOM are also the group who have higher probability to be willing to pay. The variable *att5* is statistically significant at 95 per cent level of confidence. The negative coefficient sign for this variable implies that it is those who disagreed that addressing the problems of degradation of wild elephant habitat in the FPBF-EFCOM should be the responsibility of the people in the Eastern Region are among the people who have a higher probability to be willing to pay.

The Non-use Value of Wild Elephants of FPBF-EFCOM: Extrapolation of WTP Benefits

The value of the WTP in the pooled sample (i.e., Bangkok and Chantaburi respondent groups) were calculated using non-parametric method through the responses to the WTP question for the different bids. The WTP is assumed to be the value that each household would be willing to pay while assuming that there would only be one person per household who would be contributing to the Conservation Trust Fund.

The results show that Bangkok respondents are willing to contribute THB 31.61 per household per month or THB 379.35 per household per year (Table 15). On the other hand, the WTP of Chantaburi respondents is THB 21.29 per household per month or THB 255.48 per household per year. Comparing these values with the information in Table 6, where more than 80 per cent of respondents in both groups are willing to pay THB 20 per month, it can then be expected that more than 50 per cent of the respondents would be willing and would be able to afford the amount of THB 31.61 per household per month and THB 21.29 per household per month.

Table 15. WTP (non-use values) of wild elephants in the FPBF-EFCOM

Parameter	Bangkok	Chantaburi
WTP (THB per household per month)[1]	31.61	21.29
WTP (THB per household per year)	379.35	255.48
Number of households[2]	2,912,412.00	98,558.00
Total WTP[3]	1,104,823,492.20	25,179,597.00

Notes: [1] The unit is THB per month per household assumes that there would only be one person per household who would contribute to the Conservation Trust Fund.

[2] Based on the National Statistics Office.

[3] The number of households for Chantaburi refers only to those living in the municipal area of the province.

Multiplying these values with the number of households in Bangkok and in the municipal area of Chantaburi, the non-use value or the value that people will be willing to pay to support the proposed habitat conservation measures amounts to THB 1,104 million and THB 25 million, respectively. These translate to a combined value of THB 1,130 million or approximately USD 34 million.[4] This alternative way of aggregating the non-use value per household assumes that since wild elephants is a 'public good', the relevant population should technically be the households of Thailand and not of specific provinces.

If this principle is applied and if the lower of value of THB 21.29 per household per month is used to multiply with the number of households in the municipal areas of Thailand (i.e., 10,228,716 households) (National Statistics Office, 2020), then the non-use value of wild elephants of Thailand would be THB 2,613.23 million.

The rationale for using the Chantaburi non-use value per household, rather than that in Bangkok, is the assumption that this value would better reflect the non-use value of the 'rest of the country', considering Bangkok residents have a much higher per capita income than the municipal and provincial residents. Thus, it would be more practical and realistic to target groups in the municipal areas since the fund mobilisation will not be limited to the urban population households.

However, given the site-specific nature of this study, there are clear shortcomings in using the value of THB 2,613.23 million as the non-use value of Thailand's wild elephant population. It would then be more technically accurate to conduct similar CVM studies in other wild elephant habitats.

[4] Using exchange rate of THB 33.27 = 1 USD.

Discussion and Policy Implications

This study aims to determine the non-use value of wild elephants and its habitat, with the expectation that the findings could be used to represent the benefits of the ecosystem services of Khao Sip Ha Chan if left undisturbed.

Although several economic values have been included in the revised EIA report of the planned WTR construction, the significance of KSHC-NP as one of the major wild elephant habitats has been overlooked in these reports (Nabangchang, 2021). In particular, the significance of the FPBF-EFCOM as one of the most important habitats of wild elephants was not even mentioned. What was included were the estimated values of the environmental impacts, including the value of soil carbon loss (THB 4.05 million per year), the economic cost of the impact on habitat and feeding ground (THB 5.39 million), and the market value of trees that have to be taken out of the construction area (THB 218.22 million). The value of ecosystems services included the revenue forgone of non-timber forest products amounting to THB 3.28 million, recreational value forgone of THB 0.34 million per year, revenue forgone from carbon sequestration function in the amount of THB 277.91 million, loss of soil nutrient N P K valued at THB 272 million, and block erosion cost of THB 10.74 million (Nabanchang, 2021).

