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# Capturing Urban Households' Benefits for Preserving Natural and Cultural Resources in a Neighboring Rural Area: A CVM Approach

BY

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# **Capturing Urban Households' Benefits for Preserving Natural and Cultural Resources in a Neighboring Rural Area: A CVM Approach\***

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## **Abstract**

Koronadal households benefit from Lake Sebu's natural and cultural resources in terms of recreation, tourism income generation, supply of high quality tilapia, agricultural products supply, potential hydroelectric power source, cultural heritage, biodiversity, and climate change mitigation. These benefits encompass both use and non-use values which are integrated in a single estimate using the contingent valuation method. In the study, Koronadal households are asked for their willingness to pay (WTP) or contribute to natural and cultural resources rehabilitation and preservation efforts in the form of a lump-sum monthly amount collected together with their electricity bill payment. Household's mean WTP is estimated to be between PhP52.42 (US\$1.04) and PhP64.39 (US\$1.27) per month. Multiplying the annualized WTP by the number of households in Koronadal, total potential annual contributions from Koronadal City would range from PhP29,244,533 (US\$577,841) to PhP35,863,170 (US\$708,618). Even just a fraction of this potential collection can support essential conservation efforts in Lake Sebu which up to the present have been inadequate due to financial constraints. Moreover, results of the regression analysis reveals that households are more likely to support the preservation program if the amount of required contribution is smaller and household income is higher. Older and more educated respondents are likewise more likely to support the program.

Key words: benefit valuation, contingent valuation method, cultural heritage, natural environment, willingness to pay

JEL Codes: Q26, Q51, Q56

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## INTRODUCTION

The Municipality of Lake Sebu in the Province of South Cotabato, Philippines is endowed with abundant natural resources, including lakes (Lake Sebu being the biggest), waterfalls, rivers, springs and wells, and caves. These offer various captivating sights and exciting adventures like zip-lining, spelunking, mountain trekking, lake and river cruising, and bird watching for both residents and visitors. The municipality has the rich cultural heritage of the *T'boli* indigenous tribe – its handicrafts that include *T'nalak* weaving, brass casting, beadwork, and wood carving; music and dances; festivals (*Helobung* Festival, *Lemlunay* Festival); and beliefs and traditions (sacred grounds, burial grounds, ancestral homes, etc.). Its expansive fresh water bodies are areas for lucrative fish farming operations that produce good-tasting tilapia, attracting visitors for dining and special celebrations and satisfying protein requirements of neighboring cities and municipalities. About a third of its land area is used for rice, corn and other crops, fruits and vegetable farms (a couple of which are organic), and mostly native-breed livestock and poultry raising. Further, much of South Cotabato's remaining forest is confined in Lake Sebu with its Dipterocarp forests dominating its hills and mountains and covering about two-thirds of its land area (LSMPDO 2016).

The rich natural and cultural environment in Lake Sebu provides economic, historical, cultural, social, and environmental services not only to its residents but also to the inhabitants of the surrounding cities and municipalities, such as Koronadal, the capital city of the province of South Cotabato and the regional center of Region XII or Southern Mindanao. There is a multitude of benefits that Koronadal residents derive from the natural resources and culture of Lake Sebu. One, Lake Sebu is a sight-seeing and vacation destination for many Koronadal residents during holidays, especially during the summer season. Its cool weather makes it the summer capital in Southern Mindanao. Lake Sebu is also fast becoming to be the prime eco-tourism destination in southern Philippines for foreigners and for Filipinos from other regions of the country. All tourists go to Lake Sebu via Koronadal. Hence, tourism in Lake Sebu also brings tourism income to Koronadal. Two, the municipality supplies Koronadal residents high quality tilapia. Lake Sebu and Lake Seloton are the two lakes in the municipality that are utilized for productive and profitable tilapia farming operations while Lake Lahit is devoted to open fishing. Three, Lake Sebu provides agricultural products, such as corn, cacao, coffee, root crops, fruits and vegetables to Koronadal. There are a number of organic farms in Lake Sebu providing healthy food options to Koronadal residents. Four, the culture and traditions of the indigenous *T'boli* tribe in Lake Sebu (accounting for the majority 55% of the municipality's population) provide an important cultural heritage for Koronadal and the whole of South Cotabato and the Philippines. Five, the waterfalls in Lake Sebu are potential sources of hyroelectric power for Southern Mindanao. Finally, the vast forest in Lake Sebu is home to a variety of flora and fauna and serves as a wildlife sanctuary for many rare, threatened and endangered specie -19 species of birds (including the Philippine eagle, Philippine Hawk eagle and Mindanao Lori keel), 17 species of mammals (Tarsier, Philippine lemur, Philippine brown deer) and 3 species of reptiles

