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### Economic valuation of ecotourism resources as a conservation tool for the Makiling Botanic Gardens

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#### Abstract

The Makiling Botanic Gardens (MBG) is one of the ecotourism points of interest in the Mount Makiling Forest Reserve ASEAN Heritage Park (MMFR AHP) and the nearest mountain ecosystem to Metropolitan Manila, Philippines. The MBG serves as a living collection and sanctuary of endemic and endangered plant species in the Philippines and promotes public awareness and appreciation of biodiversity through conservation education. The MMFR's recognition as AHP in 2013 has received support and assistance from different agencies to further develop its ecotourism potential. However, developments are anticipated to be at the expense of low-priced ecotourism services. The study aimed to estimate the willingness to pay of MBG visitors for its enhanced conservation using the contingent valuation method. The contingent valuation survey was administered through face-to-face interviews. Results show that out of 253 respondents, 79% expressed willingness to pay (WTP) for the enhanced conservation of MBG. The elicited mean WTP is PhP 73.79 (\$1.46) on top of the current entrance fee of PhP 50.00 (\$1)/visit. The significant factors affecting visitors' WTP were bid amount, income, and education. Given the elicited mean WTP added to the current entrance fee and the average number of visitors of MBG (41,281) annually, the potential revenue of MBG if the WTP will be captured is about PhP 6.3 million (\$124,758). Results of the study can serve as a reference in adjusting the entrance fee of the MBG to support the full implementation of MMFR's management plan in the context of an ASEAN Heritage Park.

Keywords: Protected area, Ecosystem services, Sustainable financing, Resource use fees

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#### Introduction, scope and main objectives

The contemporary concept of botanical garden pioneered in Italy, specifically at the University of Pisa, was solely constructed for the scientific study of medicinal plants. A botanic garden is an institution with documented collections of living plants for the purpose of scientific research, conservation, display, and education (Botanic Gardens Conservation International (BGCI)). These gardens play an important role in conserving rare and threatened plants (Mounce et al., 2017), and are also vital in the preservation of plant species necessary for human use and well-being (Waylen, 2006; Dunn, 2017).

Through the years, the role of botanic gardens continues to expand to provide the needs of society, horticulture and propagation, research and development, public education, and preservation of indigenous local knowledge (BGCI, 2019). The study of Golding et al. (2010) indicated that there are about 2500 botanical gardens locally and internationally. These gardens nurture about 6 million living plants representing 80,000 taxa, which demonstrate their fundamental role in *ex situ* conservation and supporting global plant biodiversity (Jackson 2001; O'Donnell and Sharrock, 2017). Apart from this, their eminence in public education expanded when people started to consider botanic gardens as a place of entertainment, and recreation (Oldfield, 2007), and have acquired economic value in terms of the recreational experiences they provide (Demir, 2017).

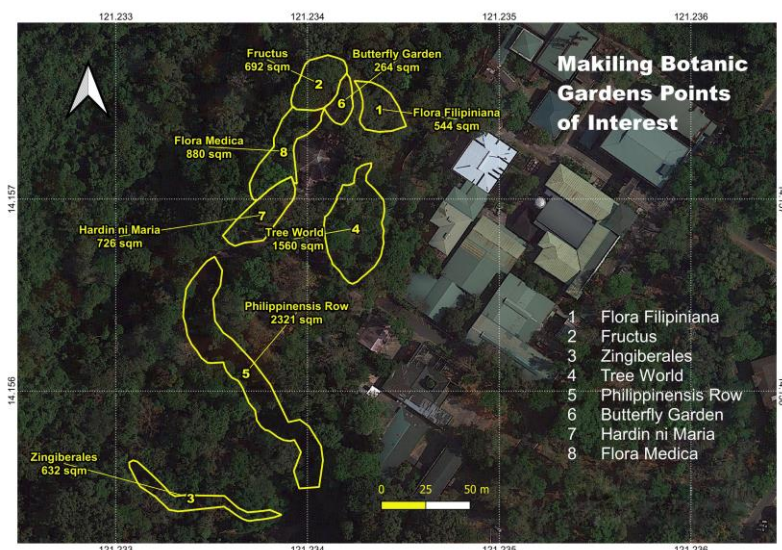
The value given to obtain these recreational activities is reflected as the price or the economic value of botanic garden (Demir, 2017). Botanic gardens are collections of various plant species, a great number of which are priceless but not valueless (Oldfield, 2010). Perceived value for such services can be elicited through a willingness to pay survey.