The non-use value was included in the EIA report as part of the ecosystem services lost. Using the benefit transfer method, the revised EIA report estimated this to be THB 0.68 million, which is equivalent to 0.06 per cent of the THB 1,130 million non-use value estimated in this study. Should the decision to invest in the WTR ever be reconsidered, the non-use value estimated in this study should be the one used for recalculating the costs and benefit of the WTR; this would better reflect the benefits forgone. Accordingly, this would increase the WTR project cost estimates and alter the net present value of the original calculation. This would then prompt decision makers to consider other sites for reservoir construction or to find ways to alter the design that would avoid and minimise habitat fragmentation.

Although the validity of the results of this present study is assured owing to the efforts to adhere closely to the recommended protocol of a CVM study, in hindsight, several areas of this study could still be improved as follows:

1. In describing the hypothetical goods, no alternative scenario was given, i.e., one in which investment in the WTR would proceed, but will be accompanied by more realistic remedial measures than that provided in the revised EIA report. Should the economic drivers of the EEC overrule the environmental concerns of the FPBF-EFCOM, then such a scenario would perhaps be the unavoidable option.

2. What was mentioned earlier and must be reiterated here is that in this CVM study, the survey was conducted during the middle of Thailand's third wave of the COVID-19 pandemic. This is far from a 'normal' situation.

   As reflected in the responses, people were concerned about the COVID-19 situation. According to the self-reported income, a large percentage of Bangkok respondents experienced a decline in income, while many felt uncertain about the future. This implies that people might behave differently and decide differently in a post-pandemic situation, all things considered. The non-use values could be higher or lower than what this study found depending on how the 'new normal' would affect the household economic situation.

3. Fund mobilisation, as described in the CV scenarios, assumes that the MWWA and the PWWA would be playing a key role in collecting the water surcharge and in transferring the contributions to the Conservation Trust Fund. If actual fund mobilisation should take place, it would require an inter-agency cooperation among the DNP, MWW, PWW, and the Ministry of Finance. To keep the CV scenarios short and focused on the core issues, these management details were not provided to the respondents of this study.

4. As habitats improve, it can be predicted that the increasing population size of wild elephants would exceed the carrying capacity of the habitat in the medium and long runs. This then would require measures to control the rate of population growth and to relocate or expand the protected areas. Again, the information on what would happen in the medium and long runs were not provided in the CV scenarios presented to the respondents.

Despite the limitations listed above, the results of this study and the information from the field surveys suggest the following possible ways forward:

1. *Conduct similar studies in other sites in Thailand that are also important wild elephant habitats and are facing HECs.* The CV scenarios presented in this study are site-specific; thus, the estimated non-use values are limited to the site and cannot be used as a proxy for the whole of Thailand's non-use values for wild elephants and habitats.

   Given the endangered status of wild elephants and given that there are other sites in other regions with similar HEC problems, it would be worthwhile to conduct follow-up studies in those locations. These follow-up studies could benefit from the design of the current study while improving on the drawbacks discussed above. Moreover, the respondents' decision could depend on their knowing the cost of the proposed measures; thus, this information could be added to the CV scenarios presented to the respondents. The combined non-use values generated from these site-specific studies would better reflect the non-use values of Thailand's wild elephants.

2. *There is a potential to mobilise funds for the implementation of a nationwide wild elephant habitat conservation.* The estimated non-use value of wild elephants and their habitats in this study implies that there is potential to develop fund mobilisation schemes. Contributions from non-users — be they households in Bangkok or beneficiaries of water supply from the FPBF-EFCOM — could be tapped and then transferred to local communities as compensation for them. This could also provide the local

communities with incentives to support elephant habitat conservation. Based on the concerns expressed by the respondents on the trustworthiness of the institutional mechanisms, much work remains to be done to build that trust and to deliver tangible conservation measures that produce concrete outcomes.