(water monitor lizard, python and crocodile) (LSMPDO 2016). Its forests also sequester and store enormous amounts of carbon, thus contributing to global warming mitigation.

This study aims to estimate the value of the total flow of benefits that Koronadal residents derive from the natural resources and cultural heritage of Lake Sebu using the Contingent Valuation Method (CVM). CVM is used extensively in environmental and cultural resource valuation as it integrates in a single estimate the different components of the resource's total economic value (TEV), namely, direct benefits from the use of the resource, indirect use values (benefits from secondary goods and services provided by the resource including non-consumptive uses), option value (future direct and indirect uses), existence value (non-use value), and bequest value (value of the resource for future generations).

Over the past few decades, policy-makers have been increasingly inclined towards the integrated resource management (IRM) approach as they recognize that competing uses and various benefits from resources as well as responsibilities to preserve resources cut across political boundaries. In the case of Lake Sebu, benefits from its natural and cultural resources are not confined to its own people and hence, preservation costs that also include opportunity costs of residents for forgoing destructive livelihood activities (such as overcrowding fish cages, overfeeding of fish, destructive farming activities such as slash and burn (*kaingin*), excessive use of fertilizers, poaching, illegal cutting of trees, land reclamation near the lakes, etc.) must be shared by those outside the municipality.

The estimate of the benefits that Koronadal residents gain from Lake Sebu's natural and cultural resources provides a basis for the amount of contribution that the neighboring urban city of Koronadal has to allocate for the preservation of the resources of the largely rural municipality of Lake Sebu. A systematic procedure in coming up with the estimate is a necessary first step for a successful collaboration among stakeholders, an important element in the IRM approach (Carlson & Stelfox 2009).

Apart from this public policy objective, this paper aims to contribute to the still scant, albeit growing, literature on total economic valuation of natural and cultural resources using the contingent valuation method in developing countries. The study looks at the WTP for both the natural ecosystem and cultural heritage that can be found in Lake Sebu. So far, most existing studies deal on either just natural resources (see, for instance, Subade 2007 and Palanca-Tan *et al.* 2018) or just cultural heritage (Tran & Navrud 2008; Sanyakamdhorn & Seenprachawong 2018). Further, in the case of cultural heritage valuation studies, there is a need for studies on non-built cultural heritage (Wright & Eppink 2016), which is the case in Lake Sebu where cultural heritage is not in the forms of temples, monuments, etc., but in the non-built art of weaving, language, songs and dances, and traditions.

## METHODOLOGY

### **Study Sites: Koronadal and Lake Sebu**

South Cotabato, a province in southern Philippines, is made up of one city – Koronadal (also known for its old name Marbel) and 10 municipalities, one of which is Lake Sebu. Koronadal, which is largely urban, is the provincial capital of South Cotabato and the regional center of South-Central Mindanao (or Region XII). Lake Sebu, on the other hand, is the largely rural and elevated municipality comprising the few hills and mountains of the generally flat province of South Cotabato. Koronadal and Lake Sebu are approximately 40 km away from each other separated by the municipalities of Banga and Surallah. While Koronadal's land area of 277 km<sup>2</sup> occupies only 7% of the total land area of South Cotabato, Lake Sebu's 702 km<sup>2</sup> occupies 18%. Nonetheless, Koronadal's population is double that of Lake Sebu, and its population density more than five times of Lake Sebu. In recent years, due to its growing tilapia aquaculture industry and as it emerges to be a prime eco-tourism destination in southern Philippines, Lake Sebu's population has been growing at a higher rate than Koronadal as well as the whole province of South Cotabato due to migration. A substantial 59% of Lake Sebu's area is still covered by forest, agriculture use accounts for a third, and built-up area (residential, commercial, industrial, infrastructure, etc.) is merely 1%. In Koronadal, on the other hand, agricultural land covers 49%, forest covers 29%, and there is a substantial built-up area of 17%. Poverty index in Lake Sebu in 2015 was 64%, compared to only 22% in Koronadal.