This study determined the value of ecotourism resources for the Makiling Botanic Gardens (MBG) using the contingent valuation method. MBG is one of the ecotourism points of interest in the Mount Makiling Forest Reserve ASEAN Heritage Park (MMFR AHP). Similar to the other botanic gardens, MBG serves as a living collection and sanctuary of endemic and endangered plant species in the Philippines and promotes public awareness and appreciation of biodiversity through conservation education. Evidence of the demand is reflected in the recorded number of visitors (41,281) every year. In an effort to better manage the growing number of visitors to MBG, the authors sought to estimate the willingness to pay of visitors for its enhanced conservation.

## Methodology/approach

### 1. Study area

The study area is the (MBG) situated in the Municipality of Los Baños in Laguna that occupies 300 hectares of natural and re-growth forests on the northeastern slope of Mount Makiling in the College of Forestry and Natural Resources (CFNR) campus (Fig 1). The MBG was established on 20 June 1963 under Republic Act 3523, and primarily aims to support professional instruction and research related to forestry and plant sciences and to serve the educational, recreational, and tourism needs of the public (Bantayan et al., 2013). MBG has 21 points of interest: Zingiberales, Flora Medica, Fructus, Flora Filipiniana, Tree World, Medinilla Garden, Figs and Bread Fruit, Philippinensis Row, Butterfly Garden, Hardin ni Maria, Bambusetum, Palmetum, Toyota Palm Garden, Dipterocarp Arboretum, Eco Trail, Molave Plantation, Rainforest Biodiversity Diorama, Water Cascades, MBG Circle, Molawin Creek, and Birds of Mount Makiling that are directly managed by the Makiling Center for Mountain Ecosystems (MCME) of University the Philippines Los Baños, CFNR.



**Fig. 1:** Points of Interest in Makiling Botanic Gardens in the province of Laguna, Philippines (Map by Nicopior, 2021)

## 2. Survey Design

The contingent valuation method (CVM) has been used to elicit consumer preference of goods and services that are not directly traded in the market (Jabarin & Damhoureyeh, 2006). The method involves directly asking people through a survey about their willingness to pay for a certain good or service.

The face-to-face survey was conducted in MBG from January 2020 to March 2020 using a structured questionnaire. To capture a reliable data on willingness to pay, the respondents were individual whose age was at least 18 years old with income or allowance. Before the questions were asked, the respondents were briefed on the purpose of the study and assured that information gathered would be treated with utmost confidentiality. The sample size was calculated based on 95% confidence interval and 5% margin of error. Given the limited time due to covid-19 pandemic, the total sample size was set at 279.

The structure of the survey questionnaire consists of four parts: (1) Respondent's Profile, (2) Knowledge, Attitudes, and Opinion towards MMFR AHP, (3) Contingent Valuation Scenario, and (4) Respondent's Use of MBG in MMFR Heritage Park. The CV scenario was presented as: "Suppose a fund will be created where visitors like you can contribute for the improved facilities, amenities, and conservation of MBG. This fund will be managed by MCME and will be used for the sole purpose of ensuring such improvements and maintenance in MBG. Your contribution for this as visitor will be collected through an amount that will be added to the current entrance fee of PhP 50.00/visitor/day." Based on a positive/yes response from this hypothetical scenario, five bid amounts (PhP 20, 50, 80, 100, and 150) were proposed as an additional fee. These bid amounts were identified using an open-ended question during the pre-test involving 30 respondents. Respondents were also asked to state their reasons why they were willing to pay or not.

## 3. Data Analysis

Completed questionnaires with extreme values were discarded and led to a final sample size of 253 responses. The boxplot method was used to determine outliers. Variables outside the interquartile range (IQR) were identified as outliers. The data were analyzed using the traditional binomial logit model that is highly used in dichotomous dependent variables (Mamat et al., 2013):

$$Li = \ln \{Pi/(1-Pi)\} = \alpha + \beta_i X_i$$

Where:  $Li$  is the log of the odds ratio/logit,

$P_i$  is the probability of WTP of  $i^{\text{th}}$  individuals, the

$X_i$  are the independent variables, and

$\beta$  is the corresponding unknown regression coefficients

Meanwhile, the mean willingness to pay was estimated using the predicted probability and logistic regression coefficients (Hanemann., 1989):

$$\text{Mean WTP} = - \left[ \frac{\alpha + (\beta_1 \times M_{X_1}) + (\beta_2 \times M_{X_2}) + \dots + (\beta_m \times M_{X_m})}{\beta_n} \right]$$

Where:  $\alpha$  : is the constant,

$\beta_1, \beta_2, \dots, \beta_m$  are the coefficient of variables.

$M_{X_1}, M_{X_2}, \dots, M_{X_m}$  are the means of variables; and

$\beta_n$  is the coefficient of bid amount.