3. *It is possible to turn the HEC threat into opportunities for the sustainable livelihood of local communities.* Although the main message of the CV scenarios was on the measures to conserve and restore the FPBF-EFCOM's wild elephant habitat,[5] a part of the funding would be channelled to support the local communities living adjacent to the FPBF-EFCOM and to foster the development of wildlife-viewing tourism-related activities. The non-consumptive nature of this tourism activity makes it more sustainable. As such, this could be a policy direction that could earn the public sector more local support than the current practice of providing compensation for crop damages, which does not reflect the market value of the loss and takes time to process. As Blignaut (2008) pointed out, well-designed wildlife policies could be conducive to both conservation and to the development of economic opportunities through markets.

4. *The cooperation between potential contributors and local communities is contingent upon the presence of 'trust'.* A well-designed wildlife policy may fail to take off due to 'trust issues'. Again, the respondents reflected this concern in terms of the management of the Trust Fund and the possible corruption. All of these are valid concerns that must be addressed.

   The monthly sum of money that the general public would be asked to support is not high. The amount THB 20–30 per month for a period of one year will not mean much of a dent in an individual's economic status. On the other hand, small contributions can amount to significant resources that would allow conservation to be undertaken at a scale that makes a difference.

   Providing a balanced information on the pros and cons of any public investment is important to avoid creating adverse environmental impacts. The general public has limited information about the endangered status of wild elephants. The featured headlines and the information available to the public create a distorted picture of the relationship between humans and wild elephants — one that features the wild elephants as the culprit as they destroy crops and properties and put human lives in harm's way. Improving the public's understanding of wild elephants could reduce this misconception and create interest in the plight of wild elephants. Accordingly, resource mobilisation could be initiated to finance solutions that would benefit both wild elephants and local communities.

   The citizen's opinion on whether the WTR construction should be continued is something that decision makers should consider. Over half of the respondents from both groups opined that the WTR investment should not go ahead. Nonetheless, the percentage of the pro-WTR was not that much lower than that of the anti-WTR. Moreover, the reasons given by the pro-WTR beg the question on how much is actually understood about the benefits of the WTR to the economy in general or to the reduction of water shortage for crop production

[5] Contents of Figure 10.

during the dry season. In contrast, the amount of information that is actually known to the general public about the unavoidable fragmentation of the wild elephant habitats and how their adaptive behaviour could increase the risks of crop and property damages of the local communities is very limited.

When the enumerators provided information to the respondents through the CV scenarios, the aim was to ensure that the respondents were adequately informed to make decisions. That limited information was already sufficient to convince a slight majority to say that they did not want the investment in the WTR to continue. An investment like that in the WTR that might adversely affect the country's public goods, while taking heed to reactions of the 'informed' individuals, would be a less risky course of action even if this would mean revisiting or even reversing prior decisions.

5. *The ACB could offer a follow up and meaningful forward step.* Related to the above, as a first step in communicating the findings of this study, the ACB could organise a workshop that would bring key stakeholders together. Apart from the DNP, the Royal Irrigation Department, the East Water Resources Development and Management Public Company Limited, — a major buyer and distributor of water in the EEC — the EEC Committee, the provincial governors of Chantaburi and Rayong, the MWWA, and the PWWA should participate in this activity. Such workshop would provide timely and targeted access to key agencies. It would also provide a forum to discuss joint ways forward that would avoid the adverse effects on the environment while achieving the economic goals of the EEC.

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ASEAN Centre for Biodiversity
D. M. Lantican Avenue, Los Baños
Laguna, Philippines 4031
Telephone Numbers: +6349 536-2865, +632 584-4210
cpa@aseanbiodiversity.org
www.aseanbiodiversity.org

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