Table 1 Comparative profile of Koronadal City and Lake Sebu Municipality

	Koronadal	Lake Sebu
Land area (km <sup>2</sup> )	277	702
Population (2015)	174,942	87,442
Population density (2015, per km <sup>2</sup> )	630	120
Annual population growth rate (2010-2015)	1.92%	2.66%
Proportion of urban population	50.38%	9.12%
Land use (in proportion to total land area)		
Forest	28.50%	58.92%
Agricultural	49.37%	33.26%
Built-up	17.48%	1.31%
All other uses	4.65%	6.51%
Poverty Index	22.41%	64.00%

Source of data: PSA 2015 Census of Population for population data; LSMPDO 2015 for Lake Sebu land use data; and KCPDO 2013 for Koronadal land use data.

## **Contingent Valuation Method**

The concept of willingness to pay (WTP) in economics is a measure of the benefits that an individual perceives to derive from a good. WTP is the price that the individual pays for the good if the good is traded in a market. In the case of goods that have no markets, such as environmental amenities, ecosystems, cultural heritage, public goods and programs, non-market valuation techniques are utilized. One of these techniques is Contingent Valuation Method (CVM), a survey-based approach that is now used increasingly in both developed and developing countries to incorporate values of non-marketed services and amenities in public policy and program assessments (please see Carson 2011 for a history and comprehensive bibliography of CVM studies).

In a CVM survey, respondents are asked to state their WTP for a good, service or public program. The stated WTP is the monetary estimate of all the benefits - tangible and intangible, present and future use and non-use values - that are derived from the good, service or public program. The WTP question can be in the form of an open-ended question (How much are you willing to pay?) or a dichotomous-choice (DC) question (Are you willing to pay XXX pesos/dollars?). The open-ended format has been progressively abandoned by CVM researchers due to large non-response rates and generally unreliable responses (Mitchell & Carson 1989). The DC format, on the other hand, simplifies the cognitive task of respondents as market transactions in which they participate in daily life usually involve deciding whether or not to buy goods at given prices, rather than stating WTP (Bateman *et al.* 2002). Hence, the DC format was used for this study.

## **Survey Instrument and Implementation**

The instrument used for the CVM survey was finalized after a series of key informant interviews (KII), focus group discussions (FGD) and pre-tests. KIIs were conducted with local government officials and sector leaders of both Lake Sebu and Koronadal to obtain background information on the conditions of the ecosystem and cultural heritage in Lake Sebu and their importance to the people in Koronadal. An FGD with representative segments of the target population of respondents – the households in Koronadal – was conducted to test the first draft of the questionnaire, determine the relevant range of questions and categorical answers on the socio-economic status, awareness and attitudes of target respondents and to obtain additional inputs for the formulation of the valuation scenario. Several rounds of pre-tests were conducted to determine bid levels.

The 10-page questionnaire consisted of four parts. Part A included a brief introduction on the purpose of the survey as well as basic information questions about the respondent and household members. Part B asked questions to gauge respondents' exposure to Lake Sebu – its natural resources, cultural heritage, fishing, farming and other economic activities. It also asked awareness and attitudinal questions on the preservation of the ecosystem and culture of Lake

Sebu. Part C contained the CVM scenario and the WTP question together with follow-up questions to the “Yes” and “No” responses to the WTP question. Finally, Part D asked socioeconomic questions about the respondents and their households. These questions were asked last to ensure that respondents’ interest did not fade early on in the survey. All questions were provided with answers or ranges of values (except for age) from which respondents could choose to make the task manageable for the respondents and the responses to all questions quantifiable. Respondents were informed at the start of the interview that the survey would take about 30-45 minutes.