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## Results

### 1. Sociodemographic Profile of Respondents

The respondents consisted of 135 males and 118 females accounting for 53% and 47% of the total tourists interviewed, respectively. About 68% live in Los Baños where MBG is also situated while the rest came from different cities and municipalities of the Philippines. Majority of the respondents were between 18-28 (39%) and 29-39 (34%) years of age. The computed mean age was approximately 34. About 89% of the respondents were employed and only 4% were students. In terms of highest educational attainment, 75% reached tertiary education. The mean monthly income was PhP23,361.08 (\$462.615) with 40% falling within the PhP 10,001-PhP20,000 (\$198-\$396) range.

### 2. Knowledge, Attitude, and Opinion about MBG and MMFR

Respondents were asked about their knowledge, attitude, and opinion about MBG. Majority (51%) of the respondents heard about MBG through friends and relatives. Others got their information from their schools (26%), internet (20%), printed materials (9%), social media (6%), and tv/radio (0.4%). When asked about the benefits MBG provides, 88% were aware of the benefits derived from MBG with 43% getting the information from friends and relatives, 30% from school, 17% from the internet, 10% from social media, 6% from printed materials, 2% from tv/radio, and 12% from other sources. Among the benefits mentioned were fresh air (66%), enjoyment (51%), health benefits (51%), educational/instructional benefits (39%), and others (2%).

Respondents were further asked if they were aware of the MMFR and MBG being part of it. Sixty-six percent (66%) knew that MBG is part of MMFR, majority of which got their information from friends and relatives. To provide context as to the importance of MMFR, respondents were asked if they were aware that MMFR has been declared as an ASEAN Heritage Park. Results showed that majority (56%) did not know of the declaration. Majority (16%) of those who heard about the declaration got the information from their schools.

To establish the willingness to pay of the respondents, they were asked first about the importance of the proper management of MBG to them. About 99% said that it is important to properly manage the MBG. The main reason stated was for fresh air (70%), followed by enjoyment (61%), biodiversity conservation (48%), and other reasons (5%) such as educational reasons, MBG's significance to human recreation and wildlife, and health benefits. The two respondents who did not find the proper management of MBG important said that MBG is already in good condition, hence no need to change management practices.

### 3. Factors Associated with Willingness to Pay

Given specific bid amounts, respondents were asked if they were willing to pay an additional amount for improved amenities and facilities in MBG. The elicited WTP was PhP 73.79 (\$1.64) on top of the current entrance fee of PhP 50.00 (\$1)/visit. About 79% or 200 visitors were willing to pay mainly because they acknowledged that it is their duty to contribute to improve MBG's amenities and facilities with 33% stating this as their main reason. Other reasons were (1) the desire to conserve MBG (31%), (2) they care a lot about MBG (28%), (3) they want the future generations to have a good experience in MBG (23%), (4) they feel satisfied knowing they contributed in protecting and conserving MBG (21%), and (5) they want continuous provision of environmental services (18%). Meanwhile, 21% or 53 of the total respondents expressed their unwillingness to pay for the bid amount assigned to them mainly because the bid amount assigned to them was too high. Other reasons include (1) cannot afford to pay, (2) MBG to stay as it is, (3) government should pay for it, (4) others may not be able to pay for an additional amount, (5) lack of trust in the management that will administer the fund, and (6) does not care for MBG.

Ten variables were tested in terms of their association to respondents' willingness to pay at 1%, 5%, and 10% levels of significance, as shown in Table 1. The significant factors affecting visitors' WTP were bid amount, income, and education. Bid amount is significant only at 10% level of significance while income is significant at 5% level of significance. The most significant variable in terms of its association to WTP is education which is significant at 1% level of significance.

**Table 1:** Correlation coefficient of variables associated with WTP

Variables	Coefficient	P>z
Age	-.0062561	0.696
Sex	.4783421	0.165
Education	.0892341	0.005***
Civil Status	-.4255678	0.198
Income	4.19e-06	0.012**
Address	-.8433763	0.234
Benefits awareness	.0128385	0.978
AHP awareness	-.0744661	0.832
Frequency of visit	-.0038005	0.992
Bid amount	-.0052319	0.054*
_cons	1.213709	0.063

\*\*\*significant at 1%, \*\* significant at 5%, \* significant at 10%

Also shown in Table 1 is the relationship of each variable to the respondents' WTP. Age, civil status, address, AHP awareness, frequency of visit, and bid amount showed an indirect relationship which means that any increase in the value of these factors will lead to a decrease in the probability of a "yes" response to willingness to pay question and their willingness to pay and vice versa. On the other hand, sex, education, income, and benefits awareness showed a direct relationship, which means that an increase in the values of these factors will also lead to an increase in the probability of a "yes" response to willingness to pay question and the respondents' WTP and vice versa. Of the three significant variables, education and income have a direct relationship with the probability of a "yes" response to willingness to pay question. The higher education attained and the higher the income is, the more likely is the respondent willing to pay. Meanwhile, bid amount showed an indirect relationship which means that the higher the bid amount is, the lower is the probability of a "yes" response to the WTP question.