The valuation scenario started with giving the respondent information about the natural and cultural resources of Lake Sebu, and the benefits these resources can offer to Koronadal residents. This was followed by a brief discussion on the threats of depletion and degradation of these resources and the need for a preservation program.

For reasons stated earlier, the DC format was used for the WTP question of this study. After several rounds of bid pre-tests, the following seven bids were used for the survey: PhP10, 20, 50, 70, 100, 200 and 300. As a common approach for public policy and program assessments, the WTP question was framed within the context of a referendum. Each respondent was asked if they would vote for the Lake Sebu natural cultural resources preservation program and be willing to pay a fixed monthly amount as his/her household’s contribution to the program. The amount will be collected together with the household’s monthly electricity bill. The respondents were told that if majority of the households would vote in favor of the program, then all, including those who did not vote for the program would be made to pay for the program.

A short “cheap talk” script reminding respondents to consider their budget constraints and to answer in accordance with what they would really do if the referendum were actually to take place was inserted in the WTP question. The WTP question was followed by two sets of debriefing questions. One set, addressed to “Yes” respondents, consisted of two items: (1) the three most important reasons for the “Yes” answer, and (2) the degree of certainty of the “Yes” answer. “No” respondents, on the other hand, were first asked if they would be willing to pay any amount (smaller than the bid) for the Lake Sebu preservation program. A “No” response to this question was followed by a question as to the reasons why they would not be willing to contribution any amount at all.

A total sample of 524 respondents was generated for this study. All 27 barangays of Koronodal were included in the sampling frame. The number of respondents in each barangay was set in proportion to the share of the barangay in the total city population. Systematic sampling procedure was employed in selecting the respondents in each barangay. The seven bid levels were randomly assigned to respondents in all survey sites.

The survey was conducted through personal interviews with the household head or the member making expenditure decisions in the family during the month of Nov 2019. Enumerators

were given a two-day training course prior to the pre-tests following the guidelines in Whittington (1996, 2002). The first day of training gave an overview of the objectives of the study, resource valuation and the contingent valuation approach. On the second day, enumerators were trained on the survey instrument, with the meaning and the reasons for each question and statement in the questionnaire discussed. The training included role-playing exercises.

## Data Analysis

The yes-no response to the dichotomous choice CVM question was analyzed using the framework developed by Hanemann (1984) based on the random utility model. Indirect utility,  $u$ , depends on  $h$  (which takes on the value 1 if the respondent is voting for the Lake Sebu natural resources and cultural heritage preservation program, 0 if otherwise), household income  $y$ , a vector of respondent and his/her household's characteristics  $\mathbf{m}$ , and a component of preferences that are known only to the respondent and not to the researcher  $\varepsilon_h$ . This utility function is specified as additively separable in deterministic ( $v$ ) and stochastic preferences ( $\varepsilon$ ):

$$u(h, y, \mathbf{m}, \varepsilon_h) = v(h, y, \mathbf{m}) + \varepsilon_h \quad (1)$$

As the random part of preference is unknown, only probability statements about yes and no responses can be made. The probability that a bid price  $B$  for the preservation program is accepted can be expressed as:

$$\begin{aligned} Pr(\text{yes}) &= Pr [v(1, y-B, \mathbf{m}) + \varepsilon_1 \geq v(0, y, \mathbf{m}) + \varepsilon_0] \\ &= Pr [v(1, y-B, \mathbf{m}) - v(0, y, \mathbf{m}) \geq \varepsilon_0 - \varepsilon_1] \\ &= F_\varepsilon(\Delta v) \end{aligned} \quad (2)$$

$F_\varepsilon(\Delta v)$ , the probability that the random variable  $\varepsilon$  will be less than  $\Delta v$ , represents the cumulative density function of the respondent's true maximum willingness to pay.

The stochastic terms  $\varepsilon$  are assumed to be independently and identically distributed following a normal distribution with mean of 0 and standard deviation of  $\sigma$ , and the indirect utility function is specified to be a linear function such that the probit regression procedure can be used to evaluate (2). The parameter estimates from the binary probit model are used to calculate mean willingness to pay  $E(B)$  with the formula:

$$E(B) = -(\beta/\sigma)\mathbf{X}/(\beta_B/\sigma) = -\beta\mathbf{X}/\beta_B \quad (3)$$

$\beta$  is a vector of estimated coefficients of all explanatory variables except bid price (vector  $\mathbf{X}$ ) and  $\beta_B$  is the estimate for the bid price coefficient.

Non-parametric mean willingness to pay for the preservation program is calculated using the lower bound Turnbull formula (Haab and McConnell 2002):

$$E_{LB}(B) = \sum_{j=0}^M B_j (F_{j+1} - F_j) \quad (4)$$

$M$  is the number of bids,  $B_j$  is the bid level,  $F_j$  is the proportion of no responses to bid price  $B_j$ ,  $F_0=0$  and  $F_{M+1}=1$ .

## RESULTS AND DISCUSSION

### **Socio-economic Profile of Household Respondents**

Table 2 gives a summary profile of the respondents and their households. Majority (57%) of the respondents in the survey are the spouse of the household head, and accordingly, just a little over a fourth (26%) are male. The average respondent is 44 years old and has lived in Koronadal for 32 years. About 13% of respondents had gone up to elementary school, 50% up to high school, 5% up to vocational school, and 31% up to college level. Only very few had no formal education or had pursued graduate studies. More than half (54%) are working and/or running a business. The substantial majority (68%) belong to the Hiligaynon-Ilonggo group, the dominant migrant group in the province.

The average household has five members. Average monthly household income is PhP19,444 (US\$384.20), and monthly electricity bill is PhP 1,067 (US\$ 21.09). Most (85%) of the respondent households own the house where they live. Almost 15% of respondent households are members of cooperatives, nearly three-fourths (72%) of which are in credit cooperatives. Only women's organizations, church organizations and senior citizens' associations (the 'other' category is mostly senior citizens' groups) are fairly common in the city. Very few or none of the households have members in environment, indigenous people, culture and labor groups.

Table 2 Respondent and household characteristics

	Mean
Household role (proportion of respondents, %)	100.00
Head	29.96
Spouse of head	57.25
Others	12.79
Age (number of years)	43.99
Gender - male (proportion of respondents, %)	25.95
Education (proportion of respondents, %)	100.00
No formal education	0.19
Elementary	13.19
High School	50.10
Vocational	5.16
College	31.17
Graduate	0.19
Work (proportion of respondents, %)	100.00
Not working	45.61
Worker (daily wage)	5.92
Employee (monthly salary)	12.79
Own business	35.11
Employee and own business	0.57
Ethno-linguistic group (proportion of respondents, %)	100.00
Hiligaynon/Ilonggo	69.47
Ilocano	11.45
Cebuano	8.02
Bisaya/Binisaya	3.63
B'laan	2.48
Tagalog	1.53
Maguindanao	0.95
T'boli	0.57
Others	1.90
Number of years in Koronadal (number of years)	31.83
Household size (number of household members)	5.04
Monthly household income (PhP/US\$)	19,444.55/384.20
Monthly electricity bill (PhP/US\$)	1,067.39/21.09
Housing (proportion of respondents, %)	100.00
Own	85.47
Renting	7.84

Living with relatives	6.31
Provided by employer	0.38
<hr/>	
Membership in organizations (proportion of respondents, %)	
Cooperative, of which	14.48
Credit cooperative	72.37
Agricultural cooperative (including irrigation cooperatives)	11.84
Other types of cooperatives	15.79
Environment-related groups	0.38
Indigenous people protection-related groups	2.10
Culture-related groups	0.00
Women's organizations	21.33
Church-related organizations	14.48
Labor-related	0.57
Other organizations (senior citizen associations)	10.10

Note: Exchange rate used: US\$1=PhP50.61 (Dec 2019)

## Respondents' Awareness and Attitudes about Lake Sebu's Natural and Cultural Resources

Table 3 presents answers to survey questions that can be indicative of the degree of familiarity of Koronadal households with Lake Sebu. Majority of respondents have visited Lake Sebu, most of whom for dining and enjoying the sights in the Seven Falls. Almost half brought home souvenir items. About a third of respondents have friends in Lake Sebu, about a fifth have relatives, and a mere 1% have work or business in or related to Lake Sebu. A substantial 28% have firm preference for tilapia grown in Lake Sebu, while a much less proportion (11%) own an item made of *T'nalak*.