## Discussion

Value for ecotourism services can be determined by visitors' personality and behaviour, and how they appreciate the value of nature. MBG is the most accessible part of MMFR hence it receives the greatest number of visitors among the tourism spots in MMFR. With MMFR becoming the center of ecotourism development and management in the CALABARZON Region and its declaration as the 33<sup>rd</sup> ASEAN Heritage Park, it gained popularity among academic institutions, government agencies, and private companies as site for recreation, research, and other activities. MCME continuously strategizes on further improving the recreational services that MBG offers while conserving the natural resources within. Apart from the cost of maintaining a botanical garden, perceived value of its visitors should also be factored in when determining the total value of the ecotourism services it provides. From the year 2000 to 2017, the entrance fee rates in MBG were Php20.00 (\$0.4) per person. It was only in 2018 when MBG started increasing its rates yearly. Currently, MBG's entrance fee rate is at Php 50.00 (\$1). This study assessed the sociodemographic profile and perceptions of selected visitors in MBG to determine the factors affecting their willingness to pay for an additional amount to improve MBG's amenities and facilities.

Results showed that while majority (99%) of the respondents were aware of the importance of improving the management of MBG, only 79% were willing to pay an additional amount to improve MBG's amenities and facilities. According to the survey, the 21% who expressed their unwillingness to pay acknowledged the importance of MBG to them but were limited by the assigned bid amount and sociodemographic factors such

as income. Aside from stating that they could not afford to pay the assigned bid amount, which was too high for them, they also felt that others would not be able to pay such amount. This was evident in the statistical analysis that showed income, bid amount, and education as significant factors associated to the WTP of respondents. Educational attainment appeared to be the most significant factor even at 1% level of significance and showed a direct relationship with respondents' WTP. This means that the higher the educational attainment is, the more likely the respondent will be willing to pay. About 75% of the respondents interviewed finished their tertiary education or took a vocational course. Education plays an important role in developing and shaping the nation and was even included as one of the Sustainable Development Goals. In 2008, the country enacted RA 9512 or the National Environmental Awareness and Education Act which aimed to incorporate environmental awareness into the country's educational system (Chandran et al. 2017). This partly explains the influence of education in caring for the environment and the respondent's recognition of their duty to conserve and protect the environment.

Income was also a significant factor at 5% level of significance. The average monthly income of respondents was PhP23,361.08 (\$462.615). Majority (65%) of the respondents have incomes falling within the PhP10,001-30,000 range (\$198-\$594). Income showed a direct relationship to WTP which means that as income decreases, the probability of a "yes" response to willingness to pay question also decreases. This is understandable as demand for a particular good or service is defined as the need or want backed by an ability to pay. The willingness to pay method does not only factor in need or want for a product or service but also the ability to pay of the respondent. This explains why most of the respondents who were unwilling to pay stated that they could not afford to pay the additional amount. This is also related to the third significant factor which is bid amount, which was significant at 10% level of significance and showed an indirect relationship to WTP which means that as the bid amount increases, the probability of a "yes" response to willingness to pay question decreases. Evidently, some respondents who were unwilling to pay said that their reason for saying no was that the price or bid amount randomly assigned to them was too high.

Based on the statistical analysis conducted, the elicited mean WTP is PhP73.79 (\$1.46) on top of the current entrance fee of PhP50.00 (\$1)/visit. That is 147.58% increase from the current fee of PhP 50.00 (\$1). Since majority of the respondents answered favorably to paying additional amount, the WTP study can be used as a basis for proposing an increase in the entrance fee rates. This will support the additional amenities and facilities for increased recreational benefits.

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## **Conclusions/ wider implications of findings**

In general, majority of the respondents already have prior knowledge about MBG and the benefits it provides. Most of them got the information from their friends or relatives. There was also a high level of environmental awareness among the respondents as almost 100% agreed that it is important to properly manage MBG. This was also evident in the high number of respondents willing to pay (79%) for its improved amenities and facilities mainly because they feel a sense of responsibility in maintaining the integrity of the garden and ensuring that future generations will still benefit from the services it provides. Bid amount, income, and education were the significant factors affecting the WTP of respondents. Given the elicited mean WTP added to the current entrance fee and the average number of visitors of MBG (41,281) annually, the potential revenue of MBG if the WTP will be captured is about PhP 6.3 million annually (\$124,758). This amount can significantly support the efforts of MCME in sustaining and even improving its operations in MBG in accordance with the management plan of MMFR. Results of the study can serve as a reference in adjusting the entrance fee of the MBG to support the full implementation of MMFR's management plan in the context of an ASEAN Heritage Park.

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