Table 3 Lake Sebu knowledge and exposure

Respondents which	Proportion (%)
Have visited Lake Sebu for leisure	53.44
Done the following activities (proportion of those who have visited)	
Visited Seven Falls	65.83
Ziplining	18.35
Dining	80.22
Lake cruising	27.70
Fishing	13.36
Bought souvenir items	47.12
With work/business in Lake Sebu	1.34
Has relatives in Lake Sebu	18.70
Has friends in Lake Sebu	31.11
Owens something made of t'nalak	11.45
Only buys and eats tilapia grown in Lake Sebu	28.05

Respondents were asked to agree or disagree using a scale of -2 (strongly disagree) to 2 (strongly agree) with each of the ten statements in Table 4 to gauge their perception and opinions about the benefits that they can derive from the natural and cultural resources of Lake Sebu and the need to preserve them. A positive average score implies that on the average, the respondents agree with the statement. The nearer is the score to 2, the stronger the respondents agree with the statement. Statements (b) to (f) pertain to the likely impact of the conditions of the natural resources and cultural heritage of Lake Sebu on Koronadal residents. Statement (e) on the need to teach *T'boli* history and culture in South Cotabato and Mindanao high schools gets the highest approval rating, reflecting the importance accorded by Koronadal residents to *T'boli* heritage in their region. Respondents also appear to recognize the contribution of Lake Sebu to tourism activities and revenues in Koronadal (statement (b)'s 0.96 score). Statements (c) and (d) have scores very close to 0, which reflects that respondents are somehow knowledgeable about the impreciseness of the two statements. Koronadal is not part of the Allah Valley Watershed (to which Lake Sebu belongs), and thus, the water supply situation in Koronadal is not directly affected by the conditions of the forest in Lake Sebu. It is also noteworthy that Koronadal residents are aware that the natural resources of Lake Sebu have a consequence on them. Statement (a) requires some detailed knowledge of what is happening with regard to tilapia farming in Lake Sebu lakes, and hence, a score of 0.61 is fairly reasonable. The last four statements relate with how the Lake Sebu resource conservation program can be financed. It appears that respondents feel that the responsibility of preserving natural and cultural resources of Lake Sebu lies in the broader community of South Cotabato (statement (h) and even the whole Philippines (j). The scores for statements (g) and (i), which are close to 1, reflect some belief among residents that Koronadal also has to contribute to the program.

Table 4 Opinion and attitudes concerning Lake Sebu natural and cultural resources, benefits and preservation

Statement	Score*
a) Too many fish cages in Lake Sebu is causing pollution in the lake.	0.61
b) When tourism in Lake Sebu is booming, tourism in Marbel is also booming.	0.96
c) If forest area in Lake Sebu gets smaller, the quantity and quality of water supply in Marbel will be affected.	0.28
d) The condition of the natural resources in Lake Sebu does not have anything to do with my family.	0.20
e) The history and culture of the T'boli must be part of the curriculum in South Cotobato and Mindanao high schools.	1.40
f) Deforestation in Lake Sebu can cause flooding in Marbel.	0.63
g) The government of Marbel must allocate part of its tax collections for the preservation of T'boli culture.	0.86
h) It is the provincial government of South Cotobato, not the city government of Koronadal, which is responsible for the protection of the natural resources (water falls, forest, lake, etc) in Lake Sebu	1.26
i) I am willing to donate money for the preservation of T'boli culture.	0.82
j) All Filipinos must contribute to the preservation of T'boli culture.	1.06

\* Score is computed by assigning the values: -2 Strongly disagree, -1 Somewhat disagree, 1 Somewhat agree, 2 Strongly agree, and 0 neutral or don't know.

## Willingness to Pay

A total of 210 out of 524 respondents indicated they would vote for the preservation program and be willing to pay the specified monetary amount (Bid) as a monthly contribution<sup>1</sup>. All except for six of these “Yes” respondents (1%) indicated they are sure of their answer. The proportion of “Yes” answers by bid is shown in Figure 1. It appears that the bid levels - PhP10 and PhP20 - are considered by respondents as fairly equivalent in terms of a monthly financial burden. The same can be said of the bid levels PhP50, PhP70 and PhP100. Nonetheless, it is evident that the proportion of respondents who are willing to pay for the Lake Sebu resources preservation program tends to be smaller if the bid is significantly higher. Respondents have varying reasons for being willing to contribute to the conservation program. Over-all, the top three reasons are its recreational value, maintenance of good air and water quality in Koronadal, and climate change mitigation. These reasons can be interpreted as the main benefits that respondents perceive to derive from Lake Sebu’s natural and cultural resources. Using the Turnbull formula, the non-parametric mean monthly WTP is calculated to be PhP64.39 (US\$1.27).

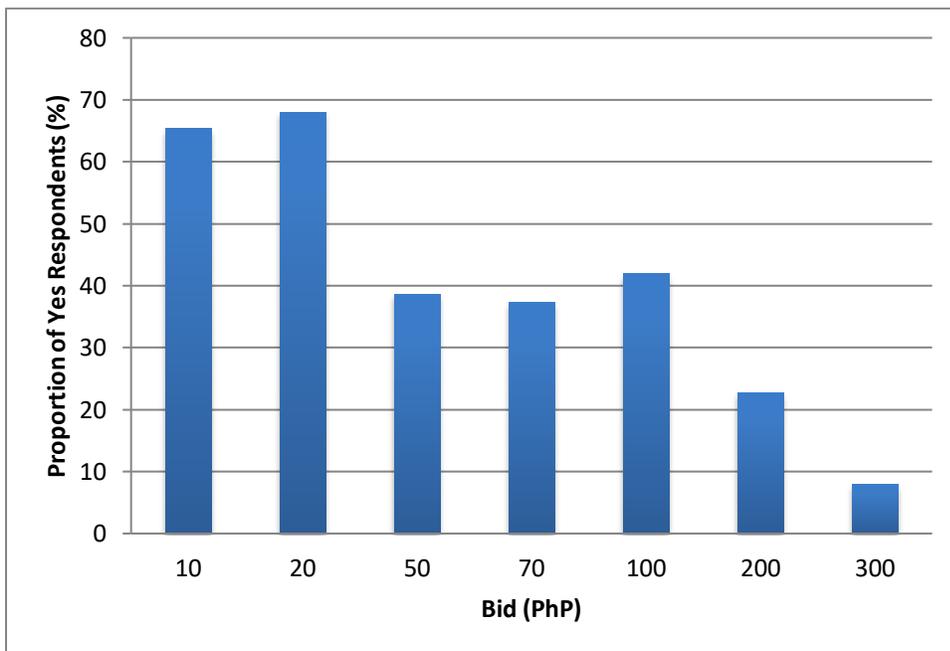


Figure 1. Bid Function

<sup>1</sup> Of the 314 who answered “no” to the WTP question, 115 indicated they would be WTP a lower amount while 199 indicated they are not WTP any amount at all because they can not afford to pay (30%), they have other more important and urgent financial concerns (43%), they believe they are not responsible for Lake Sebu natural and cultural resources preservation (22%), and they don’t care about Lake Sebu (2%).

Table 5 presents the results of the binary probit regression conducted to identify the factors that influence respondent's WTP. The sign of the coefficient of each explanatory variable indicates only the direction (not the magnitude) of the impact of the variable on the likelihood of the respondent voting for and being willing to pay for the preservation program. The significant negative coefficient of the variable Bid implies that respondents are more likely to vote for the preservation program if the contribution that they will have to make is lower. The significant positive coefficient of Household Income, on the other hand, means that respondents with higher monthly incomes are more likely to be WTP. These outcomes are consistent with the economic theory of demand. The regression results further reveal that older and more educated respondents are more likely to vote and be willing to contribute for the preservation program. Gender does not turn out to be a significant factor. Answer to Statement (i) – I am willing to donate money for the preservation of T'boli culture - is significantly positive, which adds credence to the WTP response. No other variable, including exposure to and knowledge of Lake Sebu as well as membership in environment and culture-related organizations, is found to have a statistically significant influence on WTP.

The parametric mean WTP using the results of the basic model where only Bid and Household Income are used as explanatory variables is calculated to be PhP52.42 (US\$1.04).

Table 5 Binary probit regression results

Explanatory variables	Base model	Full model
Bid	-0.0057***	-0.0062***
Household Income	8.69e-06***	7.38e-06**
Age		-0.0125**
Gender		0.0388
Education		0.1424**
Has visited Lake Sebu		0.0925
Has business or work in Lake Sebu		0.6308
Has relative/s in Lake Sebu		0.1828
Has friend/s in Lake Sebu		0.2032
Statement b		-0.0127
Statement d		-0.0337
Statement e		0.0935
Statement f		-0.0243
Statement g		0.0347
Statement h		0.0465
Statement i		0.1943***
Statement j		0.0520
Member in Indigenous People Group		-0.4062
Member in Environment Organization		-0.2054
Constant	0.1298	-0.1837
LR chi2	85.90	134.62
Log likelihood	-309.36	-284.09

## CONCLUDING REMARKS

Using CVM, mean WTP of Koronadal households for the preservation of the Lake Sebu natural and cultural resources is estimated to range between PhP52.42 (US\$1.04) and PhP64.39 (US\$1.27) per month or PhP630.08-772.68 (US\$12.45-15.27) per year. Multiplying the annualized WTP by the total number of households in Koronadal of 46,414 (based on 2019 *barangay* data), total potential annual contributions from Koronadal City would range from PhP29,244,533 (US\$577,841) to PhP35,863,170 (US\$708,618). Even just a small fraction of this potential collection can support essential conservation efforts in Lake Sebu. Currently, conservation efforts are minimal in Lake Sebu. For the lakes where tilapia aquaculture is undertaken, on-going activities include regular clearing and removal of water hyacinth, occasional seminars on proper feeding methods, and activities to promote sustainable and organic farming. Slash and burn or *kaingin* farming leads to soil erosion (in view of the sloping farm lands) and increasing deposits of sediments in the lakes, and the consequent reduction in water depth and water surface area of the lakes. Efforts to discourage, monitor and police this destructive farming method appears to be inadequate and ineffective. Further, limiting the fish cage/aquaculture areas to the mandated maximum 10% of total lake surface area has been strictly enforced and complied with only recently after the massive fish kills that occurred in 2017 and 2018. In the case of cultural resources, projects are mainly done for tourism purposes, such as the showcasing of the arts and culture of the indigenous *T'boli* as part of its tourism attractions. There is no on-going activity at all towards preservation. In *T'nalak* weaving, for instance, the designs conceived and passed on by Lang Dulay, a National Living Treasures awardee for her *T'nalak* designs, to her followers are slowly being forgotten and are not passed on to the younger generations. The same can be said of the *T'boli* language, music and arts. The younger generations are becoming less and less familiar with their indigenous culture and history. For both natural and cultural resources, there is yet no comprehensive preservation and management plan. And the major constraint in this endeavor is the lack of financial resources (LSMPDO 2016).

The WTP amount estimated in this study, may or may not be actually collected from Koronadal residents. If collected, it will be in line with the Payment for Ecosystem Services (PES), a scheme where people deriving benefits (Koronadal residents) from an ecosystem (Lake Sebu natural and cultural resources) contribute financial resources to reward local (Lake Sebu residents) initiatives to forego resource-destructive income generating activities and to undertake projects to restore and preserve the ecosystem so as to ensure the continuing flow of services (Greiber 2009). Alternatively, the contribution may be sourced from Koronadal's local government coffers. In this way, Koronadal residents are indirectly making the contributions through their tax payments and shares in the city's revenues and internal revenue allocations from the national government.

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